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Tourist seasonality in Catalonia: The relevance of demand factors

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DEPARTAMENT D'ECONOMIA – CREIP
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TOURIST SEASONALITY IN CATALONIA:

THE RELEVANCE OF DEMAND FACTORS[1]

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Tourist seasonality is one of the main imbalances in the mass-destinations. This article seeks to provide more information on seasonality through an analysis of the situation in Catalonia, the most important Spanish region with respect to international tourism. This work focuses on a specific inspection of the main empirical factors. To achieve this, the traditional model of tourism demand has been used primarily as a reference, before an empirical application of a dynamic panel data model of markets for the 2000–2014 period (specifically using the GMM–DIFF model). Results reveal the significance of the inertial factor and the relevance of income and price factors, as well as observable behavioural differentials for some of the main source markets. We believe that the results obtained may be interesting with respect to tourism policies.

Keywords: Tourist Seasonality; Dynamic Panel Data Models; Catalonia.

JEL Classification: L83, C52.

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1. Introduction

Tourist seasonality is one of the main imbalances in the tourism sector in large-scale and well-established destinations. This imbalance constitutes a major threat to sustainable growth, tourist loyalty and brand management. In particular seasonality has, on numerous occasions, revealed damaging consequences in economic, labour, environmental and even social terms (Manning and Power, 1984; Baum, 1999; Krakover, 2000; Rosselló, Riera and Sansó, 2004). Consequently, the academic literature has attempted to analyse this problem. In one survey, Koenig-Lewis and Bischoff, (2005) identified the main areas for tourist seasonality research, specifically: the definition of the phenomenon, its measurement, causes, impacts, the policy implications and an analysis of consumer behaviour. This paper focuses on the first two of these –measurement and the analysis of causes.

With respect to measurement, different reasonable alternatives exist. In all events, if we take the definition of Butler (1994) as a reference, the most consistent indicators are from inequality (Duro, 2016). Authors such as Wanhill (1980), Lundtorp (2001), Fernández-Morales (2003), Rosselló et al. (2004) or Martín, Jiménez and Molina (2014) have particularly defended the use of the Gini Coefficient in order to quantify monthly concentrations, and this is actually the measurement that is applied the most in research literature. Duro (2016) recently suggested the attractive addition of using measurements such as indexes from the Theil family and particularly neutral measurements (i.e., those that consider all observations in a homogeneous manner, regardless of their location) as it is the case of the coefficient of variation. These measurements, which are applicable to monthly distribution for example, may be applied only if complete data exists; a situation that on occasion does not arise. If this is the case, one would then have to use

approximate measurements of an incomplete nature, for example proportions of relevant periods with respect to annual global demand.

With respect to the study of the causes, several works exist that attempt to identify and classify those factors involved in order to help explain seasonal patterns (Baron, 1975; Butler, 1994; Frechtling, 1996; Butler and Mao, 1997; Baum and Hagen, 1999; Koenig-Lewis and Bischoff, 2005 and Andriotis, 2005). However, investigations of a quantitative nature are limited. Among those factors applied that explain levels of seasonality in this type of literature, basically two types can be distinguished: natural and institutional factors. The former mainly includes variables of a climatic nature, while institutional factors refer to effects on those flows related to the specific timing of school or working holiday periods, public holidays or cultural events. In all events, if what is intended is the analysis of short-term variations or cross-sectional variations (e.g. those of source markets), as we investigate here, it seems reasonable to search for other explanations, given the expected homogeneity throughout these samples of the above factors. Economic factors, are of special interest, and require reference to those principles established by standard demand models (Crouch, 1994a, b). As is well known, Consumer Theory constitutes the basis of these models, and establishes as principles those variables that affect decisions on the consumption, that is, income and prices. In this case, it would be complicated *ex ante* to hypothesise with regard to an expected sign between the latter variables and seasonal concentration.

This work seeks to empirically measure and analyse tourist seasonality in the Spanish region of Catalonia in order to extract information and knowledge that may be used, not only to gather further data on this phenomenon, in a destination that has received little attention in research literature, but also as a guide for designing correctional and/or mitigating policies. The choice of Catalonia, as an area for analysis was made for

several reasons: firstly, this region is the primary regional destination in Spain with respect to international tourism, with over 25% of the total annual flows received for the entire country, data taken from the Frontur survey, 2014 (Institute of Tourism Studies). Secondly, those tourists who visit this region tend to move through different internal tourism destinations in the search for different aspects in the tourist experience, and thirdly, undertaking a regional analysis is of interest, as in Spain the majority of tourism-related responsibilities are decentralised to regional administrations, who implement important policies, for example those related to regional brands, tourism promotion, or the programming of products.

In short, we believe that the added values of this work in an international environment are mainly the following: firstly, the updated analysis and measurement of seasonality for Spain's main tourist region, as an international case study for the 2000–2014 period. Secondly, and even more importantly, the exploration of its main empirical points through quantitative models and especially, of dynamic panels of markets in a GMM–DIFF version. The point is that, as far as we know, this analysis is novel because it has been typically applied to global demand but not to the intra-year distribution. Thus, we believe that this paper is not only useful in terms of generating knowledge for a rellevant case in the European level but also in terms of methodology. Thirdly, the models used provide variants in order to capture behavioural differentials for large-scale markets, and this may be also useful for the development of specific policies

The paper is organised in the following manner. In the second section, previously gathered descriptive data on demand and tourist seasonality in Catalonia is reviewed. In the third section, methodological aspects associated with the modelling of their macro determinant factors are specified. The fourth section details the main results obtained

from the calculations. Finally a section is provided that outlines the main conclusions and implications that have arisen.

2. Tourism and Tourist Seasonality in Catalonia

2.1. Catalonia as an International Tourist Destination

Catalonia is one of the 17 self-governing regions of Spain. It is located in the northeast of the Iberian Peninsula and covers some 32,000 km^2. Tourism in this region is one of the main economic driving forces, representing approximately 12% of its GDP. Since 2002, Catalonia has become the main international tourism destination of the country, as it receives over 25% of the total number of tourists who visit Spain, i.e. almost 17 million tourists during the last year.[2]

In general terms, those international tourists who visit Catalonia are attracted by leisure (over 80%), they choose to organise their trips in an independent manner (over 80%), mainly use air transport (66%)—although the use of cars is noteworthy (26%)—and mainly seek accommodation in hotels (60%).

Catalonia possesses diverse tourist attractions. The main forms of tourism include sun and sand, business, cultural, rural, snow and nature tourism. Partly linked to this, the region is divided into nine regional tourist brands (areas): Val d'Aran, Pirineus, Costa Brava, Terres de Lleida, Paisatges Barcelona or Catalunya Central, Costa de Barcelona, Barcelona, Terres de l'Ebre and Costa Daurada (Figure 1). Excepting the typical errors

[2] The number of international tourists during the 2000–2014 period, which will be used as a demand indicator, is the highest number available to date. We consider that this is a reasonable indicator, as it connects with the idea of measuring seasonality as a dimension of tourist impact in the region. This data is from the Frontur (Institute of Tourism Studies).

associated with generalisations, it may be said that sun and sand products are concentrated on the Mediterranean coastal regions (Costa de Barcelona, Costa Brava, Costa Daurada and Terres de l'Ebre), business tourism is focused on the regional capital (Barcelona), while cultural tourism involves all brands and rural, snow and mountain tourism are confined to the northern and inland areas of the region (Pirineus, Terres de Lleida and Val d'Aran). In all events, it must be noted that Barcelona and the Costa Brava between them are responsible for the concentration of around 70% of international tourism registered in Catalonia.

Fig. 1. Territorial tourist brands in Catalonia.

In recent years, Catalonia has seen a growth in tourist flows. Figure 2 shows the significant increase in terms of international tourists since the year 2000, which was spurred by the rise of low-cost airlines and which was interrupted solely by the 2007–2009 crisis period (e.g. in 2008 demand decreased by 5.8% and by 11.4% in 2009). So, although the overall tourism crisis took place mainly in 2009, in previous years Catalonia was already showing clear signs of fatigue with respect to the growth during first half of the decade. After 2009, Catalonia reinitiated its growth phase, based, inter alia, on the rise of Barcelona as a world destination. The region has, in simple terms gained some 4 million tourists since 2011, mainly in the more concentrated brands, such as Barcelona.

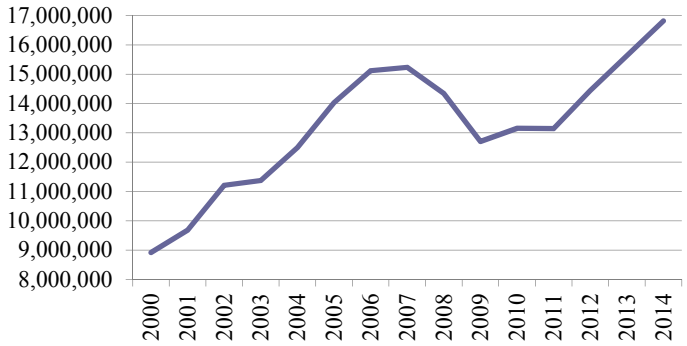


Fig. 2. International tourist arrivals to Catalonia. Source: Own elaboration through data from Frontur Survey (Institute of Tourism Studies).

If we examine the composition of the markets, the important influence of the large European (and therefore neighbouring) source markets can be seen. France is the main market, accounting for 27% of the total (due to the effect of proximity and greater familiarity)—this differentiates Catalonia from Spain, where the main source market is that of Britain. Other important markets for Catalonia are the British, the German and the Italian, which together accounted for 55% of tourists during 2014.

Table 1. International tourist arrivals to Catalonia by country of origin, 2014

Country	**Arrivals**	**%**
France	4,604,068	27.38%
UK	1,782,398	10.60%
Germany	1,429,852	8.50%
Italy	1,345,510	8.00%
Russia	833,480	4.96%
Netherlands	814,696	4.85%
Nordic countrie	758,194	4.51%
Belgium	592,598	3.52%
USA	512,603	3.05%
Switzerland	411,578	2.45%
Portugal	179,323	1.07%
Irland	178,657	1.06%
Others	3,371,241	20.05%
Total	16,814,199	100.00%

Source: Own elaboration through data from Frontur Survey (Institute of Tourism Studies).

In dynamic terms, between 2000 and 2014, the number of foreign tourists increased in most markets. The main increase was seen in the Russian market, followed at a distance by the Scandinavian countries and the USA. In all events the marked growth of the French market must be noted (18%) in addition to the increase of the Italian (12.4%) and German (9.5%) markets. The British and especially the Irish markets however registered a fall of 10% in the overall period.

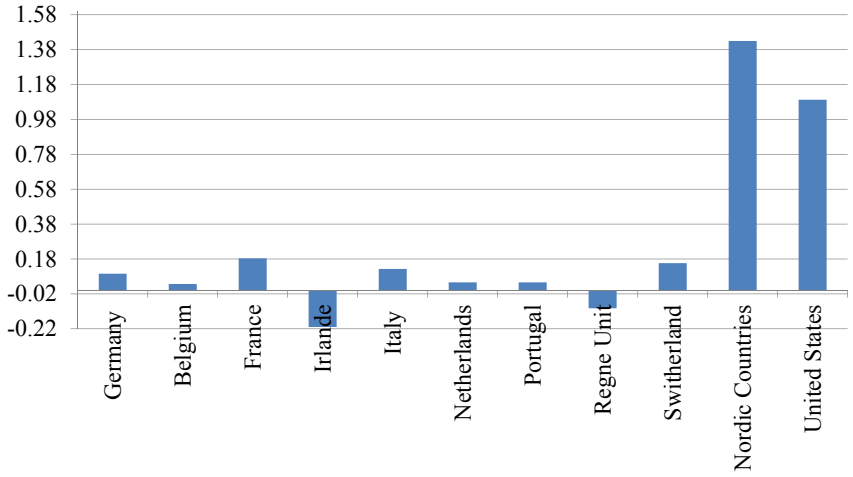


Fig. 3. Growth rates internationl tourist arrivals by markets. Source: Own elaboration through data from Frontur Survey (Institute of Tourism Studies).

2.2. Tourist Seasonality: A Descriptive Analysis

We are therefore analysing a territory having a clear expansion of demand, so an investigation of the situation and development of seasonality is of particular interest. As an initial analysis, Figure 4 shows monthly demand, with a clear one-peak distribution characteristic of those destinations with a marked climatic feature.

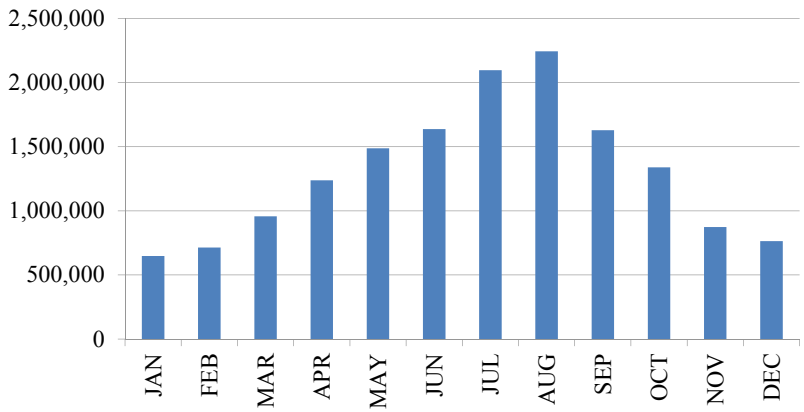


Fig. 4. Monthly distribution international tourist arrivals in Catalonia, 2014. Source: Own elaboration through data from Frontur Survey (Institute of Tourism Studies).

Beyond the mere observation of seasonal demand distribution, it is important to rigorously quantify the level of seasonal concentration, which will allow us to clarify its development over time and its comparability with other regions. In this respect the Gini[3] Coefficient, a measurement normally applied in this type of analysis, has been used and it has been calculated for the six regions with highest levels of international tourism demand in the country (Table 2). The results obtained for 2014 reveal the especially high level of differential seasonality in the Balearic Islands, followed by similar and significant figures from Valencia, Andalusia and Catalonia (0.21). Seasonality in Catalonia is linked to especially high figures in coastal areas.[4] The high level of annual demands would make it especially convenient to reduce the aforementioned values as

[3] The Gini index has been widely used in the analysis of tourist seasonality. The value of this index varies between 0 and 1. To the extent that this value are closer to one, it indicates a situation in which the variable presents a high concentration, while when the values are closer to zero it shows that the variable selected is distributed more evenly over time. Authors such as Wanhill (1980), Lundtorp (2001), Fernández-Morales (2003), Rosselló et al. (2004), Fernández-Morales and Mayorga-Toledano (2008) and Martín et al. (2014) have used and encouraged this means of measurement to examine seasonality for different areas and years. In all events the calculation of other measurements, such as the coefficient for variation do not provide excessively different results in our case. The calculations are available on request, from the authors.

[4] Duro (2016), on analysing the seasonality of the hotel demand at a provincial level (and not a regional one) finds that in the provinces of Girona and Tarragona are among those with the highest level of seasonality, together with the Balearic Islands, which are double the national average.

much as possible in order to guarantee their sustainability. Andalusia, with half the annual demand of Catalonia has a similar Gini rating. However, Madrid and the Canary Islands are on the opposite side, both with Gini ratings under 0.1, a fact explained by different reasons; business tourism and the capital effect for the former and above all climatic features in the latter (agreeable year-round temperature and reduced monthly dispersion).

Table 2. Tourist Seasonality in the six most tourist regions in Spain according Gini Coeficient

	Regions	**Gini**	**D**
1	Balearic Islands	0.469	11.365.479
2	Valencia	0.233	6.232.677
3	Andalucía	0.229	8.502.379
4	Catalonia	0.210	16.814.203
5	Madrid	0.091	4.546.694
6	Canary Islands	0.061	11.475.001
	Spain	0.208	64.990.209

Note: Gini coeffcinent has been computed acording to data for 2014; D is the overall demand in 2014. Source: Own elaboration through data from Frontur Survey (Institute of Tourism Studies).

Figure 5 provides the seasonal perspective with respect to monthly concentration using the Gini index as a basis. In fact, it can be seen that seasonality had fortunately dropped in the period of analysis, the Gini index in Catalonia dropping from the significant figure of 0.29 in the year 2000 to the aforementioned figure of 0.21 in 2014. This is an interesting reduction which leads us to consider the explanatory factors. In all events, this development has not been monotone during the cited period. The main part of this drop occurred up to 2008, with concentration figures reaching 0.19 in 2008. However, since 2009 Catalonia seems to have had greater problems in reducing this imbalance,

which also coincides with a period of intense growth in terms of annual demand, as described earlier. It therefore seems that the beneficial correlation for the earlier years of this period (overall expansion leading to a reduction of seasonality), which was probably aided by the increase in the number of low-cost airlines and secondary airports in Catalonia (in Reus to the south and Girona to the north) has not extended to recent times, in which the significant additions of new foreign tourists has met with an increased seasonal imbalance, an event that has fortunately waned somewhat in the last two years. Furthermore, one should also note the development of seasonality, which has increased in the most critical years of the global economic crisis, i.e. between 2009 and 2012. Tentatively, it appears that the economic crisis correlates with greater seasonality at an overall level. The final section of this work will help us to contrast this idea more closely.

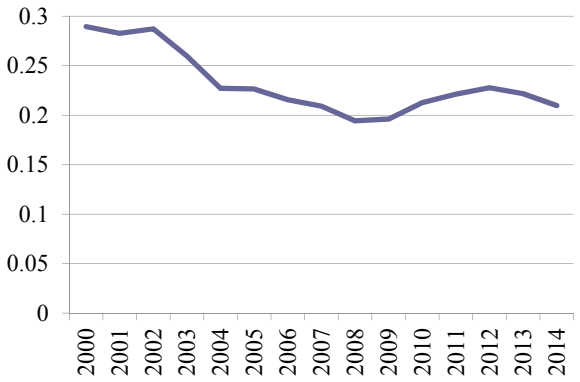


Fig. 5. Evolution of Gini Coeficient in Catalonia. Note: The value of this index varies between 0 and 1. To the extent that this value are closer to one, it indicates a situation in which the variable presents a high concentration, while when the values are closer to zero it shows that the variable selected is distributed more evenly over time. Source: Own elaboration through data from Frontur Survey (Institute of Tourism Studies).

The detailed analysis of this seasonality by source markets requires however the use of an indicator distinct to that of the Gini index; one of a partial nature. When the analysis

seeks to detail the data available at a market level, information is not provided for periods of several months in some cases; a situation that hinders the application of measures of overall imbalance, such as the Gini index. In this case an indicator of partial concentration has been used, such as that of the proportion of international visitors by country of origin from June to August within the annual total by country of origin. This measurement has been selected for three reasons—the high correlation (close to 0.93) with the Gini index for those countries where data is available, the high typical demand concentrated in those months in Catalonia and the structural similarity between the June and the months of maximum demand of July and August.[5] Note in Figure 6 that both measurements; the chosen partial method (TS) and the Gini (IG), show a highly similar development over time and for the region in overall terms.[6]

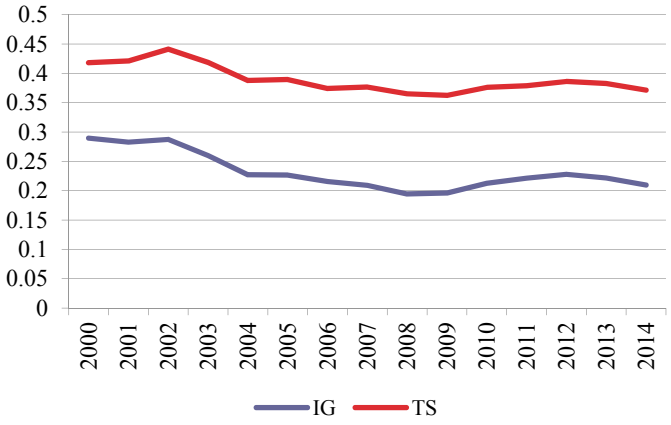
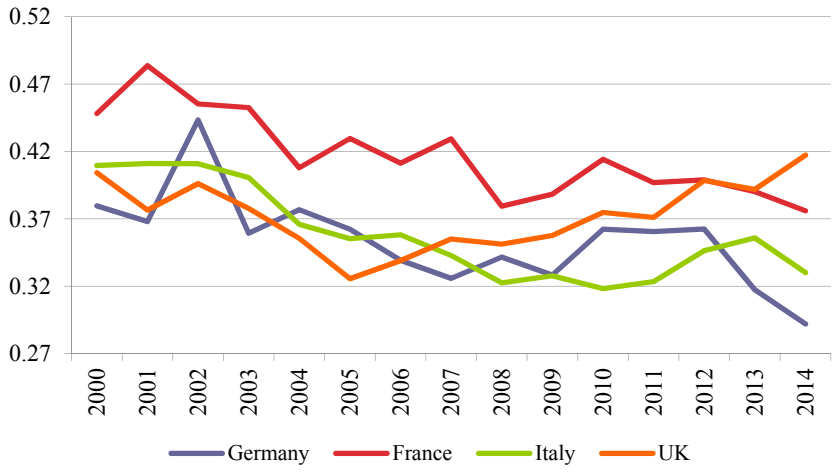


Fig. 6. Evolution of Partial Monthly Concentration and Gini Coeficient for Catalonia. Source: Own elaboration through data from Frontur Survey (Institute of Tourism Studies).

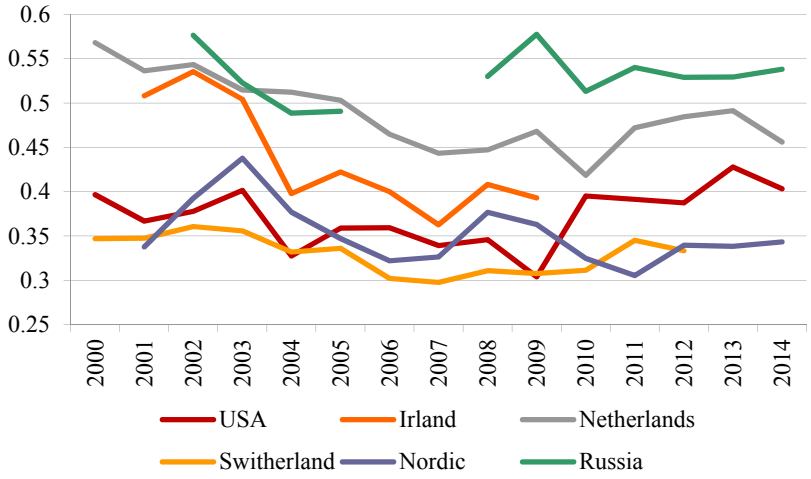
[5] Correlation in all the samples, i.e. in both the pooled figures for markets and years, as in the annual average of the cross-section of markets or the average throughout the markets in annual development, between the proportion measurement from June to August with that corresponding to July-August is very high. Calculations are available from the authors on request.

[6] It was confirmed that the correlations between the two measures were elevated, taking into account both aggregate level such as disaggregate level by segments.

The difficulty in obtaining statistical data for Belgium and Portugal has prevented their inclusion in this analysis. The results reveal that between the four main source countries, France presents greater values of partial concentration with respect to our measurement (an average of 0.42), after which come the United Kingdom (0.37), Italy (0.36) and Germany (0.35). With respect to its development, solely the United Kingdom reveals an overall (although reduced) growth. The remaining countries show significant drops. On the other hand, the difference in seasonality in large countries over the crisis period must be noted. So, while the concentration for France and Italy worsened, it improved for Germany and the UK. On the other hand, with respect to source markets of a smaller size, the high concentration of the Russian market, for example, is noteworthy, and is the largest of all markets, without a perceptible improvement in recent years. The Netherlands and Ireland also reveal high partial concentrations, with respective values of 0.49 and 0.44 on average, and which are even higher than those of the French market, but with a significant drop in both cases (until 2009–2010). The Scandinavian countries however reveal lower concentrations with an average pattern of decreased growth, but with an increasing trend since 2011.



(a)



(b)

Fig.7. a-b) Evolution of Partial Monthly Concentration by country of origin. Source: Own elaboration through data from Frontur Survey (Institute of Tourism Studies).

3. Empirical Determinants of Seasonality: Methodological Aspects

The fundamental aim of this section consists in clarifying some of the main empirical points regarding seasonal tourist concentration figures in Catalonia during the period analysed through a dynamic data panel, where the basic units of analysis are the source markets. The dynamic structure of the panel and therefore, the inclusion of the lagged dependent variable allows, among other aspects, to tackle the probable relevance of habit formation as a factor that explains the levels and the growth of this imbalance in tourism. In all events, and as will be seen below, the models include, as a fundamental aspect, those variables normally used in tourism demand models, i.e. income levels and price variables.

In order to undertake the analysis, the eight individual source markets have been included, with the data available from the dependent and explanatory variables. In all events, these markets (France, the United Kingdom, Germany, Italy, the Netherlands,

the United States, Switzerland and Ireland) represent two thirds of the total number of international arrivals made during the period being investigated and include the four main markets. Thus, it seems to us that this analysis is appropriate, taking into consideration the proper precautions.[7]

The dependent variable chosen in the analysis, as noted in the section above, is a partial measurement of monthly concentration, i.e. the proportion of international visitors by country of origin from June to August within the annual total by country of origin.

As a theoretical reference model, the classic model of microeconomic demand has been used in which, as is well known, the basic determinants used coincide with income and prices (Crouch, 1994a, b). The model includes as determinants, the following variables: the lagged measurement of concentration, relative price at the destination, income, the exchange rate and the price of oil, the latter being a proxy for transport costs. Note that in the last three cases the price type variables are different and their separate inclusion seeks to capture the different sensibilities of consumers with respect to them and their variations. We provide more detail on consistency and on the usefulness of each one of the variables below.

Firstly, the model includes the lagged dependent variable. This approach allows us to identify whether or not an inertial behaviour in seasonality that is related to habit formation in international tourists exists and, if so, from which entity. This demand characteristic may be attributed to the reduction of uncertainty, especially that of weather and the offer of tourist accommodation services, which involves repeating

[7] It must be taken into account, in this respect that the maximum coverage has not exceeded 75%, as some of the source markets are not individualised due to a lack of sufficient observations (i.e. the Other Countries and Scandinavian Countries group). In this case, the sample used would involve using almost 90% of the maximum individualised demand possible.

travel over time, to the willingness to enjoy the same tourist accommodation services or to the transfer mechanisms of information among people. Nevertheless, the inclusion of lagged explanatory variables is becoming a fairly common practice in global demand modelling (Witt and Martín, 1987 or Garín-Muñoz, 2006), it is therefore logical to extend this practice to the analysis of the seasonal concentration of this activity. Note that in this case, that this point would indicate the presence of a certain level of automaticity in the imbalance and its dynamics and in turn, to some extent, this would indicate difficulties in varying a part of the concentration.

Secondly, the price variable coincides with a relative measurement that relates the Consumer Price Index in the country of destination to the Consumer Price Index in the country of origin, this being possibly the price measurement most often applied in research literature. It may be a matter of discussion as to whether to use a price index for specifically tourist-orientated goods, or one of a more general nature. It might seem more appropriate to use basically, those goods and services that are specifically used by tourists. One must keep in mind that a tourist-orientated product covers different factors (travel insurance, the goods and services purchased at destination, transport costs, etc.) and as a result, determining an overall price is a complicated task. However, although it may appear conceptually more convenient to use tourist prices, in our case this has not been possible due to a lack of information. Authors such as Daniel and Ramos (2002), Garín-Muñoz and Montero (2007) and Garín-Muñoz (2009), among other, have also opted to include overall price indexes as a proxy for the relative cost of living in the country of destination.

Thirdly, as proxy for the income, data from Real Gross Domestic Product per capita from the source country will be used. Furthermore, in order to standardise the values of

the different countries of origin, income is expressed in purchasing power parity. The use of the variable in its distinct versions, constant or current prices or in per capita terms, is normal in the investigations of tourist demand models due to the difficulties in obtaining direct income data (Ledesma-Rodríguez, Navarro-Ibáñez and Pérez-Rodríguez, 2001; Garín-Muñoz and Montero, 2007; Song and Witt, 2012). With respect to the predicted effect of the latter on seasonality, this is unknown a priori, as in the case of the prices. Thus, depending, for example on aspects such as the profile of the affected tourists and of their composition on the overall results, the relationship may be positive or negative. The empirical results may reveal indirect evidence on this matter.

Fourthly, the type of nominal exchange rate between the destination currency and the currency of the source country has been specified separately using an additional variable in order to capture the effect of prices (or the real income effect). This approach has two explanations (Sinclair and Stalber, 1997). On one hand, inflation rates and nominal exchange rates may be distinct in the short term, which means that they may have different effects on tourist demand. On the other hand, for tourists, the information on nominal exchange rates is more accessible, visible and less ambiguous than with the development of inflation rates. Other authors, such as Rosselló et al. (2004, 2005) and Ledesma-Rodríguez et al. (2001) have worked in the same way.

Finally, we have added the average annual import price for a barrel of oil as a proxy for transport costs. Investigations already undertaken opted to use this approach (Garín-Muñoz, 2006; Ledesma-Rodríguez et al. 2001). For considering the complex structure of the transportation system which determines a high variability in transportation prices (e.g. low-cost flights). Their effect on demand could or not be important, although their influence on seasonal concentration is not clear. In all events, the choice of the indicator

to be included is often complicated and it is not often possible to have complete information. This is therefore a variable whose use has always been somewhat controversial (Crouch, 1994a, b).[8]

The empirical base model used in the final analysis was the following:

$$Ln\ TS = \beta_0 + \beta_1 Ln\ TS_{i,t-1} + \beta_2 Ln\ PR_{i,t} + \beta_3 Ln\ GDP_{i,t} + \beta_4 Ln\ EX_{i,t} + \beta_5 Ln\ TC_{i,t} + u_{i,t} \quad (1)$$

As an extension of the above, it is of interest to consider the possible relevance of the differential effects of the variables with respect to the markets (at least the main ones), and taking into account those limitations imposed by the size of the sample and the mechanism used for calculation. In this respect, interaction variables have been tested among the regressors and the four main markets (France, Germany, the UK and Italy). The complementary model finally used, based on the significance of the interaction variables by country was the following:

$$Ln\ TS = \beta_0 + \beta_1 Ln\ TS_{i,t-1} + \beta_2 Ln\ PR_{i,t} + \beta_3 (Ln\ PRi,t * DI_i) + \beta_4 Ln\ GDP_{i,t} + \beta_5 (Ln\ GDP_{i,t} * DA_i) + \beta_6 Ln\ EX_{i,t} + \beta_7 (Ln\ EX_{i,t} * DRU_i) + \beta_8 Ln\ TC_{i,t} + u_{i,t} \quad (2)$$

Table 3 provides a brief description of the variables used in this investigation.

[8] Although the model used in the end does not include fictitious variables in order to gather the influence of atypical observations, as the result of events or extraordinary occurrences, in preliminary versions the relevance of dummies, among other factors, was tested 2001 and 2008, in order to monitor the effects of the terrorist attacks and the global crisis, which did not produce any statistically significant results. Data available on request from the authors.

Table 3. Variables description.

Variable	Description	Obs.	Average	Std Dev	Mín.	Max.
TS	Partial Monthly Concentration Measures for international tourists	114	0,390	0,061	0,292	0,568
RP	Relative Consummer Price Index (destination/origin).	120	0,971	0,048	0,819	1.090
PR_DI	Differential Relative Consummer Price Index (destination/origin) effect for Italian market	120	0,122	0,325	0	1,101
GDP	GPD per capita country of origin	117	35.673,11	4.912,124	26.666	45.665
GDP_DA	Differential GPD per capita effect for German market	120	4.201,667	11.180,01	0	36.163
EX	Nominal Exchange Rate	120	0,987	0,197	0,609	1.642
EX_DRU	Differential Nominal Exchange Rate effect for UK market.	120	0,171	0,458	0	1,642
TC	Import Average Oil Price by country of origin	104	60.841	30.885	22.070	115.640

The data panel for 2000–2014 period are not balanced, as some countries do not possess observations for every year. The data used with respect to the determinant variables are from the Organisation for Economic Co-operation and Development (OECD), of the Institute of Tourism Studies (IET) and the National Institute of Statistics of Spain (INE).

The empirical results have been obtained by using panel data, as mentioned, which both allows us to reduce multicollinearity and helps us in dealing with the problem of omitted variables (Hsiao, 2003). Given the dynamic structure of the specifications, however, the use of a fixed-effects panel and/or random effects panel would cause random and inconsistent estimates, unless the time dimension is very high, which is not the case here (Baltagi, 1995). Given these circumstances, we decided to use the GMM–DIFF method (Arellano and Bond, 1991), which uses lagged dependent variables as

instruments to create consistent and efficient estimates. The use of this procedure with respect to differences also helped us to eliminate the problem of non-stationarity and allowed us to obtain short and long-term elasticities. This method may be used in a one-step or two-step mode, depending on the weighting matrix being used. In our case, we selected the one-step option (in the robust standard errors option) as it is preferable for inference on coefficients, especially in small samples like ours (Arellano and Bond, 1991). With respect to the instruments we used the delays of the dependent variable with a maximum of two periods for reducing biases due to the existence of many instruments with respect to sample size. (Alonso-Borrego and Arellano, 1999).

4. The Main Results

This section presents the main empirical results obtained from the estimates made using the GMM–DIFF model with the dynamic data panel for international tourists in Catalonia. The estimates have been obtained from STATA v.13 econometric software. Table 4 shows that the model functions satisfactorily, as indicates the Wald Test for the joint significance of the independent variables, that of serial correlation and that of Sargan on the over-identification of restrictions.[9] The corresponding results are also shown for long and short term elasticities, the latter being calculated on the assumption of long-term equilibrium ($Ln\ TS_{i,t} = Ln\ TS_{i,t-1}$) and were therefore obtained by dividing each one of the coefficients by $(1- \beta_1)$. In any case, the number of observations is not high and

[9] The serial correlation test ascertains as to whether perturbations are independent and identically distributed. The final part involves a test on the identification of restrictions, which evaluates the validity of the instruments, so that contrasts may be made with the non-correlation and the error term. Therefore, both cases are tests that evaluate the validity of the model specification.

therefore the results should be interpreted with caution, being interesting to complete them later when more information is available[10].

In the light of these results, the following points of interest may be noted:

Firstly, the lagged coefficient in the measurement of concentration shows that increases of 1% in concentration from the previous year would give rise to increases of close to 0.2% in current seasonality. Note that this result indicates the existence of a certain level of automaticity or rigidity in the variation of partial monthly concentration. This figure however is not especially high and therefore it also suggests that there is margin for implementing correction measures or for correcting this imbalance in the seasonal area.

Secondly, the overall results obtained for price elasticity in the short term suggest that the relative price does in fact influence concentration, namely in a negative manner, i.e. increases of 1% with respect to annual relative prices reduce tourist concentration to around 1.3% at an overall market level, such that, with increases in relative prices in Catalonia, international tourists opt to make more journeys outside the June to August period, probably to take advantage of its lower pricing characteristics. In the long term, the price elasticity of the concentration results in a high value of -1.5%. This sensitivity, which is the largest of the variables, therefore reveals the importance of pricing strategies as a key policy element. The strategy of high prices could thus seem advisable in this context, although obviously it would be conditional upon its effects on overall demand, which typically are negative.

Thirdly, the results show that income in the country of origin is also an important variable for explaining those changes in monthly concentration for activity in Catalonia. The findings suggest that in the short term, an increase of 1% in the income of countries

[10] Nevertheless, other papers like Garin-Muñoz (2006, 2009) have used a similar sample with a similar methodology but in that case implemented for explaining global yearly tourist demand.

of origin would reduce concentration in Catalonia by 0.9%; a reduction that would amount to 1.1% in the long term. Consequently, an increase in income in the more important economies would not only be positive in terms of annual demand but also in terms of its seasonal distribution. However, by the same token, any crises would worsen everything. In terms of policy, this result would suggest that in recessive markets or economies, or those with macroeconomic weaknesses, it is necessary to step up the introduction of anticipatory policies to increase demand in months with less activity. Furthermore, given that markets can experience different cycles, it would be interesting to diversify not only in terms of the overall annual demand (Garín-Muñoz, 2006) but also in terms of its monthly distribution, given our evidence.

Fourthly, the exchange rate has a positive and important effect on the partial concentration of tourist demand. As such, when the exchange rate is beneficial for the country of origin (i.e. own currency appreciation) a larger concentration of demand arises from June to August. An increase of 1% in the nominal exchange rate increases concentration by almost 0.4%. A qualitatively similar result was obtained by Rosselló et al. (2004) in their analysis of the Balearic Islands. Authors such as Crouch, (1994a, b) and Lim (1999), which focused on modelling annual overall tourist demand, have shown that although the exchange rate has a positive impact on demand, the type of tourist attracted by variations in the exchange rate is characterised by reduced spending capacity. In our case, this would lead to an interpretation that currency appreciation would also, to a large extent, mean that people who had previously not thought about visiting Catalonia during the months of higher demand, probably due to their profile as medium to low spenders and/or their high sensitivity to price, would now do so, due to the 'artificial' increase in terms of their spending power.

Finally, the estimated value for transport costs suggests that its impact on concentration is both positive and important, although reduced, with coefficients in the long and short term of 0.08% and 0.1%, respectively. The results therefore indicate that increases in oil prices lead to a higher concentration of demand during the summer. This may be due to the fact that with increased travelling expenses (usually for road use) visitors decide to make fewer trips during the year, but however do still travel during the summer. International tourist arrivals to Catalonia by road are superior than the other autonomous communities of Spain due to the proximity of this territory to Europe borders, between 2004 and 2012 representing on average 41% of arrivals.

In all events, one must be careful with this idea, as the low value of this parameter derives from difficulties involved in ascertaining the effect of transport costs in a more effective manner.

Table 4. Dynamic Model Results (2000-2014)

GMM-DIFF estimates			
Variable	Coeff.		Rob. Std. Err.
Ln $TS_{i,t-1}$	0,16	***	0,06
Ln PR	-1,28	***	0,43
Ln GDP	-0,93	***	0,29
Ln EX	0,42	***	0,11
Ln TC	0,08	*	0,05
_cons	8,55	***	3,03
Autocorrelation			
m_1	-2,043		
m_2	1,149		
Sargan Test	20,709 (20)		
Wald Test	73,21 (5)		
Obs.	84		
Long term parameters			
Ln *PR*	-1,526		
Ln *GDP*	-1,104		
Ln *EX*	0,503		
Ln *PCO*	0,096		

Dependent variable: Logarithm of partial concentration *denotes a significance level of 10 %, ** of 5 % and *** of 1 %.

Taking the basic results above as a starting point, it would be interesting, from a practical standpoint, and above all with respect to policy guidance, to explore the relevance of interaction variables by markets and therefore explore if important differential effects arise in sign or in scale or not and in which markets. Empirical studies, such as those of Croes and Vanegas (2004) and Mello, Pack and Sinclair (2002) have in fact observed these differences in tourist demand patterns with respect to the source country in question. The most relevant results obtained are summarised in Table 5. The table details four estimates, in which one contains the variables of the base model, the only difference being the inclusion of those distinct variables of interaction that have proven of significant. Model 1 incorporates the variable for relative price interaction with the Italian market, Model 2 includes the differential income effect found for Germany, Model 3 exchange rate for the United Kingdom and finally, Model 4 includes all the interaction variables together. The results obtained may be resumed in the following basic points:

First of all, it should be mentioned that the estimates obtained in this case confirm that the coefficients of the base model are maintained at an approximate level. This means that there are no significant changes in the values of the main determinants on introducing the interaction variables.

Secondly, Model 1 reveals that the price variable, when further separated for the Italian market, shows a high and differentially negative value. It therefore appears that Italian tourists are especially sensitive with respect to prices, and when confronted with increases, differentially divert their consumption to non-peak months. As such, this market would be especially sensitive to intra-annual mobilisation with respect to prices (and which represents 8% of the total demand). This market would therefore appear to

be a good candidate for intensifying campaigns based on prices in order to redistribute it in an another way on a monthly basis.

Thirdly, Model 2 shows that the coefficient for variable income in the German market is differentially high, but positive, countering the generally negative effect that was found. Income elasticities indicate therefore, that for Germany, favourable economic conditions clearly increase concentration. This result therefore suggests that the German market, when faced with economic crises decrease to a smaller (larger) extent its relative consumption in non-summer (summer) periods. In this regard, these results could indicate that in periods of lower economic growth in Germany, more demand is removed proportionally from the peak months. This may be because during these months, the main mobilisation comes from tourists with a medium to low income, when compared with the typical profile that is mobilised in the non-middle months. Therefore, during German expansion phases, one would have to design specific policies in the off-season for all the profiles, especially those of a medium to low output.

Fourthly, Model 3 shows that the British rate of exchange affects concentration in Catalonia less than the rest of the markets. This means that in this country there is a larger mass of tourists with respect to other relevant markets (i.e. with their own currency) who, with respect to the appreciation of currency, direct their demand more towards the non-summer period than in the Swiss or North American market, for example. This result may be attributed to a greater prevalence in the British market of medium to low spending tourist profiles.

Finally, it must be noted that Model 4, where all interaction variables are integrated together, does not reflect substantial changes in the coefficients in values and/or signs. However, we must consider that this model has a larger number of instruments and

therefore must be taken into consideration with precaution due to the level of demand required for the available sample.

Nevertheless, we present a last comment on the virtues of the specification. As mentioned earlier, the type of modelling and econometric technique used and the tests supplied would seem to indicate an absence of serious problems with respect to specification. In all events, several collateral tests were made in order to detect possible biases through the omission of relevant variables or multicollinearity, without any outstanding errors being detected.[11]

[11] In this respect, the model with pooled data was tested without finding any evidence of this possibility (using the Ramsey, RESET application test), nor was multicollinearity encountered at a general level (VIF calculation). More data is available, on request from the authors.

Table 5. Dynamic Model results acording to market (2000-2014).

GMM-DIFF Estimates												
	1			2			3			4		
Variable	Coeff.		Rob. Std. Err.	Coeff.		Rob. Std. Err.	Coeff.		Rob. Std. Err.	Coeff.		Rob. Std. Err.
Ln $TS_{i,t-1}$	0,124	**	0,050	0,169	***	0,060	0,138	**	0,062	0,112	*	0,05938
Ln PR	-1,208	***	0,414	-1,270	***	0,449	-1,437	***	0,443	-1,331	***	0,439
Ln_PR_DI	**-3,390**	****	**1,352**							**-3,309**	****	**1,674**
Ln GDP	-1,069	***	0,256	-0,976	***	0,262	-0,831	**	0,329	-1,033	***	0,267
Ln GDP_DA				**1,249**	****	**0,536**				**1,032**	*****	**0,542**
Ln EX	0,409	***	0,095	0,399	**	0,100	0,491	***	0,150	0,443	***	0,108
Ln EX_DRU							**-0,342**	*****	**0,207**	**-0,273**	****	**0,111**
Ln TC	0,102	**	0,047	0,069		0,045	0,078	*	0,047	0,090	*	0,051
_cons	9,905	***	2,668	7,421	***	3,031	7,550	**	3,428	8,172	***	2,954
Autocorrelation												
m_1	-2,008			-2,008			-2,056			-1,992		
m_2	0,922			1,011			1,115			0,768		
Sargan Test	28,865 (20)			27,688 (20)			29,673 (20)			27,136 (20)		
Wald Test	69,22 (6)			640,95 (6)			268,25 (6)			1746,27 (7)		
Obs.	84,000			84			84			84		
Long-term parameters												
Ln *PR*	-1,379			-1,529			-1,667			-1,500		
Ln PR_DI	**-3,870**									**-3,728**		
Ln *GDP*	-1,220			-1,175			-0,964			-1,163		
Ln *GDP_DA*				**1,503**						**1,163**		
Ln *EX*	0,467			0,480			0,570			0,499		
Ln *EX_DRU*							**-0,397**			**-0,308**		
Ln TC	0,117			0,083			0,091			0,102		

Note: Dependent variable: Logarithm of partial concentration *denotes a significance level of 10 %, ** of 5 % and *** of 1 %.

5. Discussion and Final Conclusions

Seasonality is one of the most important imbalances threatening the sustainability of growth in tourist destinations, especially those that are well-established and subject to massification. Seasonality is a serious threat to economic efficiency, as assets remain unused for part of the year, while they are over-congested the rest of the time. It is also a serious threat from a labour-orientated standpoint, as it affects both the quality of human capital and its productivity. It is a serious environmental problem with respect to the negative externalities that result from overuse. And finally, it is a serious threat in terms of social stability, as it causes problems in terms of safety, health, social climate and duality with respect to residents. As such, it is logical that the academic community has been concerned with the analysis of this issue, especially since the well-known manual written by Baron in 1975. Among the aspects of concern to academics are measurement, analysis and the exploration of key factors (Koenig-Lewis and Bischoff, 2005). Measurement and analysis are fundamental, as they allow us to discover where we are and how we have reached this point. The clarification of these key factors allows us to investigate the explanatory factors in a rigorous manner in order to (and from this position) offer guides with respect to the design of policies concerned with correction and mitigation. This paper deals with both aims.

Firstly it measures and analyses seasonality or the seasonal concentration of tourist demand in the main region of Spain with respect to the number of international tourists received (Catalonia) throughout the 2000–2014 period. Here, it offers an interesting case study for analysing and adding to existing international evidence. Secondly, and in a more innovative methodological manner, it empirically examines the region's main factors through the use of a dynamic panel data model (DPDM) for markets, covering the 2000–2014 period, which, in addition to checking for various econometric biases,

allows us to clarify the inertial part of the concentration. We are unaware of a similar analysis in works that have examined seasonality. It is a conventional application technique for the analysis of overall demand, but not for its monthly or intra-annual distribution. The theoretical model used as a reference to explore the factors is the standard demand model that focuses on income and price effects. Although some literature also concerns itself with factors of another type for seasonality, such as institutional determinants, we consider that for an analysis of a single destination, different markets, seasonal variations and a relatively short space of time, these factors would not explain much, as they are reasonably homogeneous throughout the sample. In all events, the models used do not appear to have problems with respect to the omission of relevant variables.

Before offering a summary of the main empirical results obtained, we might make some previous points. One, the demand variable used as an indicator for analysis is the amount of international tourists. This variable is regularly used in analyses and furthermore, it seems especially reasonable if one wishes to analyse seasonality in terms of pressure on territorial resources. In all events, it possesses the advantage of including all demand in terms of accommodation, regardless of whether this is regulated or not. Secondly, and although it would have been better to have used a complete concentration measurement, such as the Gini coefficient, this was not possible due to a lack of monthly data for certain source markets and years. In this case, we opted to use a measurement of partial concentration, such as that of demand weight in the summer months, from the total figures. We consider that this proxy is fairly reasonable as it analyses a single destination that has a marked summer tourism component. The correlation analyses between the Gini index and the partial measurement for Catalonia

and the source markets for which the analyses are available display markedly high values.

The main conclusions of this work may be summarised as:

Firstly, Catalonia is a regional destination with an important tourist concentration, one which is problematic, when compared with the annual number of tourists it receives. Its main market is France, which is the market that provides the highest average seasonal concentration from among the larger countries. Fortunately, the global monthly concentration was reduced between the year 2000 and 2008, a fact probably caused by the rise of low-cost airlines, secondary airports and Barcelona becoming a global destination. However since then, no improvements have occurred, despite the addition of 4 million tourists. Indeed, the time patterns of the overall Gini index for Catalonia appears to suggest a relationship between the global economic cycle and its dynamics traced, i.e. the phases of overall economic growth favour the reduction of concentration, but the emergence of the crisis would end up making it worse. This is useful as information for policy-making, as when crises occur, not only should we be concerned about the total amount of attraction, but also its seasonal distribution, which may naturally tend to worsen.

Secondly, the estimates of the econometric model suggest the existence of a significant inertial component in terms of concentration. Therefore, word of mouth or greater knowledge not only acts by repeating flows at the destination, but also by repeating them in a similar period. As such, the results suggest that some of the variations in concentration are rigid, and depend strictly on what has happened in the past. In all events, and given the size of the coefficient of the lagged variable, the results suggest that also there is room to act on that area of seasonality that is not so automatic.

Thirdly, the estimates allow us to conclude that the prices have an important effect on concentration and especially their higher pricing would reduce demand during the summer months, this effect being much greater in the case of the Italian market. It is relevant in terms of prices strategy but also we need to take into account the possible effects on yearly global demand.

Fourthly, results suggest that the income effect is also relevant. Thus, the economic growth of the source markets are associated, overall, with reductions in seasonal concentration (June to August) in Catalonia. This result introduces some aspects in terms of policy. However this global finding would not be the result for the German market, which can be associated to the special rellevance of low-income profiles or specifical problems for atracting them in low seasons.

Fifthly, the estimates allow us to conclude that the appreciation in the currency of the source country gives way to increases in seasonal concentration of demand in Catalonia. That also could be associated to the typical emergence in theses situations of low-income profile tourists. In all events, in the case of British tourists, this effect would clearly be smaller.

Therefore, the evidence suggests that, given the context of last growth in seasonality in Catalonia, which has coincided with increased global demand, combating it would appear prominently in the regional tourism strategy. Specifically, the results suggest further taking into account the cyclical situation of the economies in order to design specific policies in this regard, and also address the specific problems associated with various markets, such as German, among others aspects.

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