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Tourist Accommodation Demand *vs.* Blue Flag Award: Review and a Simple Empirical Approach to Bivariate Trends in the South-East of Spain

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Abstract

An analytical review of the literature on the effect of the Blue Flag eco-label on tourism demand reveals clear divergences. Certain free sources provide valuable panel data to study trends over time in Blue Flag awards to beaches, on one side, and the demand for accommodation in bathing season, on the other. These data also serve as a basis for the construction of correlation models, such as the simple approach tested here in a representative territory of sun&beach tourism, on the south and east coasts of Spain. As a result, these two variables follow a similar trend, and the Blue Flag seems to influence the inflows of both foreign and domestic tourists to that destination. Nonetheless, for the sake of consistency, factors other than Blue Flag should be considered, and the study period extended.

Keywords: blue flag, sun&beach tourism, tourist inflows, beach demand, destination competitiveness.

Introduction

Voluntary environmental certifications have speeded on products and services, as the manifestation of industry efforts to become or be perceived as environmentally-friendly. One of the industries where eco-labels are commonplace is tourism. This is no surprise, as the quality of the environment, both natural and man-made, is essential to tourism, and there is hardly any tourist activity that does not rely on environmental resources in some way. As landscapes, beaches, water quality or air quality are part of nature-based tourism, destination competitiveness and some economies heavily dependent on tourism can be disrupted because of environmental problems, such as the pollution of bathing water in highly populated or industrialized areas.

A world-renowned award for beaches is the Blue Flag. Founded in 1987, the Blue Flag programme is operated under the auspices of the Foundation for Environmental Education, and is headquartered in Copenhagen, Denmark. The programme was enlarged outside Europe, then becoming the International Blue Flag in 2001. The number of beaches awarded the Blue Flag has increased over the years. More than 4,800 beaches, marinas and boating tourism operators have been granted the Blue Flag in around 50 countries. The Blue Flag and its partnerships are contributing to the sustainable development goals for 2015-2030 agreed at the United Nations in 2015 (FEE, 2022).

Attaining the Blue Flag can be cumbersome and costly. In order to qualify for this prestigious award, a series of stringent environmental, educational, safety-related and access-related criteria must be met and maintained. After submitting an application in the autumn period, municipalities commit to have clean bathing water in their beaches, to provide showers, lifeguards, signage, as well as to engage in environmental plans referred to water and waste management, energy consumption, health and safety issues, or the use of environmentally-friendly products wherever possible. Once the Blue Flag is awarded, water tests should be conducted to ensure a clean beach throughout the season (FEE, 2022).

Research has been carried out on people's awareness towards beach awards. In the United Kingdom, Nelson *et al*. (2000) found 49% of respondents stating to be aware of beach awards and rating schemes, whereas Tudor and Williams (2006) and McKenna *et al*. (2011) came to a 58%. Since not all studies place the sole focus on Blue Flag, many suggest that this one is scoring the highest out of all beach awards: House and Herring (1995), Tudor and Williams (2006), Nelson and Botterill (2002), or McKenna *et al*. (2011). In surveys performed in South Africa, Nahman and Rigby (2008) and Lucrezi *et al*. (2015) came to a 50% and a 70% Blue Flag awareness rate, respectively. Quintela *et al*. (2009) and Marín *et al*. (2009) obtained higher rates in Portugal, 81.9%, and in Italy, 81%, respectively. Eventually, Aliraja and Rughooputh (2005) claim that the Blue Flag has turned out to be a very recognized symbol in Europe; tourists and tour operators identifying it as a symbol of clean, safe, and environment-friendly managed coastal areas.

Since beach certification schemes are usually applied in the form of awards, they are considered not only an environmental management tool but also play a valuable marketing role for communicating information and influencing tourists' choice. Thus, it can be a means of promoting and improving coastal destinations' competitiveness (Mir-Gual *et al*., 2015; Klein & Dodds, 2018; Ulme *et al*., 2018). Dodds and Holmes (2020) also conclude that beach certification is a signal of indirect competitiveness, although it depends on external factors such as tourists' awareness of it, the perception of favourable beach attributes, and the socio-demographic background of the tourists.

Indeed, some studies have been aimed to find out the effect of Blue Flag on beaches demand and tourist destinations' competitiveness. More than two decades ago, Thomsen (2001) reported an increasing number of tourists asking for Blue Flags, when deciding about their holiday destination. The same way, Marrocu and Paci (2013) and Capacci *et al*. (2015) point out that beach quality certifications such as the Blue Flag have a positive role in tourists when selecting a beachside destination in Italy. Ultimately, findings in Castillo-Manzano *et al.* (2020) suggest that Blue Flags are effective at promoting international 'sun-and-sand' tourism but not domestic tourism in Spain. Opposite results come from Cerqua (2017) for Italy, and Saayman and Saayman (2017) for South Africa, who find effect on domestic tourism but not on the flow of international tourists.

On the other hand, Nelson *et al*. (2000), Quintiliani (2009), McKenna *et al*. (2011) and Geldenhuys *et al*. (2014) concluded that beach visitors do not take the Blue Flag status much into account when selecting a beach. Nahman and Rigby (2008) gathered that the main reason for visiting a beach is habit rather than environmental features. More recently, Cabezas-Rabadán *et al*. (2019) determine that the Blue Flag award had little influence on the choice of six award-winning beaches in the province of Valencia (Spain), revealing at the same time a lack of understanding of the scope of the certification. Finally, based on a survey conducted on two beaches in Spain, Rijnen (2021) concludes that the presence of the Blue Flag does not play a significant role in the beach selection process, although many aspects that fit the Blue Flag criteria are rated as such, e.g. the cleanliness of both the sea and the beach.

There are who even found a negative relationship between the Blue Flag and the beach choice, as this award may be seen, paradoxically, as a sign of harm rather than one of quality. This way, Morgan (1999) and Duck *et al*. (2009) and Arıca (2022) found that the implementation of Blue Flag can result in additional tourist amenity infrastructure. Precisely, as many of the Blue Flag' criteria are focused on waste and water, sand, and air quality, some people may believe that it brings excessive visitors, development, and infrastructure (Lucrezi & Saayman, 2015; Arıca & Ukav, 2020).

As appears from the above, and in the opinion of authors as Bernini and Cerqua (2020), there seems to be no clear consensus in the academic literature on how effective Blue Flag is at encouraging tourism demand, with researchers advocating positive, non-existent, and even negative effects on beach choice. Presumably, those effects change over time, as society becomes increasingly concerned with environmental issues. Short- and long-term patterns of tourism demand have been addressed with univariate and bivariate decomposition frameworks, extensively being used to isolate trends and cycles (Hassani *et al.*, 2015; Li & Law, 2019; or Ridderstaat & Croes, 2017). These trends or tendencies, or the lack thereof, are relevant for many stakeholders in the tourism industry, as being beyond their influence. As a result, it seems relevant to go on studying whether the Blue Flag awards influence the selection of tourist destinations; whether Blue Flag adds to destinations' competitiveness, thereby adding value to the tourism industry.

In this study, a simple bivariate model is used to address the trends over time and the possible correlations between Blue Flag awards to beaches, on the one hand, and the demand for accommodation of foreign and domestic tourists, on the other. In doing so, the limitations that such an endeavour may face are highlighted. For that purpose, certain free sources have provided valuable panel data not only on the location and number of Blue Flag beaches, but also on characteristics or attributes such as their size. In an attempt to attenuate the unequal effects of the omitted variables, geographic and sociodemographic similarities have been sought in a representative territory of sun and beach tourism, on the southern and eastern coasts of Spain. Compared to other studies on this topic, the widely used variable *overnight stays in hotels* has been enlarged with two more types of accommodation. In addition, annual overnight stays have been shortened to just the bathing season, so as to more accurately match tourists with beachgoers.

Methods and Data

Methods

Panel data, made of repeated observations over time on the same set of cross-sectional units, have been applied widely to tourism research, to analyse the dynamics of change. Panel data offer more accurate inferences than cross-section data, being more suitable to control the impact of omitted variables (Hsiao, 2007). The basis for many panel data econometric methods is linear models, ordinary least squares applied to suitably transformed data. Ordinary least squares regression is a common technique for estimating coefficients of linear regression equations which describe the relationship between one or more independent quantitative variables and a dependent variable. A comprehensive review about these methods can be found in Arellano (2003), Baltagi (2008), Wooldridge (2009) or Siegel (2016).

Once relevant data were available annually, dynamic panel models on tourism demand speeded: Ledesma-Rodríguez and Navarro-Ibáñez (2001), Naude and Saayman (2005), Garín-Muñoz (2006), Garín-Muñoz and Montero-Martín (2007), Taylor and Ortiz (2009), Brida and Risso (2009), Habibi *et al*. (2009), Kuo *et al*. (2009), Yazdi and Khanalizadeh (2016), Dogru *et al*. (2017), Gallego *et al*. (2018), or Albaladejo and González-Martínez (2019). Castillo-Manzano *et al*. (2020) develop an extensive econometric analysis of panel data in the Spanish coastal provinces, to compare the impact of the Blue Flag award on foreign and domestic tourism demand.

Panel data analysis has been applied to the case study presented below, with the aim of approaching the possible relationship between Blue Flag awards and accommodation figures, in five geographical units on the southeast coast of Spain, and the time period 2012-2019. This panel data is a subset of longitudinal data, where observations are, on the one hand, the number of overnight stays in the bathing season (OS) each year, and, on the other hand, the number of beaches that were awarded the Blue Flag (BF) the previous year. The same time period (one year) is available for each cross-sectional unit, so the panel dataset is balanced.

The investigation proceeds as follows. At first, trends in the univariate temporal series for both beaches awarded the BF and OS separately were observed. Secondly, the trends association along the time series between the two variables was analyzed. Then, bivariate data were explored using the scatterplot of OS against BF, providing a visual picture of the relationship in these data. A regression analysis among them was performed by using the least squares method to fit lines through the set of observations, checking different trend lines by means of their R-square values and standard errors. The Analysis ToolPak in MsExcel package was used to perform the regression analysis. Ultimately, a statistic parametric procedure, the t-Student test, was used to assess the null hypothesis of no association between the two variables. The statistical significance of the trends correlation was assessed by means of the confidence level resulting from a two-sided test.

Initially, a standard panel data regression model was used to correlate overnight stays with the presence of BF each year. Nevertheless, suitable regression results from it were not met. Since the beaches awarded the same year of traveling does not seem to be relevant for planning vacations, the number of beaches awarded BFs the previous year was tried instead. By doing so, the results are much better. This is logical, as BF awards are announced around the month of May, when many travellers have already planned their vacation trips. The same reasoning has been applied to other studies of this kind, e.g., Capacci *et al.* (2015) and Castillo-Manzano *et al*. (2020).

Thus, the regression model finally applied here is $Y_{it} = \mu_i + \beta_i \cdot X_{it-1} + \varepsilon_i$, where the subscript i denotes geographic units (tourist areas) and t time (years). Y_{it}, the dependent variable, stands for the number of overnight stays in hotels, tourist apartments and campsites, in each year's bathing season. X_{it-1}, the independent variable, stands for the BF awards every year before the accommodation figures are taken. μ_i and β_i are coefficients. ε_i stands for the error term, which can be viewed as consisting of two aggregates of unobserved factors, one time-varying and another that do not change over time. Assumptions that could be made about the error term would induce fixed effects or random effects.

This way, in this model the response subject of Y_{it} to a certain X_{it-1} would tend to be similar to responses in previous years. That is, a steady behaviour of subjects apart from BFs is here assumed to be constant over time. However, other factors than BF which are not been measured may influence the expected tourist inflows: destinations' facilities, business practices, social matters, local government, or even tourists' culture and past experience. The uniqueness of each destination in the sample is captured by μ_i, which gathers the unobserved factors or heterogeneity. Therefore, μ_i stands for the reductionism and limitations of the regression model, all the time suggesting a potential solution to the problem of omitted variables and measurement errors in data (as highlighted by Seetaram & Petit, 2012).

Due to the very different size of beaches along the coastline of the study region, the percentage of BF beach area has also been addressed as independent variable. This might rise a more accurate representation of the beaches demand, as the size and subsequent crowding of a beach is a relevant factor for beachgoers, even more than just the length of coastline, considered in Álvarez-Díaz *et al*. (2020). It is clear that the regressions yield the same results using the "original" data as when percentages of either beaches or beach area are used, since these ones result from dividing the previous ones by a constant.

Data

The Blue Flag website (FFE, 2022) provides the beaches awarded the BF, in any country. These data for Spain, since 2007, can be downloaded from BA (2022). In addition, the Spanish Ministry of Environmental Affairs has an online database on Spanish beaches, where apart from the presence of BFs, plenty of information related to beach type, size, access, facilities or environment is given (MITECO, 2022). These last two sources have been used for the purpose of this study.

Beach demand has been approached through overnight stays in hotels, rental flats and campsites in the five coastal tourist areas that make up the case study. These data have been obtained from the Spanish National Statistics Institute (INE, 2022). This source defines a "tourist area" as a set of municipalities in which the tourist influx is specifically located. As an only case, the tourist area of Costa de Valencia does not include the municipality of Valencia, despite being on that coast. Because of this, neither the beaches nor the overnight stays in this municipality have been included in the study. It is worth saying that, once the population of the municipality of Valencia is discounted, the remaining population for this province gets much closer to those of the other four –making the tourist areas much more comparable.

An overnight stay is understood to be each night that a traveller stays in a lodging establishment that provides collective accommodation services in exchange for a payment. The statistical units of analysis are all the hotels, tourist/rental apartments and campsites registered as such in every region where the study area is included. A tourist apartment is one whose use is rented on a regular basis for occasional accommodation. Hotel establishments are classified according to their category in gold and silver, and within these by the number of stars. The campsites are classified into three categories. The category of establishments is assigned by each regional government.

Nevertheless, it has not been possible to include rural accommodation, hostels, inns or guesthouses, since, for these typologies, INE does not offer available data on overnight stays in tourist areas. Although the number of guests in those establishments is much lower than the ones accounted for the other three groups of lodging, the omission of those types could cause the estimated demand for the Blue Flag to be lower than it could be.

Case study

When it comes to sun&beach tourism, Spain has a prominent role, as it has a long coastline with pleasant beaches. Yet land management in Spain has not always been successful for years, neither urban development nor tourism planning have proven to be very effective or sustainable in many places, moreover along the Spanish shoreline. And the examples are there to see, mostly near seasonally busy beaches in highly crowded areas.

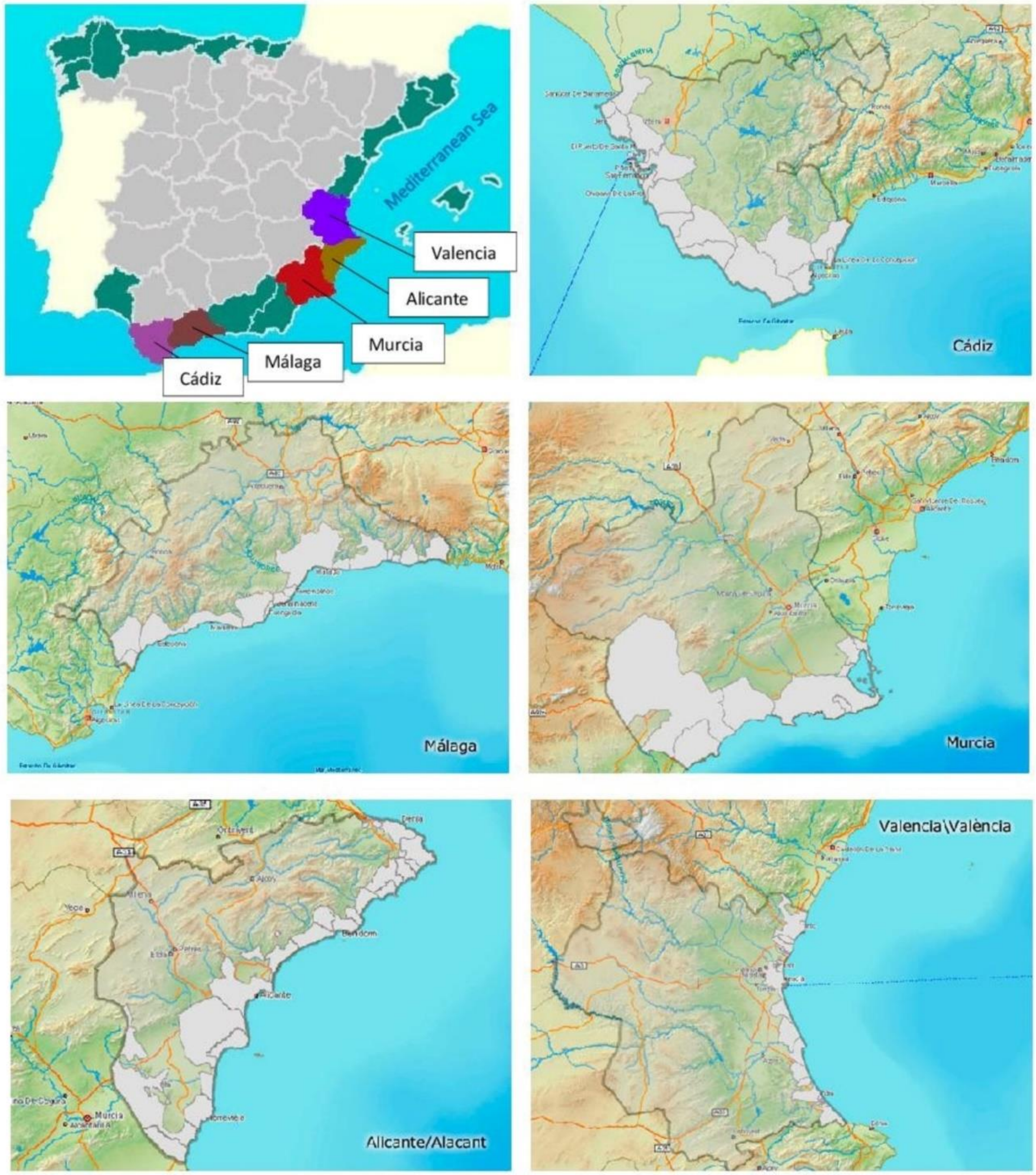
Being the second most visited nation in the world, after France, the Spanish economy is highly dependent on the tourism industry. Before the pandemic, between years 2012 and 2019, tourism contributed between 10.7 and 12.4% to the total GDP of Spain, constantly increasing (11.4% on average). In addition, this sector represented 12.1 - 12.7% of total employment, also on the rise from 2015 to 2019 (INE, 2022).

From this, it may not seem weird that since many years ago, Spain has become the country that boasts the largest number of Blue Flag beaches (614 in 2021, according to FFE, 2022), and that number is increasing every year. All of it explains the growth in the number of studies in Spain that address the issue of sustainable tourism, eco-labels and, specifically, Blue Flag certification (see f.e., Blancas *et al*., 2010; Roig-Munar *et al*., 2018). However, few studies address the impact of accreditation on tourism demand (i.e. tourist inflows).

Five tourist areas in the south and east of Spain, mostly on the Mediterranean coast, have been chosen as a case study. These areas are the coastlines of the provinces of Cádiz, Málaga, Murcia, Alicante and Valencia (see Figure 1). These five provinces gathered 170 beaches awarded the Blue Flag in year 2019, 25.91% of all beaches there. The selection of these areas has been made in view of their similar geographic, climatic and socioeconomic conditions, as well as their population and environmental pressure, in order to regard them as comparable.

Accordingly, the Balearic Islands have not been added, owing to the island effect (trips are fairly subjected to prices), the great popularity it has on foreigners and the fact that tourism there is a major economic driver, with or without BFs. The province of Barcelona has been disregarded too, because of the much greater population and the much bigger economic activity there. Opposite reasons support the fact of ruling out the provinces of Almería, Granada, Castellón, Tarragona and Gerona, much less populated and better preserved than the ones selected. The following maps show the study area finally chosen.

Figure 1. Provinces and Coastal Areas in Spanish, Selected for the Case Study



Source: MITECO (2022).

To study the BF demand for these destinations, a period of time has been set. The eight years between 2012 and 2019 have been deemed convenient, with the intention of avoiding two big shocks or economic downturn that made the number of tourists recede greatly. On one hand, the global economic recession mainly from 2007 to 2009, but extended longer in Spain and other countries, after the bursting of the housing bubble and the global financial crisis. On the other hand, the Covid-19 pandemic, which started in March 2020 and has been badly affecting tourism till now, with unprecedented global travel restrictions and stay-at-home orders. Tables 1 and 2 depict the number and area of BF beaches throughout this time series, in the provinces and coastal areas chosen as case study.

The demand for beaches has been measured by means of the number of overnight stays in those tourist areas, as indicated before. Thus, overnight stays of clients staying in hotels, rental flats or campsites in bathing season has been used as a proxy variable to infer the attraction exerted by the beaches on stay visitors. Either, in connection to the beach size, that variable could produce an occupation rate of the beaches by those clients (overnight stays per beach hectare or km^2). Overnight stays in the series 2012-2019 are given in table 3, both annually and in bathing season from June 1 to September 30, also depicting the numbers of Spanish tourists and foreign tourists.

Table 1. Number and percentages of Blue Flag beaches in the study area, between 2012 and 2019

Province	**Coastal area**	**Beaches**	**2012**		**2013**		**2014**		**2015**		**2016**		**2017**		**2018**		**2019**	
Alicante	Costa Blanca	179	55	37,41 %	58	38,93 %	60	37,50 %	60	35,71 %	62	36,26 %	64	38,55 %	68	39,08 %	71	41,76 %
Cádiz	Costa De La Luz	85	23	15,65 %	27	18,12 %	27	16,88 %	27	16,07 %	25	14,62 %	30	18,07 %	32	18,39 %	32	18,82 %
Málaga	Costa del Sol	135	23	15,65 %	21	14,09 %	21	13,13 %	22	13,10 %	23	13,45 %	24	14,46 %	25	14,37 %	18	10,59 %
Murcia	Costa Cálida	200	26	17,69 %	23	15,44 %	30	18,75 %	35	20,83 %	39	22,81 %	24	14,46 %	25	14,37 %	25	14,71 %
Valencia	Costa de Valencia	57	20	13,61 %	20	13,42 %	22	13,75 %	24	14,29 %	22	12,87 %	24	14,46 %	24	13,79 %	24	14,12 %
Study area (total)		*656*	*147*	*22,41 %*	*149*	*22,71 %*	*160*	*24,39 %*	*168*	*25,61 %*	*171*	*26,07 %*	*166*	*25,30 %*	*174*	*26,52 %*	*170*	*25,91 %*

Source: Own elaboration from BA (2022).

Table 2. Area and Percentages of Blue Flag Beaches in the Study Area, between 2012 and 2019

Province	**Coastal area**	**ha**	**2012**		**2013**		**2014**		**2015**		**2016**		**2017**		**2018**		**2019**	
Alicante	Costa Blanca	402,33	240,09	59,67 %	257,11	63,91 %	262,71	65,30 %	269,46	66,97 %	277,37	68,94 %	277,05	68,86 %	278,94	69,33 %	276,81	68,80 %
Cádiz	Costa De La Luz	946,62	230,48	24,35 %	230,58	24,36 %	247,68	26,16 %	262,18	27,70 %	231,79	24,49 %	275,43	29,10 %	272,34	28,77 %	272,34	28,77 %
Málaga	Costa del Sol	391,46	95,39	24,37 %	99,12	25,32 %	112,55	28,75 %	118,35	30,23 %	105,65	26,99 %	126,51	32,32 %	133,51	34,11 %	81,49	20,82 %
Murcia	Costa Cálida	249,10	52,60	21,12 %	45,23	18,16 %	59,63	23,94 %	65,49	26,29 %	74,62	29,95 %	47,69	19,14 %	48,39	19,42 %	48,39	19,42 %
Valencia	Costa de Valencia	346,81	165,09	47,60 %	172,72	49,80 %	172,05	49,61 %	189,05	54,51 %	179,65	51,80 %	189,81	54,73 %	189,81	54,73 %	189,81	54,73 %
Study area (total)		*2.336,33*	*783,65*	*33,54 %*	*804,76*	*34,45 %*	*854,61*	*36,58 %*	*904,52*	*38,72 %*	*869,07*	*37,20 %*	*916,50*	*39,23 %*	*922,99*	*39,51 %*	*868,84*	*37,19 %*

Source: Own elaboration from MITECO (2022).

Table 3. Overnight Stays (in thousands), Annually and in Bathing Season, in Hotels, Rental Flats and Campsites, between 2012 and 2019

	2012	2013	2014	2015	2016	2017	2018	2019
Annual overnight stays	54.487	57.963	60.443	64.012	69.223	71.188	70.487	70.900
*Overnight stays in bathing season**	*28.210*	*29.946*	*30.550*	*32.083*	*34.107*	*34.921*	*34.351*	*34.849*
Hotels	19.332	20.389	20.621	21.401	22.433	22.428	22.352	22.714
Rental flats	6.257	6.867	7.097	7.543	8.244	8.840	8.201	8.204
Campsites	2.620	2.690	2.833	3.139	3.430	3.653	3.798	3.930
Spanish tourists	14.404	14.751	15.168	15.464	15.539	15.257	15.647	16.479
Foreign tourists	13.806	15.195	15.382	16.619	18.568	19.665	18.703	18.370

Source: Own elaboration from INE (2021

Note: Overnight stays in bathing season throughout the period accounted for 49.25% of the annual overnight stays. In terms of Spanish tourists, it represents 58.10%, while concerning foreign tourists, it makes 43.95%. * From June 1 to September 30.

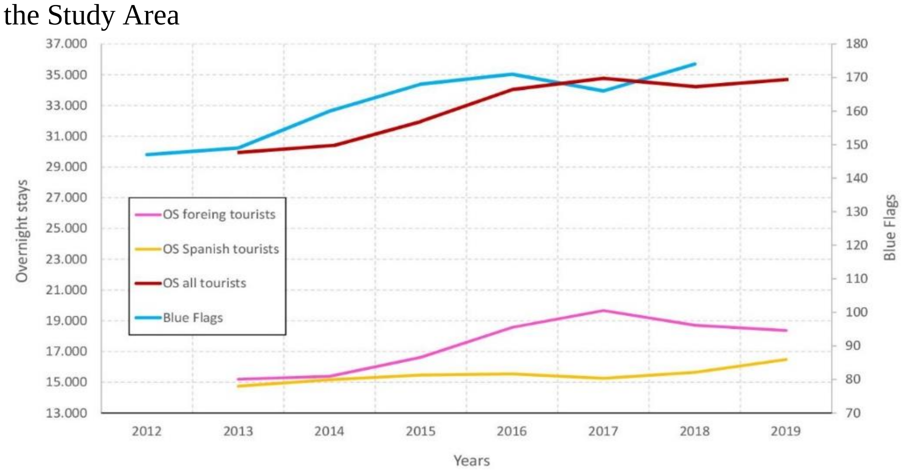
Results

In view of the tables above, one can see that BF numbers and overnight stays follow a common pattern, provided that BF is lagged or delayed one year. That is to say, these two variables vary accordingly or follow a similar trend, as shown in figure 2. This support the common idea that the number of beaches awarded BFs the previous year are more relevant for planning vacations than the beaches awarded the same year of traveling.

According to that, the BF beaches in the year before traveling could be influencing tourist inflows, when the area is considered as a whole. This has also resulted for both the proportion of BF beaches and the proportion of BF beaches area, as independent variables. In spite of this, when the tourist areas are handled separately, the results do not show so much consistency, as it can be observed in the next two tables 4 and 5.

Analyzing both foreign and domestic tourist inflows separately, which is also shown in Figure 2, we can see that overnight stays of foreigners follow a trend similar to that of the number of BF beaches, except in the last year. On the contrary, the overnight stays of nationals remain fairly stable over the years (interannual variation of less than 12%).

Figure 2. Evolution of Overnight Stays in Bathing Season (in thousands) and Number of BF Beaches, in the Study Area



Source: Own elaboration

As an extension to the simple linear regression, the quadratic regression has been used to find the equation that best fits the set of data. These quadratic equations are also included in the following tables, coming out from the whole study area and from each of the coastal areas that make that whole. The coefficient of determination, R2, shows the proportion of the variation in the dependent variable that is predictable from the independent variable. The p-value is used to infer the strength of evidence against the null hypothesis of there being no relation between these variables, as the probability that there is no real effect among them below a certain threshold, which determines the level of significance or confidence level of this assumption.

Table 4. Regressions between Overnight Stays in Bathing Season (in thousands) and Proportion of BF Beaches in the Previous Year

Province	Coastal area	Linear regression*		R^2	St. error	T-test p-value	Confidence level (%)	Best regression**	R^2
		μ_i	β_i						
Alicante	Costa Blanca	2.765,57	282,04	0,5271	687,12	0,0647	93,53	Y_{it} = - 59430 + 3911,8·X_{it-1} - 52,74·X_{it-1}^2	0,6415
Cádiz	Costa De La Luz	2.109,15	78,63	0,5754	259,75	0,0481	95,19	Y_{it} = 4997,2 - 101,05·X_{it-1} + 2,766·X_{it-1}^2	0,5844
Málaga	Costa del Sol	7.277,09	273,24	0,2311	605,03	0,2748	72,52	Y_{it} = 40215 - 3633,1·X_{it-1} + 115,39·X_{it-1}^2	0,2661
Murcia	Costa Cálida	1.653,95	-0,055	$7\cdot10^{-6}$	67,44	0,9954	0,46	Y_{it} = 2597,9 - 127,3·X_{it-1} + 4,127·X_{it-1}^2	0,1618
Valencia	Costa de Valencia	362,70	52,99	0,6667	129,58	0,0250	97,50	Y_{it} = - 23653 + 1301,4·X_{it-1} - 16,129·X_{it-1}^2	0,8877
Study area (as a whole)		*1.488,41*	*1.273,79*	*0,9666*	*419,04*	*0,00007*	*99,99*	Y_{it} = - 25618 + 3507,9·X_{it-1} - 45,85·X_{it-1}^2	*0,9679*

* $Y_{it} = \mu_i + \beta_i \cdot X_{it-1} + \varepsilon_i$, where Y_{it} stands for the number of overnight stays in each year's bathing season, and X_{it-1} stands for the proportion of BF beaches every year before.
** $Y_{it} = \mu_i + \beta_i \cdot X_{it-1} + \gamma_i \cdot X_{it-1}^2$, where Y_{it} and X_{it-1} stand for the same variables as before. Source: Own elaboration.

Table 5. Regressions between Overnight Stays in Bathing Season (in thousands) and Proportion of BF Area in the Previous Year

Province	*Coastal area*	*Linear regression**		*R^2*	*St. error*	*T-test p-value*	*Confidence level (%)*	*Best regression*	*R^2*
		μ_i	β_i						
Alicante	Costa Blanca	-2.826,64	229,87	0,7794	469,28	0,0085	99,15	Y_{it} = 94418 - 2783,5·X_{it-1} + 23,274·X_{it-1}^2	0,8486
Cádiz	Costa De La Luz	1.157,62	131,57	0,5809	258,07	0,0464	95,36	Y_{it} = 19885 - 1284,5·X_{it-1} + 26,621·X_{it-1}^2	0,6077
Málaga	Costa del Sol	7.799,00	141,17	0,6497	408,37	0,0286	97,14	Y_{it} = - 8366,6 + 1264,8·X_{it-1} - 19,268·X_{it-1}^2	0,7423
Murcia	Costa Cálida	1.669,45	-0,722	0,0026	67,36	0,9135	8,65	Y_{it} = 2743 - 93,58·X_{it-1} + 1,945·X_{it-1}^2	0,1985
Valencia	Costa de Valencia	-378,47	54,28	0,5956	142,72	0,0421	95,79	Y_{it} = 42247 + 1682,5·X_{it-1} - 15,787·X_{it-1}^2	0,7633
Study area (as a whole)		*2.415,26*	*825,19*	*0,8506*	*886,81*	*0,0031*	*99,69*	Y_{it} = - 122748 + 7692,5·X_{it-1} - 93,853·X_{it-1}^2	*0,8778*

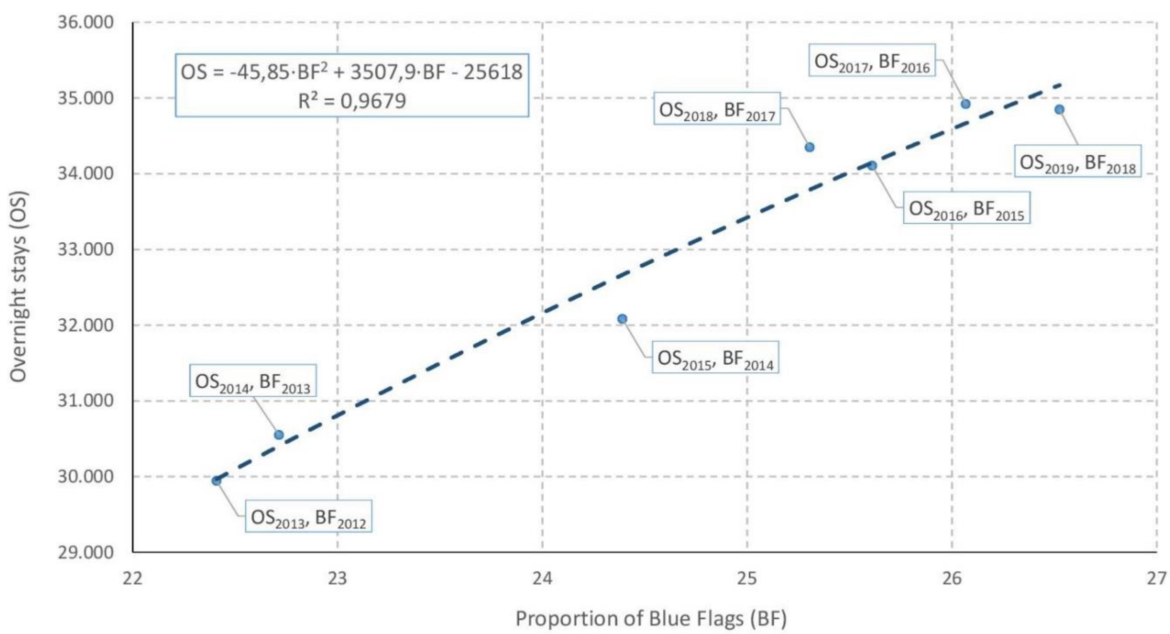
Source: Own elaboration.
* $Y_{it} = \mu_i + \beta_i \cdot X_{it-1} + \varepsilon_{i(t,t-1)}$, where Y_{it} stands for the number of overnight stays in each year's bathing season, and X_{it-1} stands for the proportion of BF area every year before.

As a result, when the five coastal areas are considered as a whole, the overnight stays in bathing season are better correlated with the proportion of Blue Flag beaches than with the proportion of beach area awarded the BF. Apart from the R2 to be higher for the first relation than for the second, the standard error of the predicted variable is more than twice lower. Nonetheless, in both regressions the outcomes are good enough to reject the null hypothesis of there being no relation between these variables (the regression coefficient βi being cero). What is more, the model shows statistical significance for a confidence level of more than 99.5%.

Individually, results show a weaker and uneven dependency. The case of Costa Cálida (Murcia) is outstandingly meagre. It is noteworthy that, unlike what happens to the entire study area, in four of the five cases analysed, the correlations yield better R^2 when the number of overnight stays are compared to the proportion of beach area awarded the BF, than to the proportion of Blue Flag beaches.

The following graph (figure 3) shows the regression that best fits this set of data: the quadratic regression found between overnight stays in bathing season and the proportion of beaches awarded the Blue Flag in the previous year. From this one and also from the linear regression, a clear anomaly is deduced, which is out of the general trend: the point OS_{2018} - BF_{2017} versus OS_{2016} - BF_{2015}. Overnight stays in 2018 are higher than those in 2016, whereas the number of BFs in 2017 is slightly less than in 2015.

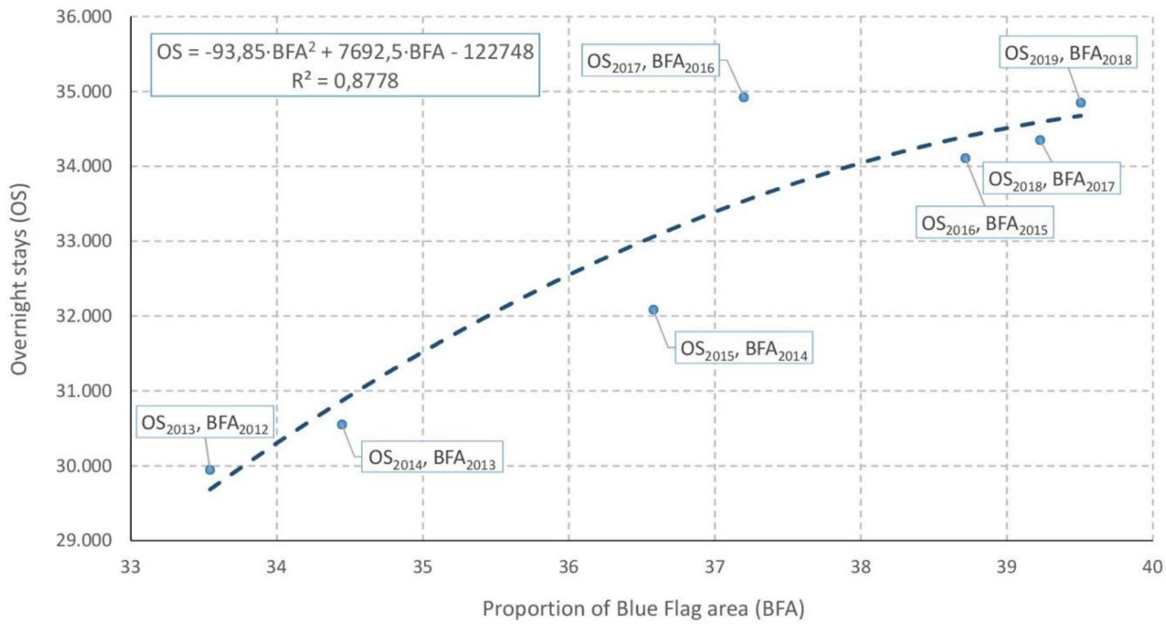
Figure 3. Quadratic Regression between Overnight Stays, OS, in Bathing Season (in thousands) and Proportion of BF Beaches in the Previous Year, for the Whole Study Area



Source: Own elaboration.

The following graph (figure 4) shows the quadratic regression found among overnight stays in bathing season and the proportion of BF beaches area in the previous year. The independent variable is now the proportion of the area of beaches awarded the BF in relation to the total beach area of the whole destination.

Figure 4. Quadratic Relationship between Overnight Stays, OS, in Bathing Season (in thousands) and Proportion of BF Area in the Previous Year, for the Whole Study Area



Source: Own elaboration.

In this graph, another anomaly stands out from the general trend. In this case, it is the point OS_{2017} - BF_{2016}: overnight stays in 2017 are higher than those in 2016, 2018 y 2019, although the area of beaches awarded the Blue Flag in 2016 was lower than that of 2015, 2017 and 2018.

Discussion and Limitations

Panel datasets allow the presence of systematic, unobserved differences across units that can be correlated with observed factors whose effects are to be measured. A simple *fixed-effect model* was built herein to approach relationship among two variables used for training: beaches awarded the Blue Flag, as exogenous variable, and overnight stays, as dependent variable.

In the most of the coastal areas analyzed, the fact of winning or losing the Blue Flag does not seem to influence greatly the number of stay visitors going there every next bathing season, a result that would fit in well with references such as Quintiliani (2009), McKenna *et al*. (2011), Geldenhuys *et al*. (2014), or Cabezas-Rabadán *et al*. (2019). But when putting those five areas together as a whole destination, the model has shown a good correlation among overnight stays and BF awards, in a way that there seems to be a time lag between the demand for accommodation and the granting of BFs. This result is in line with those from Marrocu and Paci (2013), Capacci *et al*. (2015), or

Castillo-Manzano *et al.* (2020), who suggest that Blue Flags can help promote international 'sun-and-sand' tourism.

This second pattern also applies to the influx of foreign tourists separately, but not to the domestic influx, which remains fairly stable over the years (as it results too from Castillo-Manzano *et al*., 2020). Besides that, it has come out that the number of overnight stays in bathing season is even more correlated with the proportion of BF beaches than with the proportion of beach area awarded the BF.

Nevertheless, the correlations themselves simply reveal that the values of one variable tend to go together with the values of the other in some way, but cannot explain why these two variables are associated. Indeed, the correlation found might be due to other unobserved variables that could be making BF seem to cause OS. This way, the omitted variable bias would be involving an spurious correlation. This applies to the fact that beach demand can be supported not only by the Blue Flag or any other quality indicator, but by other lures of destinations, such as natural, cultural, and recreational amenities that attract tourists. Besides, since regression predicts based on past data, it cannot anticipate the effects of a new event or intervention. Therefore, this model should not be used to make predictions or extrapolations.

Distinguishing between persistence due to unobserved heterogeneity and that due to dynamics in the underlying process would be a challenge for interpreting estimates from the panel data model. Consequently, other variables could be added and adjusted at subsequent stages: infrastructure, restaurants, hotel supply and prices, proximity, connectivity and accessibility, cultural heritage, museums, nature nearby, or even fairs' and festivals' venues.

One way to control for these differences could be randomly assign the coastal areas to control groups. For example, groups could be arranged according to the existence of cultural assets or monumental heritage. More commonly, omitted variable bias is removed by measuring changes within groups across time, usually by including dummy variables for the missing or unknown characteristics. In this case study, to reduce uneven effects of omitted variables, geographic and sociodemographic similarities have been sought. In doing so, other areas much more populated, where beaches are presumably not the main attraction for travellers, were ruled out.

The overnight stays as a single dependent variable has been used as a proxy of overall stay visitors. The demand for Blue Flag is supposed to come mostly from travellers than local residents, since the last ones, while in town, tend to go to those nearest beaches not far away from home, except probably on summer weekends. Accepting this, the fact of leaving residents aside would not be an important limitation, except for one-day visitors coming from places nearby in days-off.

In many studies on this topic, the dependent variable is usually the number of tourists that stay overnight in hotels. Herein this number has been enlarged with two more types of accommodation, data coming from the same source: rental apartments and campsites. However, guests staying in their families' or friends' homes are outside the scope of this and the research reviewed. Compared to other studies, overnight stays have been shortened just to the Spanish bathing season (1st June to 30th September), which allows to relate more accurately tourists to beachgoers than if the whole year was covered. In this sense, it must be remembered that in the study area the *sun&beach* tourism is clearly predominant, especially in summer.

On the other hand, the period of time that has been analyzed (2012-2019) may seem short. Surely it could be extended, although attention should be paid to those years of unusual tourists' fluctuations, and years of overall tourism setback or decline should be avoided, as it has been done here so as to elude the financial crisis and the Covid-19 pandemic. Nevertheless, the receding numbers for overnight stays in year 2017 could be analyzed, in search of an explanation.

Ideally, panel data at municipality census level would provide more accurate results, but the tourist areas defined by the coastline of each province has been the most specific geographical census level found in the Spanish accommodation statistics. If data of such a kind were available for municipalities, even more for beaches themselves, it would be feasible to observe the impact on tourism of winning or losing the BF award much more locally, thus more specifically and precisely.

Conclusions

The Blue Flag certification is deemed to be the most important of all the eco-labels aimed to beaches, marinas and tourism boats. Tourist coastal destinations have seen advantages in terms of improved amenity, environmental image and visitors' response to the Blue Flag award. As more beaches are awarded, more people have a chance to notice this eco-label, but it is not clear whether they become more aware of its meaning or purpose, and the influence it may have on the demand for beaches, essential to know whether it is worth it.

The objective of this work is to explore trends and possible correlations over time between the Blue Flag eco-label and the demand for tourist accommodation. From free access panel data, a simple bivariate regression model has been applied to five coastal tourist areas in the south-east of Spain that can be regarded as comparable: Costa Blanca, Costa De La Luz, Costa del Sol, Costa Cálida and Costa de Valencia, respectively in the provinces of Cádiz, Málaga, Murcia, Alicante and Valencia. The selection has been made in an effort to gather tourist areas close enough to look geographically alike, and exposed to comparable environmental affection coming basically from population, industrialization and tourism. Dissimilarities among them surely explain the uneven results found out individually.

Dealing with the five coastal tourist areas as a whole destination, common trends are observed over time between the overnight stays and the number and area of beaches awarded the Blue Flag. In addition to this, the model shows a high correlation among these variables, in a way that there seems to be a time lag between the demand for accommodation and the granting of BFs. A good correlation has come out too when the model applies to the influx of foreign tourists separately, but not to the domestic influx, which remains fairly stable over the years. Based on this, it could be that for foreign travellers the fact of having the Blue Flag may play a certain role when deciding to travel to that Spanish destination.

Nevertheless, other factors than Blue Flag are surely more determinant and even critical for beachgoers, such as the proximity to accommodation. In fact, the BF award is not affected as tourism demand is by socioeconomic factors such as tourists' income, tourism prices or public insecurity, among others, or even pandemics, man-made crisis or natural disasters. Therefore, further analysis including relevant information in panel datasets would produce more precise serial correlations and dynamic effects, and would shed more light on the effect of the BF award in the demand for coastal destinations. Besides, the period taken for the case study should be extended, yet avoiding those years when so many people were deterred from traveling, dealing with turning points and directional change errors.

To finish, from the simple framework presented here, comprehensive theoretical models could be built on empirical regularities that imply the presence of common trends amongst tourism-related time-series for different regions. The simplicity of a reductionist perspective, predicated on the tendency of tourism accommodation demand to synchronize with eco-labels awards such as the Blue Flag, offers intelligible and thus, actionable insights. A deeper understanding of the synchrony between these and other influential variables in tourism demand could assist in the optimization of accommodation management, transportation, pricing strategies, hiring decisions, marketing initiatives, or financial forecasting.

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