The economic determinants of seasonal patterns. Seasonality in monthly international tourist arrivals to the Balearic Islands.

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Abstract

Seasonal variation in demand is a well-documented phenomenon in tourism literature. For the tourism industry, seasonality is a problem related to the efficient use of capacity. Although there is a general agreement that certain characteristics influence the shape of the seasonality curve (i.e. the climate, institutional patterns like school holidays or calendar holidays, special events etc.), there is no scientific theory on tourism seasonality. The purpose of this paper is to provide evidence about the influence of some economic variables over the seasonal pattern of tourist arrivals using the Gini Coefficient and regression analysis.

1. Introduction

Seasonality is a well-documented issue in the tourism literature, particularly in relation to cold-water regions of Europe and North America (Sutcliffe and Sinclair, 1980; Snepenger et al. 1990; Donatos and Zairis, 1991; Kennedy, 1999, Jeffrey, 1999; Baum and Lundtorp, 2001). Although the reasons for significant variation on the demand side are also well documented (climate, institutional patterns like school holidays or calendar holidays, lifestyle, special events, etc.), there is no scientific theories on tourism seasonality.

Many papers have appeared in the tourist literature modelling seasonality (Kulendran, 1996; Gonzalez and Moral, 1996; Kim, 1999, Sorensen, 1999 and Greenidge, 2001) measuring seasonality (Ashworth
and Thomas, 1999; Lim and McAleer, 2001) and tackling seasonality (Wanhill, 1980; Yacoumis, 1980; Baum, 1999). Nevertheless, none of them has focused in identifying which can be the factors influencing the particular seasonal pattern of the tourist demand beyond the very general assumptions mentioned above.

If exclusively climate, school holidays or special events originate seasonality, the government performances will be limited and directed to mitigate the effects of these agents. On the other hand, if we found that other economic factors influence the seasonal pattern, private and public sectors could forecast efficiently the shape of tourism distribution during the year and consequently manage the tourist inputs more efficiently.

Over the past few decades, preferences for holidays have changed. Today people are more inclined to separate their holidays into several sub-periods, giving them the opportunity for summer as well as winter breaks. The perception that tourists from Northern Europe are substituting the traditional resort destinations in the Mediterranean for other more exotic and distant during the summer, meanwhile, weekend holidays to these traditional destinations during the no-summer period are increasingly more frequent, should be reflected in the seasonal pattern of the tourist arrival data under consideration. Thus, the objectives of this study are to detect changes in the seasonal pattern, and identify the relation between some important economic variables in the origin countries and the evolution of the seasonal pattern. We will use monthly data for tourist arrivals in the Balearic airports (Spain) for the period 1982 to 2001. Although the methodology provided in this paper was applied to visitor data, it need not be restricted to tourism but may be applied to other sectors of the economy where seasonality occurs.

The rest of the paper is organised as follows. In the second section methodological considerations about the measurement of seasonality are presented. In the third section, some figures about seasonality in the Balearics are discussed and analysed. The fourth section examines if there is a relationship between the seasonal pattern of tourist arrivals and the main tourism economic determinants, and finally, the fifth section contains a summary and the concluding remarks.

2. MEASUREMENT OF SEASONALITY

The basic unit for measuring tourism seasonality and tourism demand is usually the number of visitors. If the purpose is to measure economic impacts, the use of tourist expenses would be a better standard, but such figures are seldom available. In the following, \( y_i \) is the number of visitors at time \( i \), where \( i \) indicates the month. In many cases, the simple plot of \( y_i \) can be useful to get a first view of the phenomena. However, to eliminate the influence of the trend, \( y_i \) is often related to the total number of visitors during the year. But, because seasonality is a particular kind of non-uniform distribution, different measures have been proposed in the tourist literature for its quantification (see, for example, Yacoumis, 1980; Sutcliffe and Sinclair, 1980 and Lundtorp, 2001). Although the non-existence of important differences between these measures, the Gini coefficient, a well-known tool in economics for measuring inequalities, has been the most used. Some authors have argued that the advantages of the Gini coefficient are that it is a measure that take account of the skewness of the distribution and it is less influenced by extreme values than others measures (Wanhill, 1980). On the other hand, how is highlighted in Sen (1997), the Gini coefficient satisfies the Pigon-Dalton conditions, that in terms of the tourist demand, it involves that tourists transfer from a month with a great occupation to other in which this is smaller, reduces the seasonality measure. Finally, Lundtorp (2001) argues that the Gini coefficient, as a measure for the distribution of visitors during the year, shows a great stability and it is suitable for demonstrating the importance of seasonal concentration and dispersion.

The formula for the yearly Gini coefficient \( (G) \) used here can be written as:
where,
\[ p_j = \text{the rank of the fractiles. In our case } 1/12, 2/12, 3/12, ..., 12/12, \]
\[ q_j = \text{the cumulated fractiles in the Lorentz curve, } f_j^*, \]
\[ j = \text{the different months into the reference year.} \]

The fractile for a particular month \( j \), referent to \( G \), is defined as:

\[ f_j(G) = \frac{y_j}{\sum_{j=1}^{12} y_j} \]

where \( y_j \) is the tourism demand reference variable mentioned above. According to the Lorenz curve, \( f_j^* \) denotes that the fractiles have been ranked from the minor to the greater.

By definition, the \( G \) takes values from 0 to 1,\(^1\) with 0 for equality distribution (all the tourists perfectly distributed along the months) and 1 for the entire tourist demand concentrated in one single month.

### 3. SEASONAL PATTERNS IN THE BALEARIC ISLANDS

International monthly passengers to the Balearic airports are used as a case study. There are many factors that explain the appropriateness of the Balearics airport data. Firstly, the geographical characteristics of the Islands cause that tourists arrived by boat (4%) are a minority compared with those arrived by plane (96%). Secondly, a higher presence of international mass tourism of the ‘sun and sand’ variety since many decades ago and consequently a stable tourist typology along the time. Finally, that data has been collected correctly, without changes in the compilation methodology. Then, data used in this study consists in the monthly aggregate tourist arrivals to the Balearics between January 1982 and December 2001 and was supplied by CRE (Centre de Recerca Econòmica - Economic Research institute). Data comes from the official statistics of air passengers of the Balearic airports and is elaborated periodically by AENA (Aeropuertos Españoles y Navegación Aérea - Spanish Airports and Air Navigation).

The evolution of international monthly tourist arrivals to the Balearic Islands from 1982 to 2001 is investigated in Figure 1 where an extremely seasonal shape and the evolution of the Gini coefficient is observed.

\(^1\) Note that the Gini coefficient from equation [1] takes values from 0 to 11/13, and needs to be multiplied by 13/11 in order to be normalized.
The particular figure of the number of international tourists (INT) could be similar for many summer holidays resorts, with many visitors during the peak season and almost non-in the off-season. But, what is remarkable is the little trough detected in the summer period during the last years. This constitutes the first sign that the performance of the consumers toward the traditional and nearby sun and sand destinations is probably changing in the direction mentioned above. While some years ago, many European tourists went away on international vacation once a year, nowadays some of them have the opportunity to go on holiday more than once and they are substituting nearby destinations (like the Balearic Islands) for more distant or exotic ones during the peak season. On the other hand, they have the possibility to come back to the traditional destinations during other shorter holidays periods. This hypothesis is backed up by the evolution of the Gini coefficient, that, from Figure 1, a clear fall during the last years is observed (GINI).

To deepen in the matter, the behaviour of the different nationalities is analysed in Figure 2 where the monthly participation of German, British and the Rest of International tourists (GER, UK and RINT respectively) are depicted in reference to year 2001. How is highlighted, German tourists are the most
popular during the off-season, while British and other international tourists are more frequent in the peak season. It is often argued (Rosselló, 2001) that it is common for UK tourists to look, preferably, for sun-and-sand holidays, whereas German tourists come to the Islands because they are near from the point of view of travelling time, for the peace and quiet of the Balearics and for the increasing second homes purchased recently by German people.

But if the dynamic analysis of seasonality is introduced in the origin differentiation, the contrast between German and British tourism becomes more evident. In this way, first and second columns in Figure 3 capture the evolution of the monthly participation (during the year) of German and British tourists to the Balearic Islands respectively.

**Figure 3. Monthly participation of annual tourist arrivals. Yearly evolution**

For the German case, it seems clear that a progressive decrease in the relative importance for the months in the peak season (June, July, August and September) is compensated by the progressive increase in the relative importance for the months in the off-season (January, February, November and December). On the other hand, during the months of the medium-season (March, April, May and October) there is no a clear tendency, even though the months of March and April show some increase.
For the British case, there is not a clear increase or decrease in the relative importance for the months in the peak season and in the medium-season. Nevertheless, during the off-season months there is a decrease.

Naturally, as is observed in Figure 4, these special features have their impacts in the Gini coefficient evolution. As is observed in Figure 4, the Gini coefficient for the German tourism (GGER) remains under Gini coefficient for the British tourism (GUK) over the period analysed. This fact is interpreted as a greater distribution of the German tourists during the year, while tourists from United Kingdom are more concentrated during the peak seasons. Furthermore, GGER shows a negative tendency going from values closed to 0.36 to 0.28, while, GUK traces a more stable draw ranged from 0.35 to 0.40. These pictures are consistent with Figure 3, which showed a relative increase in the off-season, simultaneously with a decrease in the peak season, for tourist from Germany, and a more stable seasonal dynamics for tourists from UK.

Figure 4. Gini coefficient for tourist to Majorca from United Kingdom and Germany.

4. DETERMINANTS OF THE SEASONAL PATTERNS OF TOURISM DEMAND.

4.1. Methodological considerations and data

Having defined the Gini coefficient as the summarising variable for the yearly seasonality and having studied the singularities of the Balearics data, the second proposal is to relate the dynamics of this variable to the main economic tourism determinants. In the present case the Gini coefficient for tourist arrivals from United Kingdom and Germany will be examined. Tourists from these two countries represented, together, 80% of international inbound tourism in the Balearic Islands since many years ago. Besides, the seasonal evolution between these two nationalities analysed in the above section highlight important differences and hence they provide a diverse set of circumstances to investigate.
In relation to the tourism determinants, the number of potential variables is very large. Based on the latest empirical investigations (see for example Song and Witt, 2000; Lim, 1999; or Crouch, 1994) the preliminary set of economic variables selected here are the following:

- **Gross Domestic Product per capita** (GDP). In tourism demand functions, origin country income is generally included as a key explanatory variable, and the Gross Domestic Product per capita often approaches it.

- **Relative Prices** (RP) The difficulty in obtaining the appropriate measure of tourism prices brings, often, the empirical exercises to include this variable calculated by:

  \[ RP_t = \frac{CPIH_t}{CPIO_t} \times \frac{1}{EX_t} \]  

  where,

  - \( CPIH_t \) is the consumer price index of the host region (the Balearic Islands),
  - \( CPIO_t \) is the consumer price index of the country of origin (Germany or United Kingdom), and
  - \( EX_t \) is the nominal exchange rate between the Spanish peseta and the foreign currency.

- **Nominal Exchange Rate** (EX) (included separately). The justification for including a separate exchange rate variable in international tourism demand functions is that consumers are more aware of exchange rates than destination costs of living for tourists.

- **Consumer Price Index** (CPI), refereed to the origin country a measure of substitution possibilities.

Data for most of the indicators were collected from the OECD’s Main Economic Indicators and the Spanish Statistical Office (http://www.ine.es). However, the relative prices variable (RP) is not available directly and needs to be calculated as expressed in Equation 3.

In order to investigate whether there is a relationship between the economic variables and \( G \) the following regression is estimated:

\[
\ln G_t = \mu_t + \sum \alpha_i G_{t-i} + \sum \beta_k x_{k,i,t-i} + u_t \]  

Where \( G_t \) represents the Gini coefficient; \( \mu_t \) denotes the deterministic component, which may include a constant term; \( x_k \) is the \( k \)-vector with \( k \) national economic indicators; \( \alpha \) and \( \beta \) are parameters to be determined and, finally, \( u_t \) is an error term.

Initially, \( i = 2 \), and then, using the general-to-specific strategy (Hendry, 1995 or Charemza and Deadman, 1992), the model of Equation 4 can be simplified. By this way, the likelihood Ratio and the Wald Test were used as diagnostic tests for the model simplification. The Akaike Info Criterion (AIC) and the Schwarz Criterion (SC) were also calculated in order to compare different models. Finally, the Breusch-Godfrey LM test was used to check for serial correlation.
4.2. Results

Using data from 1982 to 2001, and following the methodological considerations outlined above, two models, one for German tourism and another one for the British Tourism, were estimated. From Table 1 it can be seen that the results from the German tourism can be qualified as satisfactory. The variables included in the final estimation are GDP, $RP_{-1}$, $G_{-1}$ (this is the lagged dependent variable). Residuals of the estimation can be qualified as satisfactory too (see appendix).

Table 1. Regression analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>German Tourists</th>
<th>British Tourists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G[-1]</td>
<td>0.6518</td>
<td>-2.0746</td>
</tr>
<tr>
<td>C</td>
<td>-0.3212</td>
<td>-0.0189</td>
</tr>
<tr>
<td>GDP</td>
<td>-0.0179</td>
<td>154.80</td>
</tr>
<tr>
<td>RP</td>
<td>-24.161</td>
<td>-</td>
</tr>
<tr>
<td>RP[-1]</td>
<td>(0.1146)</td>
<td>(0.2360)</td>
</tr>
<tr>
<td>CPI</td>
<td>-24.161</td>
<td>-0.0022</td>
</tr>
<tr>
<td>EX</td>
<td>-</td>
<td>0.0027</td>
</tr>
<tr>
<td>Adj. $R^2$</td>
<td>0.91</td>
<td>0.88</td>
</tr>
</tbody>
</table>

Notes: Figures in parentheses are standard errors. ** and * denote significance at the 5% and 10% levels, respectively. The Gini coefficient ($G$) is the dependent variable. [-1] denotes one lag.

From Equation 4 there are no expected signs of the parameters. So, they have their own interpretation in terms of the kind of relationship between the economic indicator the seasonal shape. In this way, from the German case, as Gross Domestic Product per capita increases (decreases) Gini coefficient decreases (increases) or in other words, as consumers income increases (decreases) distribution of tourists during the year tend to be more smooth (concentrated). On the other hand, as relative prices increases (decreases) Gini coefficient increases (decreases), then as tourism prices in the destination increases (decreases) distribution of tourists during the year trend to be more concentrated (smooth).

From Table 1 it can be seen that the results from the British tourism can also be qualified as satisfactory. The variables included in the final estimation are GDP, RP, EX and CPI. In this case the inclusion of the lagged dependent variable is not necessary and no lags for the other variables have been incorporated. Residuals of the estimation are satisfactory too (see appendix).

Sings of the parameters for the British equation go in the same way that in the German case, and can be interpreted as following. Again, as Gross Domestic Product per capita increases (decreases) or the relative prices decreases (increases), Gini coefficient decreases (increases), that is, the distribution of tourists during the year trend to be more smooth (concentrated). For the CPI variable, as prices in the origin country increases (decreases), Gini coefficient increases (decreases) so, as prices of other goods increases (decreases) distribution during the year trend to be more concentrated (smooth). On the other hand, as nominal exchange rates increases (decreases) Gini coefficient increases (decreases), so as exchange rates are favourable (unfavourable) for tourists from UK a higher (lower) proportion of tourists comes during the peak season. This fact suggests that although the nominal exchange rate has a positive relation with tourism demand, it help to increment more the tourism in the peak season than in the off-season.

The inclusion of the lagged dependent variable in the German Equation makes difficult the comparison of the parameters of the two equations. So, long-run multipliers are computed following the standard procedure represented in Equation 5, for a $x$ dependent variable:
\[
\lim_{i \to \infty} \left[ \frac{\partial G_i}{\partial x_i} + \frac{\partial G_i}{\partial x_{i-1}} + \frac{\partial G_i}{\partial x_{i-2}} + \cdots + \frac{\partial G_i}{\partial x_{i-i}} \right] = \frac{\beta}{1 - \alpha} \quad [5]
\]

Results, referred to the German and British equations are presented in Table 2:

<table>
<thead>
<tr>
<th></th>
<th>German long-run multipliers</th>
<th>UK long-run multipliers</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>-0.05148</td>
<td>-0.01889</td>
</tr>
<tr>
<td>RP</td>
<td>69.3970</td>
<td>154.8041</td>
</tr>
<tr>
<td>EX</td>
<td>-</td>
<td>0.00274</td>
</tr>
<tr>
<td>CPI</td>
<td>-</td>
<td>0.00222</td>
</tr>
</tbody>
</table>

By this way, the German distribution of tourists seems more sensitive to GDP and less to RP than British tourists. Then, an equal increase in the income in the two origins will cause a smoother seasonal figure for the German tourists than for the British tourists. On the other hand, an equal decrease in the relative prices between the destination and the two countries will cause a smoother seasonal figure for the British tourists than for the German tourists.

5. CONCLUSIONS

This paper studies the behaviour of the Gini coefficient as a temporal measure of the seasonality and investigates whether a relationship exists between the coefficient and a set of economic indicators using data of the Balearics and his most important markets, UK and Germany. The findings of the analysis may be summarised in two parts.

First, using the Gini coefficient we get a measure that easily shows temporal variations of the seasonality shape. By this way, it is possible to find not only which the nationalities (or market segments) that present a higher concentration of visits during the peak season are, but also which the tendency of the particular origin is.

Second, the regression analysis indicates that some specific economic variables have a relationship with the seasonal shape of tourism demand. The overall pattern of results is pleasing and tends to lend support to the idea that as income grows and relative prices fell down seasonality tends to be smooth. That is consistent with the changes in the holiday preferences that involve people to separate their holidays into several sub-periods as more income has available. Otherwise, the nominal exchange rate seems to play the inverse relation in the sense that, as more favourable is for tourists, they come preferably during the peak season.
These results give support to the idea that tourists in the peak season differ from tourists in the off-season. So, further research should proceed in modelling tourism arrivals using seasonal segmentation and trying to find some differences between summer and winter tourists with the economic determinants.

APPENDIX

Figure 5. Residual from German equation

Figure 6. Residual from British equation

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