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SEASONALITY DETERMINANTS FOR THE MAIN MARKETS IN SPAIN

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Abstract

Tourist seasonality consists of an imbalanced tourist activity over the course of the year. This variation has become one of the main problems facing the tourist sector, as it constitutes a major threat to sustainable growth, destination image, and loyalty, especially with respect to large-scale, well-established destinations. In this paper, our purpose is to identify seasonality determinants for the main markets of origin in Spain (i.e. British, German, and French market origins). To this end, a dynamic model has been used for a provincial panel data set during the 2006-2015 period. The Xtabond2 model has been largely used, as it combines natural and non-natural explanatory variables. The results show that the inertial factor, economic variables (income levels and relative prices), and climatic variables (temperatures differences between the destination and the place of origin) are significant determinants, together with several differences among the main markets. It is hoped that the findings of this research will be able to assist public and private organisations in developing their predictions and especially with respect to designing anticipatory correcting policies.

***Keywords*:** seasonality; markets; dynamic panel data model; GMM estimators; Spain

1. Introduction

Seasonality in tourism consists of an imbalance in tourist numbers over the course of the year. Most authors consider that seasonality in this sector has damaging consequences in economic, labour, environmental, and social terms. Firstly, economic effects occur due to the inefficient use of resources and assets, i.e., because firms are unable to maintain their fixed costs during the off-season due to profit loss. In contrast, during the high season over-use of infrastructures occurs, affecting service quality and consumer satisfaction (Sutcliffe & Sinclair, 1980; Manning & Powers, 1984; Rosselló, Riera & Sansó, 2004). Furthermore, this fluctuation in demand, which generates profit instability, is one of the main problems with regards to access to capital, due to the high-risk level of some investments (Butler, 1994). Secondly, the labour effects include fluctuations in local employment levels, which lead in turn, to temporary contracts and low qualification requirements, making the maintenance of a quality service difficult to maintain (Ashworth & Thomas, 1999; Krakover, 2000). Thirdly, environmental effects that occur during the high season at destinations are varied, for example physical erosion of footpaths and other natural areas, the accumulation of waste, and the disturbance of wildlife (Manning & Powers, 1984). Finally come the well-known social effects, for instance those related to traffic congestion, crime, increases in service and goods costs, or difficulties in the provision of basic goods like water (Hartmann, 1986; Kuvan & Akan, 2005).

According to some researchers, seasonality is, indeed, one of the most problematic questions, but also one of the least understood aspects in this field (Jang, 2004). A better understanding of this phenomena, and therefore, of its causes, is therefore required. This knowledge may be useful for destination marketers and planners in the development of strategies that focus on mitigating troublesome seasonality at destinations. Given this situation, the purpose of this paper is to identify the determinants of seasonality in Spain, which is one of the most important destinations worldwide. Moreover, Spain is one of the most seasonal countries in the European Union (located in the second position only after Italy) and even with an increasing pattern in the last years.

On the other hand, researchers such as Croes & Vanegas (2005), Crouch (1995), Daniel & Ramos (2002) or Mello, Pack, & Sinclair (2002) found that different patterns of tourism demand exist among markets. It therefore seems advisable to identify a model for each country of origin, as it may be possible that tourist activity from different countries does not have the same behaviour patterns. As a result, we decided to choose the main three markets, i.e., the United Kingdom, Germany, and France. In this regard, Turrión-Prats & Duro (2016) find that the British, German and French markets, contribute to explaining two-thirds of monthly international tourism concentration demand in Spain. It would therefore seem reasonable to focus on the efforts in these countries, in order to mitigate the monthly concentration of foreign demand in Spain in a significant manner.

A dynamic model, particularly the Generalized Method of Moments - Xtabond2, has been used, this combines natural factors (climate in the destination and origin markets) and non-natural factors (basically economic variables) as explicative variables. This type of model allows us to incorporate the lags of the dependent variable as explanatory factors. It is especially useful in this type of study due to the relevance of inertia factor and of tradition to explain seasonal behaviour. The model uses a panel data set that consists of the monthly concentration of the British, German, and French markets in Spanish provinces during the 2006-2015 period. Seasonality has been analysed by means of a monthly synthetic concentration measure, such as the coefficient of variation (Duro, 2016).

The main contributions of this study to current literature on the topic are as follows. Firstly, the current paper includes under-utilized methodologies in this context, which may constitute a toolbox for other analyses and cases. Thus, in the analysis of the determinants involved in this imbalance, we applied Generalised Method of Moments (GMM) estimators, and specifically the Xtabond2 estimator proposed by Roodman (2006). This estimator, as far as we know, has not been used in this type of analysis (seasonality analysis) even though it has been proven to be consistent and asymptotically efficient for measuring seasonality in tourism. Moreover, we propose the use of the coefficient of variation as a measure with which to summarise monthly concentrations, this instrument is rarely used, despite its advantages - such as the uniform treatment it gives to months. Secondly, we used models separated by markets, which include natural (factors such as destination climate and home climate) and non-natural (economic factors) determinants of seasonality. Thirdly, the analysis is carried out empirically for a large and seasonal-increasing tourist country like Spain.

The rest of the paper is organized as follows. The second section presents a review of the literature. The third section describes the data and the applied methodology. The fourth section shows a descriptive analysis and the empirical results. Finally, a section has been devoted to the major policy implications and conclusions obtained.

2. A Review of the Literature

Although some researchers have paid attention to its causes, to measurement techniques, effects, strategies to combat it, and to policy implications (Koenig & Bischoff, 2005), little detailed quantitative research has been carried out on the topic of tourism seasonality (at least if we compare it with needs). First of all, and in order to analyse monthly concentration, the subject needs to be appropriately quantified. However, there is yet no general agreement respect to which data and measurements should be used. With respect to data, researchers have opted to use variables such as tourist arrivals (Duro, 2016; Lundtorp, 2001; Rosselló et al., 2004; Tsitouras, 2004; Wanhill, 1980), overnights (Cuccia & Rizzo, 2011; Duro, 2016; Fernández & Mayorga, 2008) or average spending per person (Koc & Altinay, 2007).

In terms of measurement, the literature available has suggested several summary indicators with which to measure seasonality. One of the most well-known is the Gini Index (Gini, 1912), which has been used by authors such as, Fernández-Morales, Cisneros-Martínez, & McCabe (2016), Fernández-Morales & Mayorga-Toledano (2008), Koenig & Bischoff (2005), Lundtorp (2001), or Wanhill (1980). This index has several advantages, for example, its stability and the fact that it is barely influenced by outliers. On the other hand, a peculiar feature of the Gini Index is that it gives more weight to changes in observations located around the mean (Cowell, 1995). The literature available also offers some other useful alternatives, such as Theil family indices (Theil, 1967), Atkinson family indices (Atkinson, 1970), and the coefficient of variation (Duro, 2016; Rosselló & Sansó, 2017). In our work, we will use as a seasonality index, basically the coefficient of variation, which is insensitive to the place where the monthly changes occur, and so treats those changes that occur in different months homogenously, regardless of their location on the monthly ranking.

In terms of the determinants, diverse factors have been proposed (see Table 1). A very popular, synthetic structuration allows the specification of two broad categories: natural and institutional (Bar-On, 1975). With respect to the natural factors, several studies have demonstrated that climatic and weather factors (temperature, precipitation, wind, or daylight) affect the choice tourist destination choice. Kozak (2002) finds that good weather is one of the most important factors for German and British tourists when considering travelling to Mallorca or Turkey. In a British survey it has also been observed that 73 per cent of those questioned think that pleasant weather is a key factor when travelling abroad (Mintel International Group, 1991). There is an abundance of literature related to the effects of climate on tourist flows, especially in the context of the problem of climate change (Lise & Tol, 2002; Amelung, Nicholls, & Viner, 2007; Bujosa & Rosselló, 2013). Studies such as Amelung et al., (2007) analysed for example, the potential implications of climate change for world tourism by using the Tourism Climate Index (TCI), developed by Mieczkowski in 1985. This Index has been one of the most well-known climate indices to assess the factors of destination climate comfort and attractiveness. The TCI is calculated using various climatic variables, which are included in the formula according to the relative importance that these have on an average tourist’s wellbeing when visiting a destination.

This index also is used for Goh, Law, & Mok (2008) to examine seasonal tourism in Hong Kong between the markets of the United States and the United Kingdom. Their results show, for example, that natural determinants explain the variability of monthly tourist arrivals better than economic factors (see also Goh, 2012).

Another extended rule in this literature is that of introducing different variables of climate in the models. For instance, some authors have used the temperature, especially the average temperature, and its square as proxies to measure the impact of climate on tourism (c.f. Maddison, 2001; Lise & Tol, 2002; Hamilton, 2004; Bigano, Hamilton, & Tol, 2006; Bujosa & Rosselló, 2013). Bigano, Goria, Hamilton, & Tol (2005) observe that temperature and precipitation have an impact on seasonal tourism demand in Italy (except of winter sports destination). Furthermore, their results show that the impact of these variables depends on region type. Cai, Ferrise, Moriondo, & Nunes (2010) also detect different effects according to the type of product offered by municipalities. Other studies, such as those of Kulendran & Dwyer (2010) and Hadwen, Arthington, Boon, Taylor, & Fellows (2011) have also analysed the repercussion of climatic variables on seasonal tourism demand using variables such as maximum and minimum temperatures, humidity levels, rainfall, and sunshine hours. In addition, Kulendran & Dwyer (2010), find that the influence of these variables varies according to tourist nationality.

However, an important point is that few studies have taken into account the impact that the climate in regions of origin has in decisions to travel abroad. For example, in Ridderstaat, Oduber, Croes, Nijkamp, & Martens (2014) inspect the joint effects of home climate and destination climate on tourist arrivals and they observe that some climatic variables of origin (United States and Venezuela) and destination (Aruba), for example rainfall, temperature, wind, and cloud coverage, have a significant effect on tourism demand. In a recent work, Li, Song, & Li (2017), using a model that links climate and seasonal tourism demand from Hong Kong and 19 of the major tourist cities in Mainland China, detect that home climate, destination climate, and their differences, have an impact on tourist arrivals. Furthermore, Eugenio-Martin & Campos-Soria (2010, 2011) have also found that climate in the region of origin is a significant determinant, which means that tourists that live in regions with better climates make more domestic trips than abroad. However, less favourable weather conditions can also act as a push factor for tourism demand (see, for example, Lise & Tol, 2002). Authors such as Hill (2009), find that the number of trips abroad from the United Kingdom increased during the rainier seasons, despite the economic and financial crisis of 2008-2009. Saverimuttu & Varua (2014) also observe that travel from United States to the Philippines increases when the weather in United States is colder.

On the other hand, relevant literature has suggested the importance of other causes, such as scheduled school, workers' holiday periods, programmed festivals or cultural events, and the type of tourist product offered by the destination (Cuccia & Rizzo, 2011; Martín Martín, Jiménez Aguilera, & Molina Moreno, 2014), as well as the market structure, or economic variable (Rosselló et al., 2004). In recent years, the latter factors have been perceived as being highly important. Rosselló et al. (2004) analysed the relationship between seasonality and economic determinants for the Balearic Islands with respect to their two main markets, the British and the German. Their results showed that income, prices, and nominal exchange rates had significant impacts on tourism seasonality. Turrión-Prats & Duro (2016) analysed tourist seasonality from a market-side perspective for Spain as a whole and found that inertial and economic factors are also significant explanatory determinants.

Therefore, and in a summarised fashion, researchers have attempted to identify and classify determinants that help to explain seasonal patterns, but detailed quantitative research into their nature is limited. In this sense, unanimity exists among the authors when identifying weather conditions as one of the most important factors to take into consideration. However, very few researchers have also analysed the impact of the destination climate, home climate, and relative climate as potential travel motivators. Furthermore, the conceptual framework has shown us that school and labour holidays, and special events have been some of the most widespread causes of seasonality levels. However, when a focus is placed on analysing short (and medium) term patterns, for example, in terms of variations of seasonality, the use of economic factors, such as the main determinants may be more reasonable. Economic Theory and demand models offer an excellent conceptual reference for their inclusion. The identification of which economic determinants (and others) have an impact on seasonality would help the public and private sectors to have a better forecast with respect to future trends in the distribution of intra-year arrivals and improving the management of tourism inputs and activity (Rosselló et al., 2004). As such, economic factors with the demand model have been included in this paper, together with tourist income and relative prices (Crouch, 1994a, b; Garín-Muñoz, 2006; Garín-Muñoz & Montero-Martín, 2007; Serra, Correia, & Rodrigues, 2014; Witt & Martin, 1987).

Table 1. An Overview of the Determinants of Tourism Seasonality suggested in the Literature.

	Bar-On (1975)	*Hartmann (1986)*	*Butler (1994)*	*Butler & Mao (1997)*	*Baum & Hagen (1999)*	*Lundtorp, Rassing, & Wanhill (1999)*	*Frechtling (2001)*	*Rosselló, Riera, & Sansó (2004)*	*Capó, Riera, & Rosselló (2007)*	*Cuccia &Rizzo (2011)*	Turrión-Prats & Duro (2016)
Natural (climate/weather)	✓	✓	✓		✓		✓				
Institutional	✓	✓	✓								
Sociological	✓										
Physical and Socio/cultural Factors in Tourism Generating and Receiving Areas				✓							
Social Customs/Holidays, Business Customs					✓		✓				
Calendar Effects	✓				✓		✓				
Social Pressure and Fashion			✓								
Sporting Seasons			✓								
Economic Factors	✓							✓			✓
Inertia and Tradition			✓								✓
Supply-side Constraints					✓				✓		
Tourism Product										✓	
Push Factors (institutional, calendar, inertia and tradition, social pressure and fashion, access (transport costs, time, climate in generating area) and Pull Factors (climate in receiving area, sporting season and events)						✓					

Source: derived by the author.

3. Research Method and Data Sources

The aim of this paper is, then, to propose and estimate a model that explains tourist seasonality in the main Spanish markets. This study focuses on those tourists who choose hotels as accommodation for different reasons. First, this type of accommodation represents a high number of the tourist arrivals from Germany (69%), the United Kingdom (63%), and France (50%) (2012 Annual Report created by the Institute of Tourist Statistics - *Instituto de Estudios Turísticos*). Secondly, the average daily expenditure of tourists who choose this type of accommodation is higher than that of tourists who choose another type; and thirdly, this is the only demand variable that is available at the level of regional detail required (i.e. provinces) for this study.

In order to undertake this analysis, the model is applied to a panel data set consisting of the monthly concentration of the British, German, and French markets in Spanish provinces. These markets have been selected as they are key source countries of tourists who visit Spain, considering that the latter represented almost 50 per cent of overall international demand for the 2006-2015 period. Furthermore, recent research, such as that carried out by Turrión-Prats & Duro (2016) has shown that these markets contribute to a major part of monthly international tourism demand in Spain, which has increased in recent years.

The study used panel data to estimate the models. This methodology allowed us to improve both the possible econometric specifications and the parametric estimations. The structure of panel data consists of several observations made over time, which provide more informative data and greater variability. Panel data also limits the problem of omitted variables and reduces multicollinearity bias (Hsiao, 2003). This methodology also has the advantage of controlling unobserved heterogeneity and removing the risk of obtaining biased results if no controls are established for this heterogeneous behaviour. Lastly, this method makes it possible to analyse variables for which there is no information available in all the periods.

It is also important to underline that panel data is applied to a dynamic model. This type of models permits us to tackle the probable relevance of inertia or habit formation as a factor that explains the levels and the growth of this imbalance in tourism. Two forms are used in the literature analysed to carry out estimates with endogenous variables; either by using an Instrumental Variables (IV) approach or the Generalised Method of Moments (GMM). The former makes it difficult to find proxies that meet the appropriate characteristics used as instruments of the variables. Therefore, the choice of the method to be used must be based on the type of instruments available. Nevertheless, when wishing to use the lagged dependent variable, as an explanatory variable, the preferred option would be GMM. In fact, the inclusion of the lagged dependent variable, as an explanatory variable in an equation, may cause problems of multicollinearity in both the Within Groups (WG) estimator and the random effects estimator (Garín-Muñoz, 2007), except when the number of periods is large (Baltagi, 1995), which is not our case. The Ordinary Least Squares (OLS) estimator would be also biased if destinations-specific effects were significant. Therefore, the solution to these problems is to use the Generalised Method of Moments approach (GMM). In specific terms, the estimation method used in this study is the Xtabond2 estimator proposed by Roodman (2006). This allows us to carry out the regression with endogenous variables, using both their differences and levels as instruments, which reduces the loss of information in small time samples, as in our case. This estimator also offers more alternatives in the treatment of variables. For instance, it could also be possible to exclude the lag of the dependent variable as a regressor, or treat the variables differently (as strictly exogenous, endogenous or predetermined). This method is used in a two-step mode in order to improve the efficiency of the estimations.

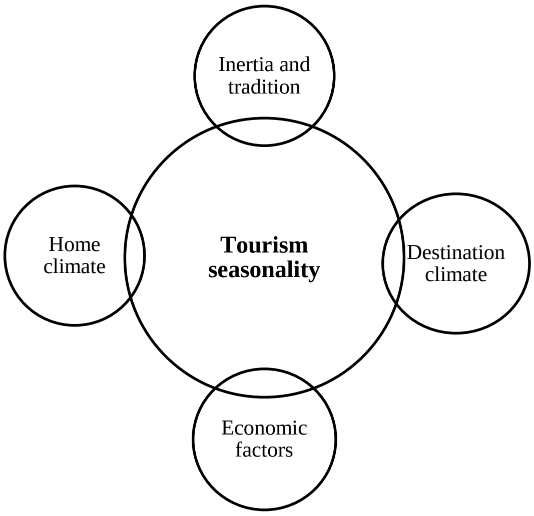
Xtabond2 handles relevant modelling concerns such as fixed effects and endogenous variables. However, the problem of instrument proliferation often arises in the application of this estimator, especially when the number of groups in the sample is small. It weakens the Hansen test, which verifies the overall effectiveness of all the instrumental variables. In our case, in order to solve the problem and to reduce bias in estimation due to the existence of many instruments with respect to sample size, the number of instruments has been restricted.

The study employs the variation coefficient of monthly demand as a dependent variable. The demand indicator used to create this variable is the number of international tourists who arrive from the United Kingdom, Germany, and France, and who were lodged in hotel establishments by month, year and province between 2006 and 2015. Data comes from the Hotel Occupation Survey (EOH) carried out by the Spanish National Statistics Institute (INE).

The reference framework used to select the determinants of tourism seasonality that will be introduced in the model is based on the combination of different factors proposed on the research literature (Figure 1). Hence, natural and economic determinants have been used in the analysis. With respect to natural factors, considering previous studies and data availability, the paper includes destination climate, domestic climate, and relative climate variables. The economic determinants used in this analysis are income levels and relative prices (Crouch, 1994a, b; Garín-Muñoz, 2006; Garín-Muñoz & Montero-Martín, 2007; Serra, Correia, & Rodrigues, 2014; Witt & Martin, 1987).

Although other factors could be added, given the approach, i.e., territorial comparisons for each market and short-term analysis, the factors considered may constitute a reasonable basis for empirical analysis. In this sense, note that, for example, institutional factors such as holiday periods would seem to have little relevance in this study, given that these parameters could be expected to affect all Spanish destinations in a similar way in any given year and market. Nor does the analysis add product variables, as given that the model is specified in terms of initial differences, it would seem reasonable to think that this kind of variable should not have a significant effect. In all events, the tests applied on the models would indicate that the omission of relevant variables is not a problem for the results' robustness.

Figure 1. Conceptual Framework of Causal Factors of Seasonality in the Tourist Sector



Source: Own creation.

Going into detail, the model includes the following variables as determinants:

Firstly, the lagged dependent has been selected in order to identify an inertial behaviour or habit formation in seasonality (Butler, 1994). The use of a lagging dependent variable is becoming a common practice in global demand modelling (see, for example, Witt & Martin, 1987). Therefore, it is logical to extend this practice to an analysis of tourism seasonality. Note that, the introduction of this variable would indicate the presence of a certain level of automaticity in the imbalance and, consequently, some difficulties in varying a part of the monthly concentration (Commons & Page, 2001).

Secondly, as proxy for income data from a median net income equivalent from source markets (income_o), expressed as a purchasing power standard has been used. Researchers have used several measures in order to include income in the demand models. For instance, Lim (1997) suggests applying the income remaining after taking into account that spent on necessities in a tourist's home country. Nevertheless, in some cases due to the difficulties that arise in obtaining direct income data, the most commonly-held practice has been to use Gross Domestic Product in its distinct versions, constant or current prices or in per capita terms (Ledesma-Rodríguez, Navarro-Ibáñez, & Pérez-Rodríguez, 2001; Song & Witt, 2000). According to economic theory, changes in consumer income may cause variations in terms of the demand for products. For instance, an increased income provides consumers with a greater spending power; however, depending on whether a tourist destination is considered normal or inferior, demand for it will increase or decrease. Nevertheless, the predicted a priori effect of changes in income on monthly concentration is less well-known. Thus, the sign depends on factors such as tourist profile or their sensitiveness with respect to off-season travel, for instance.

Thirdly, selecting an overall price variable for a product such as tourism is a complicated task due to the large number of different kinds of costs that may affect the travel costs (e.g. travel insurance, the goods and services purchased at destination, transport costs, etc.). In addition, whether to use a price index for specifically tourist-orientated goods or one of a more general nature is a matter of contention. It may appear conceptually more convenient to use tourist prices but in our case, this has not been possible due to a lack of information. The price variable we have used coincides with a relative measurement that relates the Consumer Price Index in the country of destination (CPI^D) with the Consumer Price Index in the country of origin (CPI^O) and the exchange rate ($EX_{D/O}$), calculated according to: $rp\_tc_{\ i,t} = \frac{CPI_t^D}{CPI_t^O} * \frac{1}{EX_{D/O}}$. This is possibly the price measurement most-frequently applied in the academic literature consulted (Daniel & Ramos, 2002; Garín-Muñoz & Montero-Martín, 2007). In the case of seasonality, there are no clear hypotheses about the expected effect of the relative prices either. An empirical analysis could therefore help us to obtain some conclusions regarding their relationship (Rosselló et al., 2004).

Fourthly, specification also includes destination, home, and relative climate variables. The most commonly-used, summarised line pursued consists of incorporating variables of temperature such as minimum, maximum, or average as proxies to observe the effects of climate on tourist flows (Hamilton & Tol, 2007; Taylor & Ortiz, 2009; Kulendran & Dwyer, 2010; Hadwen et al. 2011; Becken, 2013; Riddestraat et al. 2014). Other types of variables, such as aesthetic factors (e.g., cloud cover, high visibility, solar radiation, or sunshine) and physical factors (precipitation and wind speed) also have been proposed in the literature (Freitas, 2003). However, this study only uses temperature variables due to their signification and the availability of meteorological data. The temperature variables used have been measured in terms of annual average (see Bigano et al. 2006) and by seasons (Nunes, Cai, Ferrise, Moriondo, & Marco, 2013). The temperature during high season is calculated as the average temperature from May to September and the temperature in the low season as the average of the remaining months (providing a consistent intra-annual shape of distributions). Nevertheless, we also used temperatures from June to September as a high-season period with similar results. In more specific terms, the climatic variables included in the model are as follows: annual average temperature at destination and origin (tm_d and tm_o); the relative temperature (relative_tm_o) calculated according to annual average temperature at destination and divided by origin; annual average temperature at low and high season in destination (tm_low_season_d, and tm_high_season_d) and origin (tm_low_season_o and tm_high_season_o); the relative annual average temperature at low season expressed as annual average temperature at low season at destination divided by the origin (relative_tm_low_season_o); and the relative annual temperature in high season calculated according to annual average temperature at high season in destinations divided by origin (relative_tm_high_season_o).

Finally, the dummy variable, d_2008, was included to capture the special influence of the financial and economic crisis on seasonality in the three main markets.

The models used in the analysis are as follows:

$$ln\ ts\_o_{i,t} = \beta_0 + \beta_1 ln\ ts\_o_{i,t-1} + \beta_2 ln\ income\_\ o_t + \beta_3 ln\ rp\_tc\_o_t + \beta_4 tm\_d_{i,t} + \beta_5 tm\_o_t + \beta_6 d2008 + v_{i,t} \quad (1)$$

$$ln\ ts\_o_{i,t} = \beta_0 + \beta_1 ln\ ts\_o_{i,t-1} + \beta_2 ln\ income\_\ o_t + \beta_3 ln\ rp\_tc\_o_t + \beta_4 relative\_tm\_o_{i,t} + \beta_5 d2008 + v_{i,t} \quad (2)$$

$$ln\ ts\_o_{i,t} = \beta_0 + \beta_1 ln\ ts\_o_{i,t-1} + \beta_2 ln\ income\_o_t + \beta_3 ln\ rp\_tc\_o_t + \beta_4 tm\_low\_season\_d_{i,t} + \beta_5 tm\_high\_season\_d_{i,t} + \beta_6 tm\_low\_season\_o_{i,t} + \beta_7 tm\_high\_season\_o_{i,t} + \beta_8 d2008 + v_{i,t} \quad (3)$$

$$ln\ ts\_o_{i,t} = \beta_0 + \beta_1 ln\ ts\_o_{i,t-1} + \beta_2 ln\ income\_o_t + \beta_3 ln\ rp\_tc\_o_t + \beta_4 relative\_tm\_low\_season\_o_{i,t} + \beta_5 relative\_tm\_high\_season\_o_{i,t} + \beta_6 d2008 + v_{i,t} \quad (4)$$

Where $ts\_o_{i,t}$ is the measure of seasonality in provinces *(i)* and year *(t)*; *d* is the destination country (Spain) and *o* is the market of origin (United Kingdom, Germany, or France). This model adopts the double-logarithmic form for economic variables and $v_{i,t}$ denotes the fixed effects decomposition of the error term (time and country-specific effects) and the error component which varies across regions and time.

The data for economic explanatory variables comes from the Organisation for Economic Cooperation and Development Statistics (OECD) and EUROSTAT. The climatological data were collected from Spanish National Institute for Statistics (INE) for Spanish provinces, the British Meteorological Office (Met Office) and the World Bank for Germany and France.

Table 2 provides descriptive statistics for the variables used in this study.

Table 2. Descriptive Statistics for the Variables

Variable	*Obs.*	*Mean*	*Std. Dev.*	*Min.*	*Max.*
ts_uk	487	0.525	0.202	0.082	1.388
ts_ger	490	0.566	0.204	0.062	1.212
ts_fr	498	0.569	0.168	0.106	1.144
income_uk	500	17,124	974	15,776	18,778
income_ger	500	18,269	1,373	15,167	20,365
income_fr	500	17,848	1,573	14,981	19,885
rp_tc_uk	500	0.998	0.030	0.952	1.040
rp_tc_ger	500	1.000	0.011	0.981	1.015
rp_tc_fr	500	1.003	0.013	0.976	1.021
tm_d	478	15.690	2.825	10.050	22.367
tm_uk	500	11.733	0.608	10.588	12.625
tme_ger	500	9.833	0.665	8.322	10.795
tm_fr	500	12.614	0.523	11.611	13.391
relative_tm_uk	478	1.340	0.245	0.886	2.113
relative_tm_ger	478	1.603	0.303	1.018	2.688
relative_tm_fr	478	1.245	0.227	0.824	1.926
tm_low_season_ d	482	11.521	3.227	5.600	21.029
tm_high_season_ d	481	21.510	2.778	15.760	26.900
tm_low_season_uk	500	8.171	0.983	6.286	9.457
tm_high_season_uk	500	16.720	0.601	16.150	18.220
tm_low_season_ger	500	5.158	1.051	3.036	6.874
tm_high_season_ger	500	16.378	0.376	15.723	17.306
tm_low_season_fr	500	9.213	0.867	7.977	10.580
tm_high_season_fr	500	17.376	0.456	16.651	18.008
relative_tm_low_season_uk	482	1.426	0.427	0.721	3.345
relative_tm_high_season_uk	481	1.288	0.171	0.943	1.637
relative_tm_low_season_ger	482	2.330	0.843	1.029	6.926
relative_tm_high_season_ger	481	1.314	0.170	0.976	1.693
relative_tm_low_season_fr	482	1.259	0.368	0.629	2.625
relative_tm_high_season_fr	481	1.238	0.158	0.919	1.599

4. Results

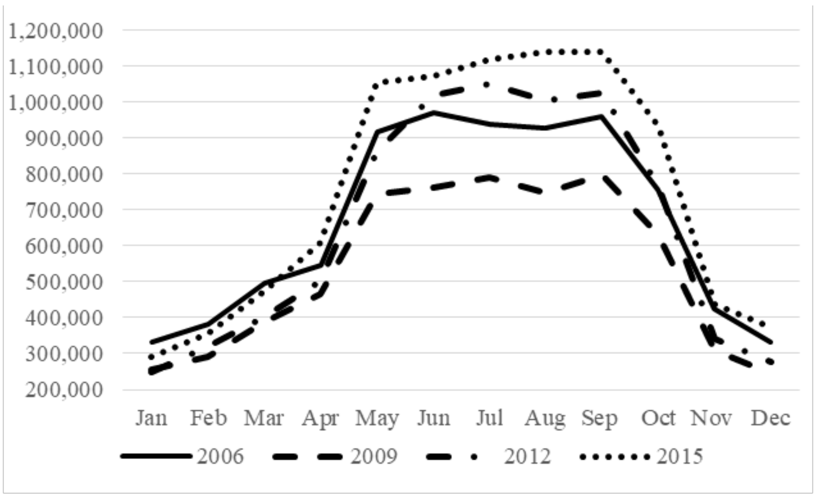
4.1. Tourism Seasonality in Spain

In this first section, a descriptive analysis of the monthly concentration of British, German, and French markets in Spanish provinces has been presented. In Spain, there are 50 provinces and 2 cities but in our case, we have only chosen those that possess monthly data for most of the years during the entire period (2006-2015). Therefore, this means the exclusion of the two cities (Ceuta and Melilla). Nevertheless, the regions selected include the vast majority of national demand, which represents over 99% of the total international hotel demand in Spain according to the Hotel Occupation Survey (EOH, 2015). This study focused on tourist arrivals in hotels establishments, based on data from the Hotel Occupation Survey (EOH) as compiled by the Spanish National Institute of Statistics (INE). Tourism is an important sector for the Spanish economy, where according to the EOH the number of visitors during 2015 was 93 million, 51 per cent of these being Spanish tourists and 49 percent of whom were foreigners. The main source markets of international tourists are European countries. British tourists accounted for 20% of all international tourist arrivals, German 16%, and French 12% (EOH, 2015).

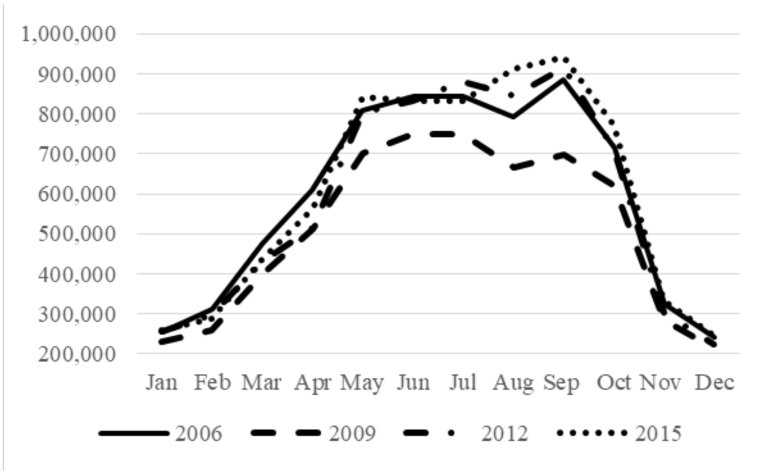
Arrivals in Spanish hotel establishments (this being the main type of tourist accommodation) are not distributed uniformly throughout the year and are normally concentrated in the summer months. In order to provide an initial overview of seasonal movement of tourist flows, the monthly distribution of hotel arrivals has been shown in Figure 2. The plot confirms a clear high-demand season from May to September with about 60% of yearly flows received. Furthermore, the figure shows that the seasonal patterns for British and German tourists are similar. Both seem to have a high season that encompasses the months of spring and summer. Nevertheless, the French market shows two clear peaks in annual distribution, producing a second demand peak during April, which coincides with the Easter holidays.

Figure 2. The Monthly Distribution of British, German, and French Tourists in Spain, Selected Period 2006-2015.

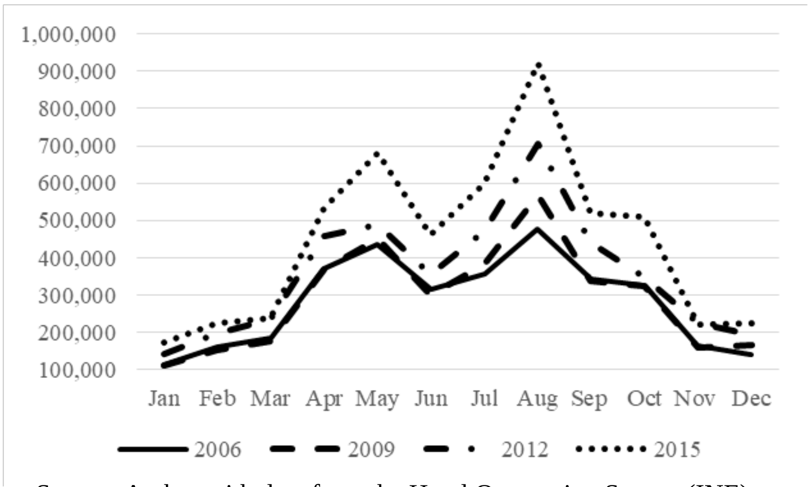
United Kingdom



Germany



France



Source: Author with data from the Hotel Occupation Survey (INE).

Table 3 shows the results for the summarised measure of the monthly concentration during selected years from the period studied. As can be seen, the markets analysed show a monthly concentration higher than the international average for each of the selected years. Note also that the three markets have increased their monthly concentration significantly between 2006 and 2015. Demand also increased during this period, especially in the French case (which increased 57 per cent). Also relevant is that the financial and economic crisis of 2008 affected this expansion demand (except for France). Thus, from 2006 to 2009, demand decreased 19.5 per cent (but seasonality increased 6.4 per cent) in the British market. The German market however, reveals a decrease in both variables (with a drop in demand of 14.3 percent and a reduction of the monthly concentration of only 1.3 percent). By way of contrast, the French market shows an increase in both variables in this sub-period (possibly because Spain is a proximity destination for French). Nonetheless, in the recent 2012-2015 sub-period, hotel demand has recovered in these three countries and it would seem that even an improvement in monthly concentration has arisen, except in the French case (again). This country displays the highest growth in two variables (with a 12% rise in seasonality and 24.6% in tourist demand).

Table 3. Monthly Concentration in Terms of Main Markets

						Variation Rate (%)		
		2006	*2009*	*2012*	*2015*	*2006-2009*	*2012-2015*	*2006-2015*
UK	*CV*	0.387	0.412	0.487	0.451	6.4	-7.4	16.6
	D	7,979,996	6,423,724	7,809,363	8,992,936	-19.5	15.2	12.7
GER	*CV*	0.413	0.408	0.447	0.440	-1.3	-1.6	6.4
	D	7,106,811	6,089,489	7,019,583	7,261,342	-14.3	3.4	2.2
FR	*CV*	0.419	0.462	0.447	0.501	10.1	12.0	19.4
	D	3,387,317	3,494,386	4,259,793	5,309,417	3.2	24.6	56.7
INT	*CV*	0.318	0.297	0.335	0.320	-6.7	-4.4	0.6
	D	15,937,638	15,994,636	20,847,989	24,129,675	0.4	15.7	51.4

Note: CV is the coefficient of Variation; D is the total demand; INT: does not include the United Kingdom, Germany, or France.

Source: Author’s own, from the Hotel Occupation Survey (INE).

Nevertheless, with respect to monthly concentration, relevant differences exist among destination provinces. Table 4 shows tourism seasonality for the ten tourist locations with the greatest average demand during the 2006-2015 period for each of the main markets (in order to save space). The provinces more affected in a negative sense are the Balearic Islands, Girona, and Tarragona (the latter in the case of British and French tourism). Note that these provinces are typical sun-sand-and-sea destinations. The Balearic Islands is facing a highly worrying situation due to high demand and monthly concentration levels that have increased, even with respect to 2006. Girona is also one of the regions most affected by this imbalance, despite its efforts to implement a strategy of diversification towards a more culturally-orientated tourism. At the other extreme are regions such as Santa Cruz de Tenerife, Las Palmas, and Madrid. Despite high demand, these locations are in a privileged situation in terms of monthly concentration. The lower values in the Canary Islands (Santa Cruz de Tenerife and Las Palmas) are likely due to their low variation in annual temperatures, considering that the annual average temperature coincides with the optimum level for their main variety of tourism. Demand in Madrid is also uniformly distributed throughout the year. This can mainly be attributed to the multipurpose motivation of international visitors, that is, the higher number of tourists received in summer months by vacation tourism may well be offset by the lower values of business and conference tourism during the summer period. Although, in relation to the evolution of monthly concentration, Madrid shows a positive growth rate in all cases, while Las Palmas is only positive for the British market and in Santa Cruz de Tenerife for the German market, but not for the British.

Table 4. a. Monthly Concentration of the Ten Provinces with the Greatest Demand, on Average, in the 2006-2015 Period based on British Tourism

		CV	*Var. CV*	*D*
1	Balearic Islands	0.931	+	2,103,838
2	Tarragona	0.893	+	300,396
3	Girona	0.667	+	189,063
4	Málaga	0.365	+	805,565
5	Barcelona	0.316	+	779,712
6	Seville	0.304	+	105,760
7	Alicante	0.240	+	744,845
8	Madrid	0.203	+	334,197
9	Las Palmas	0.121	+	786,639
10	S. Cruz de Tenerife	0.102	-	805,433

Table 4. b. Monthly Concentration of the Ten Provinces with the Greatest Demand, on average, in the 2006-2015 Period based on German Tourism

		CV	*Var. CV*	*D*
1	Girona	0.880	+	179,056
2	Balearic Islands	0.724	+	2,849,454
3	Cádiz	0.594	+	250,326
4	Granada	0.508	+	90,548
5	Seville	0.507	-	85,441
6	Málaga	0.417	+	268,732
7	Barcelona	0.368	-	539,326
8	Madrid	0.257	+	236,854
9	S. Cruz de Tenerife	0.170	+	500,356
10	Las Palmas	0.095	-	1,184,568

Table 4. c. Monthly Concentration of the Ten Provinces with the Greatest Demand, on Average, in the 2006-2015 Period, based on French Tourism

		CV	*Var. CV*	*D*
1	Balearic Islands	0.875	+	239,914
2	Tarragona	0.802	+	270,563
3	Málaga	0.586	+	213,348
4	Girona	0.564	+	677,820
5	Granada	0.564	+	118,554
6	Seville	0.421	-	167,978
7	Barcelona	0.358	+	724,876
8	Guipúzcoa	0.315	+	98,145
9	Las Palmas	0.288	-	111,308
10	Madrid	0.163	+	310,402

Note: CV is the coefficient of average variation during the 2006-2015 period; Var. CV is the variation of CV with respect to 2006; D is the total average demand during the 2006-2015 period.

Source: Author’s own from the Hotel Occupation Survey (INE).

4.2. Main Estimates

The estimation of the model has been carried out using the Stata v.14.0 econometric program. A dynamic model such as Xtabond2 is used to estimate the models described in the previous section. Table 5 and Table 6 present the main empirical results from the estimates.

Nevertheless, some previous comments may be in order, in terms of the validity of the results. The validity of the specifications have therefore been analysed using the Wald test for the joint significance of independent variables, the first- and second-order serial correlation tests ascertain as to whether perturbations are independent and identically distributed, and the Hansen test is used to verify the overall effectiveness of all the instrumental variables. This latter test allows us to corroborate the consistency of the results, as they depend on whether the lagged values of the endogenous and exogenous variables are valid instruments. Furthermore, most of our estimates accomplish the condition suggested by Roodman (2009), which states that in the Hansen test it would be optimal where prob> χ^2 is between 0.1 and 0.25. The model has been also estimated with the 'collapse' option, which has been used to reduce the instruments. This tool allows us to create an instrument for each variable and lag, instead of one for each period, variable, and lag. All of this allows us to reduce the risk of more instruments appearing more than necessary, satisfying the condition that the number of instruments is less or equal to the number of groups. There therefore appears to be no evidence of over-identification in the estimates. On the other hand, several tourism variables, such as tourist arrivals or overnights in a destination, may be conditioned by the values of their neighbouring tourism destinations. This dependency may cause spatial autocorrelation and, consequently, biased results. In this sense, it would seem reasonable to test the presence of spatial autocorrelation in our samples. Concretely, Moran I (Anselin, 2005) was computed and the results obtained reveal that no problems exist with respect to spatial autocorrelation.

Moreover, in order to support and confirm the robustness of the results, each model has been approximated by means of another estimator, and both procedures appear to yield very similar outcomes.[1] Although other estimators such as Balestra & Nerlove (1966) or Arellano & Bover (1995) could have been used, the alternative estimator chosen was Diff-GMM, as proposed by Arellano & Bond (1991), and which is one of the most commonly applied to analysing global demand. Diff-GMM uses instrumental variables based on lags for the endogenous and predetermined variables and differences for strictly exogenous variables. Specifically, the values of the dependent variable that lagged for two periods or more are valid instruments for the lagged

[1] Any results required are available by making a direct request to the authors.

dependent variable, creating consistent and efficient estimates. The use of this procedure, with respect to differences, also helps us to eliminate the problem of non-stationarity.

After these considerations and based on our results, the following points of interest can be noted initially for the most important market, that is, the British (in terms of overall demand and contribution to overall international seasonality in Spain):

Firstly, the result for the lagged dependent variable shows that increases of 1% in monthly concentration for the previous year would increase current seasonality by an average of almost 0.3%. This outcome indicates the existence of a certain level of rigidity in the monthly concentration of British tourism. Nevertheless, in this market there would be room for action, given that this coefficient is not very high (for example when compared with that obtained in Turrión-Prats & Duro (2016), where 0.5 per cent of the international monthly concentration in Spain is attributed to habit-persistence effects).

Secondly, the estimates suggest that British incomes are also an important variable for explaining changes in monthly concentration. In particular, an increase of 1% in British income leads to a decrease in the monthly concentration of tourist flows in Spain by more than 1 percent. Consequently, an increase in British income would not only be positive in terms of annual demand in Spain but also in terms of monthly distribution. Related to this result, one issue of special concern would be the effects of Brexit. According to the results, Brexit could aggravate monthly concentration (and, of course, overall demand) due to an expected drop in GDP (according to data from National Institute of Economic and Social Research). In terms of policy, this evidence would suggest that with respect to recessive economic cycles in the U.K., it would be necessary to step up the introduction of anticipatory policies to increase demand in months with less activity.

Thirdly, the overall results obtained for price elasticity suggest that relative prices have a negative influence on monthly concentration. In general, a relative increase of 1% on prices would contribute to decreasing seasonality by about 0.3%. As such, the differential price rise in Spain would proportionally withdraw more tourists from the months of greater demand. The differential pricing strategy may be relevant for attracting British tourists in the low season. Brexit would have consequences, not only through the income-channel but also through the price-channel, as several studies have predicted that travel could be more expensive due to a possible devaluation of the pound in medium-long term. Against this background and giving the results, the perceived increase of the prices may temporarily redistribute flows, which may be positive. However, it should be taken into account that the estimates suggest that the impact of relative prices is less than the impact of income, which predicted the opposite effect, a worsening of monthly concentration.

Fourthly, in terms of destination climate, the results indicate that the coefficient of the annual average temperature is statistically significant and has a negative effect on monthly concentration. That is, for every unit that increases the average temperature in Spain, the monthly concentration in this market decreases by an average of almost 5 per cent. Although, as we can see in Model 3, this is true when this increase occurs in the off-season, as this variable is statistically significant and negative (-0.059). By contrast, high temperatures during the peak season do not seem to have any affect. Studies such as Coshall (2009) shows that the British market was not influenced by the extremely hot month of August 2003. Ibarra (2011) indicated that more people spend their holiday in August in Benidorm, as this is the hottest month. Besides, the beaches in this month were mainly used during the hottest hours of the day. By relating our results with the effects of climate change, it may be suggested that changes such as growths in temperatures during the low season (all other things being equal) could improve monthly distribution, favouring the arrival of tourists during the spring and autumn season (see Maddison, 2001). Another possible consequence addressed in the literature is that an alteration in climatological conditions may modify the geographical distribution of the tourists in summer. Researchers such as Priego, Rosselló, & Santana-Gallego, (2015) found that rises in temperature would increase the frequency of trips the colder provinces in the north of Spain and warmer provinces in the south it would cause an reduction of tourist attraction (see also Moreno & Amelung, 2009).

Fifthly, in terms of domestic climatic factors, annual average temperature, in both cases, when measured in annual terms and by seasons, has a significant and positive impact on tourism seasonality (with coefficients above 4%). On the one hand, when average temperature rises in the low season, the British are more likely to stay at home. On the other hand, an improvement of temperatures in the high season would seem to incite them to travel to Spain during this period. This result may be due to the fact that an increase in temperatures during the high season could be not sufficient to promote domestic tourism or that it causes discomfort among the public at home. In fact, when evaluating weather suitability in terms of tourism one should take tourist motivation into account. Thus, terms such as ‘comfortable climate’ could be relative because it depends on what activity the tourists want to do. Regions with uncomfortable climates are less probable to exchange international and domestic tourism than regions with better climate conditions (Eugenio-Martín & Campos-Soria, 2014). Nevertheless, based on our estimates, and in the context of climate change, ceteris paribus an increase in the temperatures at home during the low season could involve a growth of domestic tourism in origin and reducing tourist flows to Spain in this season.

Sixthly, Model 2 and Model 4 are estimates used to determine the impact of climate in relative terms (home-destination). The values of the coefficients show that monthly concentration is highly dependent on the weather differences between home and destination. This result is in the line with other authors, who consider that a motivation to travel may be the existence of differences between the climate in the place of origin and destination (Gómez Martín, 2005; Petrick, 2002). Specifically, according to this evidence, greater differences between the destination and home temperatures, in annual (with a coefficient of -0.630) or seasonal terms (a coefficient of -0.249 in the low season and -0.363 in the high season), would allow an improvement in the monthly distribution of British tourists in Spain.

Finally, the results for dummy variables (d2008) confirm the special sensitivity of English tourists to the economic crisis, which would promote the monthly concentration.

Given the results, some points may be underlined:

Firstly, the estimated coefficients for income elasticity suggest that French monthly concentrations are also strongly affected by changes in income, but its effect is different when compared with British tourists. In France, higher incomes growth would in fact increase monthly concentration (elasticity near to 1). Therefore, during phases of economic growth in France the strategy implemented would need to anticipate the pattern and intensify actions for increasing flows in the off-seasons (e.g. marketing campaigns). Note that for the German market, the effect of this variable is not conclusive, since it is only positive and statistically significant in one of the models. Taking into account these results, and assuming that the United Kingdom and France have more or less homogeneous economies, it would be interesting to diversify markets, not only in terms of the overall annual demand but also in terms of global monthly distribution.

Secondly, the coefficients for relative prices elasticities suggest that both markets (German and French) are greatly influenced by changes in prices. For the case of the French market, the connection is similar (in the same direction) to the British market but higher in scope (nevertheless, for some models the coefficient is not significant). However this is not true for the German market, where its effect is high but positive. Consequently, for this market the distribution of arrivals throughout the year tends to be smoother (more concentrated) when relative prices decrease (increase). In fact, this relation has also been found in Rosselló et al. (2004). In this way, it would seem that the Germans have a differential preference for the high season in terms of the price-channel.

Thirdly, and regarding the effect of home and destination climate on tourism seasonality, the estimates indicate that the average temperature in the low season is statistically significant and positive for both markets, as in the case of the British.

Finally, according to the estimated d2008 value, contrary to what happened with the British, for the Germans and French in some of the models, the economic crisis decreases its relative consumption differentially in high season periods, so reducing concentration.

Table 5. Estimation Results for the British Market (2006-2015)				
Variables	Model 1	Model 2	Model 3	Model 4
L.ln_ts_o	0.322***	0.291***	0.259**	0.286***
	(0.106)	(0.109)	(0.107)	(0.109)
ln_income_o	-1.083***	-1.201***	-1.207***	-1.231***
	(0.220)	(0.245)	(0.223)	(0.246)
ln_rp_tc	-0.289**	-0.306**	-0.491***	-0.317**
	(0.124)	(0.124)	(0.143)	(0.160)
tm_d	-0.0546***			
	(0.0170)			
tm_o	0.0472***			
	(0.0117)			
relative_tm		-0.630***		
		(0.192)		
tm_low_season_d			-0.0560**	
			(0.0222)	
tm_high_season_d			-0.00251	
			(0.0154)	
tm_low_season_o			0.0312***	
			(0.00864)	
tm_high_season_o			0.0774***	
			(0.0242)	
relative_tm_low_season				-0.249***
				(0.0938)
relative_tm_high_season				-0.363**
				(0.171)
d_2008	0.080***	0.095***	0.104***	0.0946***
	(0.0296)	(0.0299)	(0.0271)	(0.0289)
Constant	10.290***	11.950***	10.26***	12.21***
	(2.130)	(2.441)	(2.089)	(2.464)
Wald Test	76.40 (6) ***	62.92 (5) ***	92.85 (8) ***	67.99 (6) ***
Autocorrelation				
m1	-4.22***	-4.34***	-4.24***	-4.52***
m2	1.00	0.67	0.74	0.44
Hansen Test	2.30 (1)	1.79 (1)	0.91 (1)	1.62 (1)
Num. Instruments	8	7	10	8
Collapse	Yes	Yes	Yes	Yes
Observations	414	414	416	416
Num. Groups	50	50	50	50

Note: Dependent variable: Logarithm of CV for monthly tourism. Standard errors in parentheses. The asterisks denote that the coefficient is significant at *10 %, ** 5 % and *** 1 %. Two-step estimation results are presented: m1 and m2 refer to first and second order autocorrelation tests. The Hansen test is used to test for the overall effectiveness of all the instrumental variables.

Table 6. Estimation results for the German and French markets (2006-20015)

	German market				French market			
Variables	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
L.ln_ts	0.138	0.224*	0.117	0.236*	0.221*	0.233*	0.0919	0.122
	(0.114)	(0.127)	(0.105)	(0.124)	(0.134)	(0.135)	(0.113)	(0.0969)
ln_income_o	0.296*	-0.0175	0.290	0.0585	0.838***	0.903***	1.017***	1.017***
	(0.180)	(0.194)	(0.191)	(0.214)	(0.176)	(0.171)	(0.323)	(0.198)
ln_rp_tc	1.587**	2.741***	1.751**	1.991**	-1.442	-2.077*	-2.283	-2.798**
	(0.667)	(0.724)	(0.891)	(0.834)	(1.183)	(1.199)	(2.034)	(1.353)
tm_d	-0.0571***				-0.0376***			
	(0.0209)				(0.0104)			
tm_o	0.0239				0.0289**			
	(0.0188)				(0.0129)			
relative_tm		-0.350***				-0.438***		
		(0.132)				(0.122)		
tm_low_season_d			-0.0814***				-0.0335**	
			(0.0233)				(0.0149)	
tm_high_season_d			0.0165				-0.00848	
			(0.0176)				(0.0173)	
tm_low_season_o			0.0426**				0.0267**	
			(0.0167)				(0.0127)	
tm_high_season_o			-0.0740				-0.00337	
			(0.0572)				(0.0248)	
relative_tm_low_season				-0.0320				-0.239***
				(0.0299)				(0.0916)
relative_tm_high_season				-0.420***				-0.237
				(0.153)				(0.243)
d_2008	-0.0546*	-0.0521	-0.0411	-0.0543*	-0.0448	-0.0392	-0.0646*	-0.0525**
	(0.0318)	(0.0340)	(0.0251)	(0.0322)	(0.0316)	(0.0323)	(0.0330)	(0.0265)
constant	-2.760	0.289	-1.853	-0.379	-8.441***	-8.743***	-10.08***	-9.857***
	(1.765)	(2.029)	(1.895)	(2.160)	(1.780)	(1.615)	(2.931)	(1.994)

Table 6. Estimation Results for the German and French Markets (2006-20015)								
	German Market				**French Market**			
Variables	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Wald Test	40.580(6)***	40.420(5) ***	37.02 (8)***	43.2(6)***	82.410(6) ***	77.500(5) ***	70.59(8)***	68.34(6)***
Autocorrelation								
m1	-2.500**	-2.510**	-2.83**	-2.47**	-3.860***	-2.310***	-3.440***	-3.880***
m2	-0.89	-0.61	-1.02	-0.53	-0.9	-0.95	-1.27	-1.23
Hansen Test	9.080(7)	11.490(7)	2.33(1)	11.03 (7)	0.480(1)	0.550(1)	3.580(2)	2.680(2)
Num. Instruments	14	13	10	14	8	7	11	9
Collapse	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	419	419	421	421	428	428	430	430
Num. Groups	50	50	50	50	50	50	50	50

Note: Dependent variable: Logarithm of CV for monthly tourism. Standard errors in parentheses. The asterisks denote that the coefficient is significant at *10 %, ** 5 % and *** 1 %. Two-step estimation results are presented: m1 and m2 refer to first and second order autocorrelation tests. The Hansen test is used to test for the overall effectiveness of all the instrumental variables.

4.3. Additional Estimates

Taking the basic results above as a starting point, the earlier models have been re-estimated considering two reasonable subsamples: coastal destinations (provinces in which there is a high correlation between being on the coast and offering the sun and the beach as a main product, although there may be other products available, depending on the province) versus the rest of the destinations.[2] It is interesting, from a practical standpoint, and above all with respect to policy guidance, to explore if there are differential effects between both types of destinations, a rise in sign or in scale or not. In order to simplify matters, only the results for one of the models (Model 2) are included in Table 7.[3] The results may be resumed in the following basic points:

Firstly, the estimates reveal that the past has a very important impact on current seasonality for the provinces of the coast, contrary to what happens to other provinces. Therefore, word of mouth, or greater knowledge not only acts by repeating flows in these type of provinces but also by repeating them over a similar period (this being particularly important for UK and German markets). The presence of a great level of automaticity in the imbalance and its dynamics would indicate more difficulties in varying a part of the concentration in the coastal areas, which already show greater signs of concentration. As a consequence, planners in the tourist industry with regard to these areas face a major challenge.

Secondly, the income has a negative impact and is of similar magnitude for both types of provinces and for the British market. While for French tourists, income has, contrarily a positive and significant effect, which is higher for interior destinations (with a coefficient of more than 1). One possible reason for this result is that urban tourism or inland tourism may be more expensive, especially in the high season, and this would explain why this type of tourism could be more sensitive to changes in income.

[2] The provinces Alicante, Almeria, Asturias, the Balearic Islands, Barcelona, Cádiz, Cantabria, Castellón, A Coruña, Girona, Granada, Guipúzcoa, Huelva, Lugo, Málaga, Murcia, Las Palmas, Pontevedra, Santa Cruz de Tenerife, Tarragona, Valencia, and Vizcaya are all considered as coastal destinations. On the other hand, Álava, Albacete, Ávila, Badajoz, Burgos, Cáceres, Ciudad Real, Córdoba, Cuenca, Guadalajara, Huesca, Jaen, León, Lleida, Madrid, Navarra, Ourense, Palencia, La Rioja, Salamanca, Segovia, Seville, Soria, Teruel, Toledo, Valladolid, Zamora, and Zaragoza are considered in the group of rest destinations.

[3] Furthermore, in order to undertake other exercises of robustness, the model has been re-estimated, firstly using the Gini index as an alternative measure of seasonality given its wide use in the consulted literature to measure seasonality (Wanhill, 1980; Lundtorp, 2001; Fernández-Morales, 2003; Rosselló et al., 2004; Fernández-Morales & Mayorga-Toledano, 2008; Martín Martín et al., 2014). In all cases, this measure does not provide excessively different outcomes. Secondly, the concept of 'the number of nights spent at tourist accommodation' has been used as another indicator of tourism demand and has been also tested as a robustness exercise. Among the results, the following points may be stressed. Firstly, the monthly concentration of overnight stays for German tourists is highly rigid in comparison with that found in tourist arrivals, and strictly depends on what has happened in the past. Secondly, the British market is more sensitive to variations in income and prices when overnight stays are used, rather than tourist arrivals. This outcome could be explained due to the fact that tourists prefer to reduce overnight stays, instead of reducing the amount of trips during the peak season to variations of income or prices.

Finally, the price-elasticity results from Germany are similar in both types of provinces (positive and large). Nevertheless, for the French market, elasticities are negative and clearly higher in the case of inland provinces. It would therefore seem that differential pricing might be a reasonable and effective policy, clearly for these type of provinces.

Table 8. Estimation Results for the Main Markets (2006-2015)

	Coastal Destinations			**Rest of Destinations**		
Variables	UK	GER	FR	UK	GER	FR
L.ln_ts_o	0.647***	0.796***	0.310*	0.236	0.213**	-0.0185
	(0.114)	(0.108)	(0.165)	(0.192)	(0.105)	(0.133)
ln_income_o	-0.805*	-0.0500	0.728***	-0.896*	-0.0976	1.246***
	(0.459)	(0.248)	(0.245)	(0.466)	(0.203)	(0.335)
ln_rp_tc	-0.147	2.104***	-1.378	-0.300	2.092**	-3.829*
	(0.194)	(0.803)	(1.991)	(0.253)	(0.954)	(2.144)
relative_tm	-0.365***	-0.171*	-0.469***	-0.406**	-0.0989	-0.690***
	(0.113)	(0.102)	(0.175)	(0.187)	(0.112)	(0.207)
d_2008	0.0785	0.0183	-0.0132	0.0684	-0.0263	-0.0804*
L	(0.0608)	(0.0487)	(0.0279)	(0.0575)	(0.0371)	(0.0483)
Constant	8.093*	0.662	-6.902***	8.635*	0.734	-11.96***
	(4.437)	(2.548)	(2.276)	(4.506)	(2.020)	(3.115)
Wald Test	313.9(5) ***	315.310(5)***	59.630(5)***	14.23(5)***	12.220(5)**	20.570(5)***
Autocorrelation						
m1	-2.880***	-2.750***	-1.940**	-2.688***	-2.380**	-2.420**
m2	-0.450	-0.280	-0.370	1.44	-0.180	-1.290
Hansen Test	6.630(5)	10.490(6)	5.130(3)	21.96(15)	6.350(6)	6.200(3)
Num. Instruments	11	12	9	21	12	9
Collapse	Yes	Yes	Yes	Yes	Yes	Yes
Observations	189	192	192	225	227	236
Num. Groups	22	22	22	28	28	28

Note: Dependent variable: Logarithm of CV for monthly tourism. Standard errors in parentheses. The asterisks denote that the coefficient is significant at *10 %, ** 5 % and *** 1 %.Two-step estimation results are presented; m1 and m2 refer to first and second order autocorrelation tests. The Hansen Test is used to test for the overall effectiveness of all the instrumental variables.

5. Conclusions and Implications

This research attempts to identify and measure the impact of the seasonal determinants for British, German, and French tourism; the main international tourism markets in Spain. The work identifies a model for each market, given that in the literature available differences in tourism demand patterns between countries have been observed.

Extensive academic research has theoretically investigated the natural and non-natural determinants of monthly concentrations with respect to tourism demand. Although much less research has investigated its relations empirically. Thus, the present paper proposes and uses methodologies for empirically measuring and analysing seasonality, taking Spanish provinces as reference units.

Essentially, the main features, and contributions, of this research are as follows:

Firstly, following Butler's definition (1994), measurement is carried out by means of summary indices, especially the coefficient of variation. This is a reasonable measure, which allows the changes that take place in different months to be treated homogenously. Although, as a robustness exercise, our models have also been re-estimated using the Gini index, and in overall terms, this does not yield qualitatively different results.

Secondly, in order to explore the main explanatory factors in greater depth, a dynamic panel data model has been estimated, with data for the 2006-2015 period. The use of panel data allows us to improve our econometric specifications and parameters due, for example, to greater variability in all the variables, higher levels of freedom, scant multicollinearity and to control unobserved heterogeneity. The estimator used is Xtabond2, as proposed by Roodman (2006), which, among other advantages, reduces information loss in a relatively small sample like ours. This is an up-to-date estimation technique, and as far as we know, it has not been used in the analysis of this topic.

Thirdly, the proposed methodologies allow us to empirically test the theoretical framework of the determinants proposed by literature. For instance, even though the importance of climate in tourism seasonality has been recognized in many research studies, to date there have been few researchers that have also quantitatively examined the relationship between climate (especially in the country of origin) and tourism seasonality. Furthermore, this research includes economic variables linked to typical demand modelling in the conceptual framework.

Fourthly, these methodologies have been applied to the case of Spain, which is one of the largest international tourist destinations in the world (currently ranked 3rd, and only surpassed by France and the United States) and its monthly concentration level is one of the greatest (and with a recently-increasing path) among those European Union countries with high tourism demand. The empirical analysis has been concentrated on British, German, and French markets for several reasons: because these countries are the major source markets for tourists to Spain, and because in previous studies it has been found that these three markets contribute to explaining two-thirds of the monthly concentration of international tourism demand in this country (Turrión-Prats & Duro, 2016). Therefore, it would be reasonable to focus the analysis on these markets if when seeking to mitigate Spanish seasonality in a significant way.

The main empirical conclusion may be summarised as:

First, the estimates of the econometric model predict typically the existence of an inertial component in terms of concentration, particularly in the case of the coastal destinations. Consequently, destination marketers and planners whose work relates to these provinces might face a greater challenge in order to improve seasonal distribution, while taking into account the fact that these areas already have higher seasonality values. In the literature, the most common tactics used to counteract this imbalance have been product diversification, market segmentation, and differential pricing (Butler & Mao, 1997).

Second, the results suggest that the British and French markets are heavily dependent on their economic situation. The evidence shows that tourists from United Kingdom would tend to become less concentrated when their income increases. In contrast, in France a favourable economic situations would worsen monthly distribution, especially in inland destinations. Thus, these results may be used for designing specific anticipatory policies, given the GDP estimates for these countries. In fact, given that business cycles in the European Union may be similar, these results would reinforce the convenience of diversifying markets, and in terms of seasonality outcomes.

Third, the estimates of the models show that the German and French markets are very sensitive to variations in prices, especially this latter market in interior provinces. For French tourists, the differential increase in destination prices would involve travelling more in the off-season, given the evidence regarding the relevance of differential pricing strategies as a tool to manage French seasonality. In the case of the German market, the relationship is inverse, which may suggest a clear preference for travelling in peak seasons. For the UK, relative prices also have a negative effect (as with France) but less so. Consequently, the possible effects of Brexit, such as an increase in the price of air tickets, could lead to an improvement in monthly concentration. Nevertheless, it must be noted that the magnitude of the effect of relative price changes is lower than the income, which would lead to a worsening in the distribution of tourist flows.

Fourth, the estimates for destination climate indicate that in all the markets, an increase in the Spanish average temperature for the low season would improve the monthly distribution of tourist arrivals. With respect to home climate variables, increases in the low season temperature in the country of origin, would seem to indicate that tourists travel to Spain less in off-peak periods. However, when a temperature increase takes place in the high season, only British tourists would prefer to concentrate their trips to Spain during this season.

Therefore, the results show the differences among the main source markets, indicating that tourists have different sensitivities to changes in the determinants of seasonality. These results would suggest the suitability of specific management and marketing strategies for markets, given the absence of general homogeneities. In fact, and in general terms, we could use the information provided by the previous aggregate models and their results, together with the situation and predictions of parameters such as national income, prices and climate (home and destination), in order to anticipate the reactions of markets and therefore design rapid and appropriate policies of mitigation and correction with respect to annual seasonality.

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