UNIVERSITAT ROVIRA I VIRGILI

TOURISM ISSUES: SEASONALITY AND ECONOMIC STRUCTURE

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TOURISM ISSUES: SEASONALITY AND ECONOMIC STRUCTURE

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WE STATE that the present study, entitled “Tourism Issues: Seasonality and Economic structure”, presented by Albert Vancells Farraró for the award of the degree of Doctor, has been carried out under our supervision at the Department of Geography of this university.

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CONTENTS

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ABSTRACT

Tourism is one of the major economic sectors in recent decades. It represents more than 10% of the GDP and of those employed worldwide, so understand we are dealing with one of the activities with the greatest economic and social impact, and which requires preferential attention in research, especially in our territory: Europe, Spain and Catalonia.

The increasing importance of this sector is demonstrated by the increasing scientific production in recent years. And this production should help us to have more information about the tourism activity, such as the benefits it generates, but also to gather information to be able to deal with the problems generated by it, with pertinent and effective policies.

In this sense, the research work that is presented here pursues two clear objectives: first, to contribute to the understanding of seasonality, one of the biggest problems facing the tourism sector and its agents. The second, to improve the knowledge about the relationships that are generated between the different tourism subsectors and the rest of the economic sectors.

Seasonality is one of the main challenges facing the tourism sector. This is one of the traditional problems of this activity, especially in those destinations that have grown and continue to have based on the tourist products developed in a specific season. In the Spanish and Catalan case, we are talking about the seasonality that occurs, mainly,

in summer and winter tourist destinations, but also at European level these are some of the destinations with highest seasonality.

The problem of tourist seasonality has been described by some authors such as BarOn (1975), Butler (1994), Hartmann (1986), Hylleberg (1992), Manning and Powers (1984), Moore (1989) and Sutcliffe and Sinclair (1980). We have four documents that focus on tourist seasonality: Koenig-Lewis and Bischoff (2005), Cannas (2012), Chung (2009) and Corluka (2019). Recently, research carried out by Duro (2016), Rosselló et al. (2004) and Turrión-Prats and Duro (2019), have deepened the analysis of this phenomenon, the methodology of measurement, and the macroeconomic determinants that can affect or explain the evolution of seasonality.

However, seasonality remains a problem that needs to be investigated. It continues to generate negative impacts on the environment, employment, the profitability of both public and private investments, in short, calling into question the sustainability of the sector. It is important, therefore, to improve the analysis of the phenomenon in order to develop political and managerial initiatives that allow us to reduce the degree of seasonality and its impact. It can also allow us, especially with the analysis of its relationship with macroeconomic variables, to improve the forecast of the evolution of tourist demand and seasonality.

The second aspect examined in this dissertation, the economic structure of the tourism sub-sector, allows us to make a double analysis. First, the effect of tourism demand over the own sector and on the rest of the economic sectors, but also of the relationships that are established between the different subsectors.

In this case, the methodology used is the traditional one of Input-Output analysis, initiated among others by Archer (1977), Archer and Fletcher (1990), Briassoulis (1991), and Fletcher (1989), but with the version of the subsectors proposed by Alcántara (1995) and specifically that of Alcántara and Padilla (2009).

The results obtained show us that seasonality does not have a significant value at European level, except when we analyze some specific countries, especially those around the Mediterranean Sea, and the same happens when analyzing the regions at NUTS2 level. Clearly, sun and beach destinations suffer from significant seasonality.

However, what our results tell us that in recent years, prior to the Covid pandemic, the increase in the number of tourists did not lead to a better temporal distribution throughout the year, and neither the impetus for some deseasonalization policies, nor those promoting alternative products had this effect. In fact, some regional destinations that had not suffered from seasonality before, with the increase in the arrival of tourists, are experiencing increases in seasonality.

One of the significant conclusions is that, despite the attempts and the policies developed, seasonality remains very dependent on the type of products developed, the demand for them, as well as institutional aspects, such as school holidays.

Regarding the analysis of the macroeconomic determinants, some variables happen to be significant, especially those related to income, which leads us to innovate with the inclusion of the level of unemployment and the inequality index as conditioning factors of seasonality. In relation to these results, the mixed evidence points to the need to refine and deepen the research in this area, which can lead us to a better knowledge of seasonality, its causes, and its consequences.

Finally, it can be seen how the Catalan tourism sector has subsectors that relate to each other in a significant way, and that spread highly significant economic activity towards the rest of the subsectors. The increase in tourism demand, therefore, can lead to an economic growth, linking with the previous question, it is clear that an improvement in seasonality can allow a better evolution of the economy of the area, as well as of the economic sectors in the area that receive this demand.

Keywords: Seasonality, Inout-Output, European Union, Mediterraneant, Catalonia, Gini Index, Decomposition, Macroeconomic Determinants, Tourism subsectors.

CHAPTER 1 INTRODUCTION

The tourism sector in Catalonia, Spain and the European Union (EU) is one of the most relevant economic sectors, as different authors have highlighted previously and as we will reaffirm throughout this research. This significance of the tourism sector makes research on it more than fundamental, both in terms of increasing the level of knowledge and improving management of the sector. In this sense, this thesis is part of an investigation of two aspects that significantly affect the tourism sector: seasonality and the economic configuration of the sector.

Seasonality is one of the most significant problems in the tourism sector, both because of its effects on the sector's sustainability, and because of the difficulty in finding solutions that allow a reduction of this issue, as indicated by, Cannas (2012), Corluka (2019) and Koenig and Bischoff (2005) in their reference articles.

This problem implies the need to expand the knowledge we have on this subject, so in the following chapters (from Chapters 2 to 5) a study is conducted on the evolution of seasonality and the economic determinants that affect this seasonality at the level of the European Union, concentrating on the most significant countries in terms of tourism.

The second relevant aspect to highlight in this thesis is the choice of geographical area. There are few studies that focus on a detailed analysis of the main countries in terms of tourism in the European Union (EU). The existing studies, such as that of Ferrante et al. (2018) relate to the EU as a whole. This choice has an economic logic because of the knowledge it will provide us about the relationships established between these countries, and the tourist flows that occur between them.

In the last chapter, a more specific study is made, both in terms of the geographical area, Catalonia, and in methodological terms of the application of input–output subsystems in the tourism sector. The application of this methodology allows us to increase our knowledge of the relationships established between the subsectors themselves, and about the rest of the economy.

The choice of these areas of study is justified by the need to respond to some gaps detected in the research, such as:

First, the expansion of knowledge about seasonality in the most significant tourist countries at EU level, which may involve investments, both economic and policy to reduce its impact. The descriptive analysis developed at different geographical levels, but also in terms of economic determinants, expands this knowledge and we hope that it can lead to new political and management strategies.

Second, the need to open new fields, both in terms of economic determinants and other hidden (or not so visible) aspects in the evolution of this seasonality, such as the issue of economic inequality.

Thirdly, the knowledge of the relationships that are established between the tourism subsectors at the Catalan level and that shape this tourism sector for us, as well as increasing knowledge of the spillover effects of this sector on other economic sectors.

The growing research in tourism is justified as this activity has been, and continues to be, one of the fundamental economic sectors in the economic development of Spain and Catalonia. Larrinaga and Vallejo (2013) present the importance of tourism as a development factor in the Spanish economy, since the beginning of the '*Plan de Estabilización Económica*' of 1959, which was considered a key actor for economic growth. The inflow of currency was supposed to allow some economic problems of the moment to be resolved in relation to the outside world. However, they also allowed the growth of other economic sectors in the country, and for these to gain in importance, above all, thanks to the indirect and induced effects, and their multiplier effect (Goeldner, Ritchie & McIntosh, 2000).

This importance of the sector can be seen in the figures it represents in the economy, both in Catalonia and in Spain. In this sense, we find that in Spain and Catalonia tourism accounted for 12% of Gross Domestic Product (GDP) in 2019. Additionally, according to data from the Tourism Satellite Account (2020) and the *Generalitat de Catalunya*, those employed in the tourism sector represent 12% of Spain's total and 14% of Catalans. Unfortunately, the impact of Covid-19 has caused a drop to 5.5% of GDP in 2020, and the value of employment in the tourism sector was reduced to 11.8%, saved by the aid programmes of the Government of Spain. At European level, the importance is relatively lower, but it is still above 10% of GDP and more than 11% of those employed, according to the 2018 data.

According to the United Nations World Tourism Organisation (UNWTO), in 2019, Spain was in second position in the number of international arrivals with 84 million, only behind France with 89 million, and in terms of income, with 80 billion dollars, behind the USA with 214 billion dollars. At a global level, the European region remains the one that receives the most international tourists globally with 744 million international tourists, more than double the number of arrivals compared to the second region (Asia and the Pacific).

This importance of the tourism sector has meant that in the set of large tourist receivers, Spain is where tourism is more important in the overall economy, for example in France this sector only reaches 8% of GDP (UNWTO, 2020). The importance of tourist activity at European level and its problems justify the continuous research in tourism. In this framework, this research begins by investigating seasonality, since it remains a problem where the different administrations and tourism managers apply significant effort and public budget, such as the IMSERSO-type programmes of the Government of Spain.

Seasonality, following Butler (1994), is the temporal inequality in the arrivals of tourists, their expenses, the traffic that occurs, as well as in other issues related to this problem such as some businesses' activity or, simply, employment. This problem has increased the research produced in recent years, especially around the papers of Koenig-Lewis and Bischoff (2005) and Cannas (2012), but also by that developed by Duro (2016), Turrión-Prats (2018) or Turrión-Prats and Duro (2019).

In this sense, the research on seasonality in this thesis is based on two questions: the analysis of the evolution of seasonality and the economic determinants that influence this seasonality.

Regarding the first question, the analysis of the evolution of seasonality, this is subdivided into two studies. First, the evolution of seasonality for the EU of 15, where the evolution of seasonality at a global level is analysed for these countries. In the second part, groups of EU regions are identified by the chosen countries, according to the main tourist product.

These two studies make it possible to analyse seasonality based on demand, but also the supply developed in the analysed area. This is an important decision in terms of political implications, focusing seasonality solutions on demand or on supply. Traditionally, both solutions have been promoted, boosting demand in off-season periods, such as Spain's IMSERSO programmes or the recommendation to develop off-season products. The analysis from the point of view of demand or supply will lead us to policy proposals with different implications.

The geographical decision of the EU-15 is justified by the touristic importance of the countries that comprise it. According to the UNWTO (2020), five of the top ten world tourist destinations, both in terms of arrivals and income, are in the European area: France, Spain, Italy, Germany and the UK. Although in recent years the exit of the UK from the EU has taken place, we continue to consider this as an important tourism unit in the EU, and which continues to take advantage in terms of mobility at the level of the EU and which continues to make the traditional movements of the last decades.

This descriptive analysis of the evolution of seasonality at EU level, corresponding to the first part of Chapter 2, was presented at the XXII Congress of Asociación Española de Expertos Científicos en Turismo (AECIT), October 2022, where it received the 'Award for the Best Communication in the Area of Tourism and Sustainability', and was published in the book of abstracts of the congress.

As we have previously commented, the second question discussed was the seasonality economic determinants, which can show us some of the economic reasons that could explain the evolution of seasonality. In this sense, the article by Rosselló et al. (2004) is taken as a reference. The GDP, the price index and the exchange rate are analysed in relation to the evolution of seasonality of the Balearic Islands, counting the arrivals of tourists from the UK and Germany. This research allows us to develop a first analysis of the economic determinants that give us information on the evolution of seasonality and that also provide us with a certain possibility of predicting what the future situation of seasonality may be in a certain area. The EU is once again the geographical reference for making this analysis; this being a very interesting innovation as it allows us to see the great differences that occur between the destinations closest to the Mediterranean area and those that are not.

To close this question of economic determinants, the research focuses on one of the factors that emerge from the previous analysis, the effects of unemployment and inequality on seasonality. Little research has focused on this aspect, and that existing has focused on the analysis of how unemployment affects demand, not having much literature concerning seasonality and unemployment. The analysis presented in this thesis makes it possible to carry out a double exercise, first to analyse the effects of unemployment on the evolution of seasonality and to see which areas are most affected. The second approach tries to consider inequality as one of the causes of seasonality.

Therefore, based on what we have previously proposed, the basic objectives of this thesis in terms of seasonality would focus on:

- First, to present a descriptive analysis of the evolution of seasonality:

o To analyse the evolution of seasonality at European level, concentrating on the most significant touristic countries.

o To observe whether similar patterns can be identified between countries and be able to group countries and thus develop more surgical policies to reduce seasonality and its negative effects.

o To assess seasonality at NUTS-2 level and assess the effect of product supply on seasonality.

o To identify the countries that cause seasonality or those that allow its reduction.

- The second group of objectives is based on assessing the economic determinants that affect seasonality:

o To analyse whether the economic determinants traditionally considered are confirmed at European level.

o To observe if there is any difference in the importance of the economic determinants between the analysed countries. Or, if there are different effects depending on the grouping by product; in this case if the countries are located around the Mediterranean or not.

o To identify if unemployment and inequality can be significant economic determinants in the explanation of seasonality.

To carry out this research, the other decision related to the measure of seasonality. The application of the best methodology to calculate this variable was not a matter of research in this thesis. There is a lot of literature on the calculation of seasonality and the methodology to follow, such as in Rosselló and Sansó (2017) or Duro (2016) and Duro and Turrión-Prats (2019) where calculations are presented. In this case, the choice was to follow Gini index, although calculations have also been carried out with other options, such as Theil index or coefficient of variance, with which no significant differences were found.

Similarly, given its validity, the econometric methodologies applied in the different chapters of this thesis follow classic research, with structural break calculations in Chapter 3 to observe the possibility of changes in trends due to external shocks, or the dynamic linear panel data model in the chapter on economic determinants.

The application of the Gini decomposition is considered an important numerical exercise to understand the evolution of seasonality and allow a refinement of the policies, both public and private, to be applied to reduce this issue. This methodology allows the identification of the territories which are more important when explaining the evolution of seasonality, and what causes a growth in these data. We applied this methodology at all geographical levels followed in this thesis: countries, groups of countries, regions and groups of regions.

In each of the chapters, the decision regarding the chosen model is justified.

Regarding the last chapter, as previously mentioned, the main objective was to have a greater knowledge of the relationships that are established within the different tourism subsectors and with other sectors.

To do this we used the traditional input–output methodology, with its subsystem's version. Archer (1977), Archer and Fletcher (1990), Briassoulis (1991) and Fletcher (1989) are the papers considered initiators of the use of the input–output method as an instrument to analyse the economic impacts of tourism. This methodology can be optimised with the application of subsystems, developed by Sraffa (1960) and continued by Pasinetti (1980) or Sinisalco (1982), among others. Later, we also find applications by Alcántara (1995) and by Alcántara and Padilla (2009), which will be the methodology followed. The advantage of using this methodology allows us to know the relationship and economic impacts that occur between the different sectors that make up the tourism subsystem but also the relationships that are established with the rest of the sectors of the economy.

As some researchers have shown (Alcantara & Padilla, 2009), this methodology will allow us to expand research on tourism in a subject as sensitive as sustainability and the environmental impacts of the sector. The big problem with this methodology is being able to differentiate the part that corresponds to the tourism sector itself, and the part of the activity that does not specifically correspond to tourism. In this case, we follow the definition of the subsectors proposed by the Tourism Satellite Account of the Instituto Nacional de Estadística (INE). To reduce the issues, the touristic subsectors are refined in the research. For example, sectors such as transport, restaurants, bars or leisure activities, include an important economic activity that is not properly touristic or not generated by tourists. Some of the economic impacts are generated by residents or by activities that are not related to tourism. Refining the statistics can improve the data and therefore, the reality of the findings.

The research questions raised in this chapter are:

- What is the economic importance of the tourism sector and its subsectors?

- Is it possible to identify a proper tourism subsector in Catalonia?

- What activities can this subsector collect? Which activities defined by the INE Tourism Satellite Account can be considered non-tourist?

It should be noted that this chapter has already been published in the international journal, *Research in Hospitality Management*. This methodology continues to arouse interest among researchers, although recently, other methodologies have been imposed on the traditional input–output approach.

To finish, we present a brief summary of each of the chapters that make up this thesis:

Brief summary of Chapter 2 ‘A seasonality’s review of literature’.

In this chapter, we present a brief review of seasonality’s literature in the main different questions treated in this thesis: definitions, effects, methodologies, economic determinants and unemployment.

Brief summary of Chapter 3 ´Radiography of European Tourist seasonality: A Territorial Analysis’.

This chapter is divided into two important sections. The first describes the evolution of seasonality at EU level, and the countries where seasonality is more significant. A possible grouping of countries is presented for a more accurate analysis, to help policy managers to prepare policies to reduce this problem. The decomposition of the Gini Index is carried out, which allows us to identify the countries that have more importance in terms of seasonality, and those that have a positive impact, in terms of reducing seasonality or negative, in terms of its expansion.

The second part of the chapter focuses on the analysis of the evolution of seasonality at regional level. Eurostat statistics from regions defined as NUTS-2 at EU level are taken. With these regions, a grouping proposal is made according to the main offer identified in each region. Once the descriptive analysis wis carried out, two elements are identified, the first if it is significant that this region belongs to the Mediterranean area, and second, the decomposition of the Gini Index. As in the previous case, the decomposition exercise allows us to see which regions are most important in the evolution of seasonality at European level, and which groups of regions explain this evolution.

Brief summary of Chapter 4 'Economic determinants of international arrivals and tourism seasonality: A macroeconomic approach'.

This chapter is based on the research of Rosselló et al. (2004) on the economic determinants that can affect seasonality and its evolution. What is interesting in this case are: first, the geographical decision: the EU-15, never applied in previous research. Second, the signs that we found in our study, that were slightly different to those found by previous research. Finally, we grouped the countries according to their proximity to the Mediterranean or not. This allowed us to continue with the thread established in the previous chapter and which indicated a clear pattern of seasonality behaviour at EU level. The seasonal activity of 'sun and sea', as well as the strong appeal of these destinations, together with the institutional factor of the concentration of family holidays in the summer months, can explain a good part of the seasonality, both at European level, as well as regionally, but we should focus on the economic factors that determine this problem in the tourism field, because they are the main questions that policymakers could use to prevent and solve seasonality.

In this chapter, we propose an innovative element in the research proposed above on economic determinants. In this case, unemployment and inequality as economic variables are considered to explain seasonality. The approach of the proposed numerical exercise allows us to consider a continuation in the search for the relationship between inequality and seasonality. In this case, we found a significant relationship between unemployment and the evolution of seasonality and concentrated in the Mediterranean countries. These destinations have a very high degree of tourism maturity and a type of tourism that, on many occasions, is based on economic prices and closed packages. The research allowed us to point out that, a worsening of economic inequality would imply a lower concentration of tourist activity in more economic areas, with cheaper prices, and where the number of trips would increase in periods where institutional issues were more significant such as family holidays.

These exercises opened a new research line on seasonality. Chapter 4 is related to the effects of income changes over seasonality. The inclusion of GDP, Unemployment and Income Inequality lead seasonality research to the effects of the income over seasonality. Results obtained lead to define and to apply different methodologies to obtain better information to help managers to deal with seasonality problems.

Brief summary Chapter 5 ‘Catalan tourism subsystem: Applying the methodology of subsystems in the tourism sector’.

As noted previously, this chapter starts from the use of the methodology developed by Sraffa (1960) and with the application proposed by Alcántara (1995), where the identification of economic subsystems based on input–output tables is proposed. This application enables an exercise to identify the tourism economic subsystem and the relationships established between these subsectors at the Catalan level. This application allows us to see these relationships but also the indirect effects that can occur in other economic sectors from tourism demand, and which continue to confirm that the tourism sector is highly significant in the economic growth of the area.

Brief summary of Chapter 6 ‘Empirical findings and their implications’.

In this last chapter, we present the main conclusions of the thesis, but also the implications both at the policy level and at the level of future research in the tourism field.

CHAPTER 2 LITERATURE REVIEW OF SEASONALITY.

2.1. Global Issues

The importance of tourism as an economic sector has been steadily increasing since 1960 and is nowadays one of the principal sources of economic activity. From the beginning of this spike, seasonality has been one of the main problems faced by firms and local politicians. BarOn (1975) produced early work on the role of seasonality and was followed by other researchers such as Butler (1994), Hartmann (1986), Hylleberg (1992), Manning and Powers (1984), Moore (1989) and Sutcliffe and Sinclair (1980). There are four seminal papers which provide a comprehensive study on seasonality within tourism: Cannas (2012), Chung (2009), Corluka (2019) and Koenig-Lewis and Bischoff (2005). Using these works, among others, we present a short review of the seasonality literature, in Table 2.1. is presented the main authors by theme.

Koenig-Lewis and Bischoff (2005) produced a seminal paper in which we find a wealth of information on the main issues surrounding seasonality: the definitions of seasonality, causes and impacts, policy implications, studies into consumer behaviour and approaches to measuring seasonality. In other works, for example Cannas (2012) and Goulding (2006), a range of questions and methodologies related to seasonality have been analysed.

We can find different definitions of seasonality in Allock (1994), BarOn (1975), Butler (1994), Hartmann (1986), Mitchell & Murphy (1991) among others. According to

Butler (1994, p.332), seasonality is "a temporal imbalance in the phenomenon of tourism, [which] may be expressed in terms of dimensions of such elements as numbers of visitors, expenditure of visitors, traffic on highways and other forms of transportation, employment, and admissions to attractions".

As stated by Turrion-Prats (2018), there are few differences among the definitions provided by Allcock (1994), Butler (1994), Cooper et al. (2005), Grainger and Judge (1996), Higham and Hinch (2002), Hylleberg (1992), Lundtorp (2001) and Moore (1989).

Abstracting from this formal definition, we can reduce the dimensionality of seasonality by focusing on variation over time, since many factors, for example those related to social, economic and institutional determinants, cause tourist arrivals to be concentrated in a specific period.

Beyond simply stating definitions, we should go deeper into the reasons for seasonality. A second and significant section of the literature, in addition to the definition field, is based on understanding the causes of seasonality. In this area we found a wide range of literature targeting such questions and catalogued under "Different Structural Reasons" in Table 2.1.

BarOn (1975) classified the causes of seasonality into two types: natural and institutional seasonality. Natural causes stem from the geography of the local area, for example local weather or climate conditions, and institutional reasons arise from social factors such as school holidays, fashion or religious periods. Kessler (1990) calculated that 50% of the population plan their trips based on school holidays. Butler and Mao (1997) provide further information on the causes of seasonality and its principal factors, and they extend their analysis of seasonality to include supply and demand side concerns.

Butler (2001) describes five different forms of seasonality: natural, institutional, social, climatic, and traditional or inertia. Budyko (1974), Mauss and Beuchat (1979), and Smith (1973) showed that seasonality increases with distance from the equator, increasing the importance of natural channels. This result is significant for our research when analysing patterns across the EU. Other authors talking about structural reasons are; Baum (1999), Baum & Hagen (1999), Connell et al. (2015), Frechtling (1996), Frechtling (2001), López-Bonilla and López-Bonilla (2006), among others.

But, literature can be defined in three specific set of factors which determine seasonality: natural factors, institutional factors and push and pull factors. Such set of factors are not exclusive, for instance: natural factors, as weather, determine some institutional activities as scholar or labour holidays.

Natural factors, as stated in Allcock (1989), BarOn (1973), Baum and Lundtrop (2001), Bender et al. (2005), Butler (1994), Butler and Mao (1997), Koenig and Bischoff (2005), Luntrop (2001) or in Turrión-Prats and Duro (2019), describe casual channels which cover a range of climatic effects which include natural phenomena such as sunlight, snowfall, storms and rainfall. Climatic phenomena determine which types of tourist activities are feasible in which periods of the year. For example, will tourists have access to sunny beaches, skiing, outdoor activities or other weather-dependent tourism goods? Turrión-Prats (2018) provided in-depth and relevant analysis of recent research into the role of climate factors.

The institutional factors are well presented in BarOn (1972), BarOn (1975), Butler (1994), Hinch and Hickey (1996), Murphy (1985), and Rosselló and Sanso (2017). Institutional factors refer to the seasonality caused by activities due to religious, cultural, social or organizational factors. For instance, school vacations are one of the principal components of institutional factors. School holidays occur in specific and regular periods of the year: Christmas, Easter or summer. Families will organize their vacations during these periods, and this implies that tourism activity peaks during these specific times of the year. In the same way, labour holidays are another institutional factor. Companies provide holidays to the employees in some specific moments of the year, for instance: tourism companies allow the employees to take vacations when the tourism demand is low. Another example of this is teachers' holidays. Government decides the academic calendar and teachers should go on holiday during the periods indicated.

Butler and Mao (1997), Cannas (2012), Corluka (2019), Kolomiets (2010), and Lundtorp et al. (1999), discussed push and pull factors. Push factors are those which drive people to make certain choices around their tourism. These include upcoming school holidays and climate concerns, among other trends, whereas pull factors are those which attract tourists to certain destinations, which again include climate awareness and local events and activities.

Another interesting body of literature is that which examines different approaches about seasonality measurement. We analyse two subgroups in this field. We first look at data collection and then the methods used to calculate seasonality. As stated in Turrion (2018), there are different schools of thought on which variables are best to capture seasonality within tourism: tourist arrivals (e.g., Duro, 2016; Rosselló et al., 2004), overnight stays (Cuccia & Rizzo, 2011; Duro, 2016; Ferrante et al., 2018) or average spending per person (Koc & Altinay, 2007).

The other subgroup looks at the methods used by researchers to measure in a synthetic way seasonality. We can identify four leading indices: the Gini index, the coefficient of variation, the Theil index and the Atkinson indices. Following Koenig-Lewis and Bischoff (2005), a combination of different methodologies, as Theil indices or Coefficient of Variation (CV), is often the best way in which to analyse seasonality, but the methodology most commonly used is the Gini index. Rosselló and Sansó (2017) present a broad analysis of the literature on measuring seasonality. They focus on research which comes under the category of longitudinal analysis or that which utilises the older statistic, the “seasonality ratio” or the “coefficient of seasonal variation” alongside the leading research examples which use the Gini index. Additionally, along with Duro (2016), Rosselló and Sansó (2017) aimed to derive new indexes to calculate seasonality and they proposed a number of new methods which include entropy and relative redundancy. These measures are derivatives of the Theil index.

Wanhill (1980) provides the justification for why we should move on from old methodologies such as the seasonality ratio or the coefficient of seasonal variation.

Wanhill's work was developed by Cannas (2012), Koenig-Lewis and Bischoff (2005), Lundtrop (2001), and in particular Karamustafa and Ulama (2010), who apply each of the different methodologies to data on Turkish tourism. This literature concludes that the main reason to leave behind old methodologies is that those types of index present severe deficiencies when used to calculate inequality because they are influenced by extreme values and are held back by this inherent weakness.

The Gini index is the most commonly used statistic in seasonality research, as stated in Roselló and Sansó (2017). Other authors who applied Gini Index are Fernández-Morales and Mayorga-Toledano, (2008), Fernández-Morales et al. (2016), Koenig-Lewis and Bischoff (2005), Lau et al., (2017), Lundtorp, (2001), Martín Martín et al., (2014), Rosselló et al. (2004), or Wanhill (1980), among others.

Duro (2016, p.54) defended the use of the Theil index as an alternative to the Gini index, and stated that it "is more sensitive to changes in months with a lower demand". Rosselló and Sansó (2017) and Duro (2018) used this Index in other research papers.

The coefficient of variation was used by Duro (2016) and Duro and Turrion-Prats (2019) as an alternative to the Gini and Theil indices. Because the current thesis is not an attempt to check the validity of the different methods, we decided to apply the Gini index, as it is the measure most accepted by researchers[1].

[1] We should highlight the work done by Gil Alana, who has developed some research to adjust the seasonality of time series. The aim of the methodology applied by this author is to improve the time series available and to provide better data to study tourism demand, and therefore seasonality. Some of his

Finally, we want to highlight another methodology, the Gini decomposition. Following Shorrocks (1982) and Lerman and Yitzaki (1985), we used this methodology to go deeper into the investigation of seasonality'sources, including its origin and evolution. In geographical terms, we will identify the countries and regions where seasonality is significant, and the marginal effects created by tourist arrivals. This methodology has been widely used by many authors (Duro, 2016; Duro, 2018; Fernández-Morales, 2003; Fernández-Morales et al., 2016; Fernández-Morales & Mayorga-Toledano, 2008; Rosselló & Sansó, 2017; Turrion-Prats & Duro, 2019; Duro & Turrion-Prats, 2022). Decomposition methodology will be explained in the next paragraphs.

Decomposability—i.e. the possibility of calculating the contribution of different components to the total concentration. The literature on inequality measurement emphasizes different possibilities to decompose concentration indexes (Cowell, 1999):

- Decomposition by group: identifying an intra-group component and an inter-group component (Shorrocks, 1984), where groups are defined according to a specific characteristic such as gender, nationality, geographic location, etc. The intra-group element captures inequality due to variation in a selected variable (income, arrivals, overnight stays, for instance) within each group, while the inter-group component captures inequality due to variation in this variable across different

papers are Gil-Alana, L.A. Perez, F. and Cuñado, J (2004) for Spain or Gil-Alana, L.A., Mudida, R. and Perez, F. (2014) for Kenya, Gil-Alana, L.A. and Huijbens, E.H. (2018) for Iceland, Payne, J.E., Gil-Alana, J.A., Mervar, A., and Goenenchea, M. (2022) for Croatia, among others.

groups. Application to seasonality in tourism usually defines groups formed of consecutive months or tourism seasons. For instance, Fernández-Morales (2003) uses this approach to decompose the Gini index to analyse differences in the concentration of hotel demand in three Spanish provinces between 1980 and 2001 and shows that the between-seasons component is the most important source of seasonality. In a related study, Duro (2016) uses a Theil index decomposition to analyse the case of the main Spanish provinces for the period 1999–2012 to test the reliability of monthly aggregates to explain the global concentration of overnight stays and assess their use as a tool for public planning.

- Decomposition by factor: when factors can be expressed additively (Shorrocks, 1982)—i.e. understanding each factor as an additive part of the global component. In the literature on income inequality, this approach refers generally to the contribution of different sources of income. Applications to tourism seasonality analyse the role of different factors, mostly defined in terms of origin markets for a particular destination. An example is Fernández-Morales and Mayorga-Toledano (2008), who use a Gini decomposition by factor components to examine the effect of different markets on the annual level of seasonal concentration in Costa del Sol, Spain. More recently, Fernández-Morales et al. (2016) applied this methodology to the analysis of seasonality in the United Kingdom and tourists' place of origin and their main travelling motivation. Duro (2016) also applies this approach to analyse the contribution of domestic and non-resident tourists to overall seasonality, to identify the main role played by the foreign component. In the same research project, Duro (2016) presents a broad explanation of the reasons to apply this form of decomposition to analyse the distributional imbalance, that, as defined by Butler (1994), seems to be seasonality's principle phenomenon. As we go on to explain in the subsequent paragraphs, decomposition by factor gives us the best option to analyse the reasons behind the evolution of seasonality observed in the data. Our main objective is to understand the importance of each factor to EU seasonality, individual country arrival rates, and the trends observed in seasonality in each region.

In a recent paper by Turrión-Prats and Duro (2022), we find a deeper analysis of the existing decomposition methodologies and their properties. In this chapter, we followed the Lerman and Yitzhaki (1985) proposal, focusing on two concepts. Firstly, the proposal allow us to know the weights of every market in an effective way; secondly, the authors propose an interesting calculation of the marginal effects when seasonality changes. This gives us the chance to know the weight of every market and the effect in relation to seasonality. Decomposition, then, is a good exercise to know where seasonality has greater importance and how to act specifically in that area.

Turrión-Prats and Duro (2022) explained and applied two other decomposition methods following Shorrocks (1982) and the Shapley value, proposed by Shapley (1953). In Shorrocks (1982), the index used to calculate inequality it is not significant. Decomposition calculations use any proposed index. Nevertheless, Duro (2016, p.3) indicates that we obtained different data depending on the index used: "The Gini index is sensitive to central observations; the Theil to those in the last positions of the ranking and the CV is neutral."

The decomposition proposed by Shorrocks (1982) is based on the relative weight of every market and is the result of the concentration of every relative weight and the correlation with other markets. Following the analysis by Turrión-Prats and Duro (2022), the problem of this method is that it works better with absolute data than with relative data, and the data used are mostly relative.

Meanwhile, the Shapley value allow us to calculate the percentage of arrivals and the absolute and relative contribution of every market using the Gini index. The use of the Gini index exclusively is a limitation in comparison with the previous method; however, the Shapley value allows us to reduce duplications and we obtain better values for marginal effects.

As stated by many researchers, seasonality creates numerous problems for the touristic sector due to the imbalance of tourist activity, and over the next sections we present research on the impact of seasonality. As presented in Yan and Wall (2003), the impacts of seasonality have increased with the growth in the number of tourists travelling each year. It is clear that not only economic impacts are significant but often ecological and socio-cultural impacts lead to sizable effects (Cannas, 2012; Koenig-Lewis & Bischoff, 2005). Obviously, the range of seasonality impacts is huge and covers a wide range of questions. Despite this, we are able to concentrate our analysis on four different impacts: economic, employment, ecological and sociocultural impacts.

Duro and Farré (2015) and Fernández-Morales and Mayorga-Toledano (2008) reproduce the consequences of seasonality in Spain, which we can extend to other countries. They find the following set of outcomes:

- Labour market problems including unemployment during the off-peak season, low salaries, lower job quality.

- Economic inefficiency, due to the saturation or underutilisation of resources or the deficit in public and private resources.

- Social and environment effects such as traffic problems, security or queues.

Other problems are related to the fact that income during the off-peak season does not cover fixed costs, particularly in the family business accommodation sector (Koenig-Lewis & Bischoff, 2005). The same authors, following Grant et al. (1997), argue that there are some positive impacts of seasonality as it provides the time and opportunity to conduct necessary maintenance or to offer training to employees.

Butler (2001) and Cannas (2012) wrote in-depth research papers on seasonality and presented some of the economic impacts and problems that seasonality causes in the tourism sector. These include difficulties obtaining capital, full time workers, issues with returns, and reduced and/or overused facilities.

In economic terms, one clear problem is the inefficient use of resources and assets during periods of low activity, as stated in many reports, like those of Sutcliffe and Sinclair (1980) and Butler (1994), or the overuse of infrastructure or costs to public services in moments of high activity (Duro, 2016 and Roselló et al., 2004). Seasonality creates many problems for companies due to cash-flow discontinuities or questions about the number of rooms to offer during peak season compared to off-peak season.

Employment within the sector and its evolution is another issue related to seasonality. The imbalance of tourism activity creates employment problems due to the instability which spreads throughout the sector. Conditions make it hard for employers to contract workers throughout the whole year or to maintain high-skilled workers in places with high seasonality. This problem, as stated in Turrion-Prats (2018, p. 33), leads employers "to employ staff with a low level of professional qualification and offer them temporary contracts." This compounds the underlying problem and leads to a lower standard of quality for the products offered (Corluka, 2019).

Ecological impacts were clearly defined by Manning and Powers (1984), who emphasized the strain tourism activities have on the ecological capacity of certain destinations, especially as a result of heavy usage during the peak season. Ecological impacts are one of the main and most urgent problems within tourism, but the situation becomes worse when we focus on destinations which suffer from high seasonality. Peak seasons mean high numbers of visitors and spikes in pressure being applied to fragile environments (Butler, 1994). One of the questions to solve by local tourism planners is how to handle the negative effects seasonality has on the environment.

Lastly, there is a strand of literature which has looked at sociocultural impacts. Some authors, like Allcock (1989), Butler (1994), Chung (2009), Commons and Page (2001), Koenig and Bischoff (2005), Manning and Powers (1984), Mathieson and Wall (1982) or Murphy (1985) have pointed out that large numbers of visitors during peak seasons increase the number of services which are required during this period—which stresses infrastructure, health services and other vital provisions. In addition, prices can rise during peak seasons, which translates into increasing costs for some social services. Even though local populations can enjoy such services during the off-peak season, sometimes these services with higher level in standards in comparison to other places with no tourist activities, as stated in Murphy (1985).

Strategies to solve seasonality are another vibrant research question. The main strategies, which were stated by Turrion-Prats (2018), include product diversification, market segmentation and differential pricing strategies. The first aims at trying to expand the number of tourist activities or locations on offer so as to reduce the pressure placed on highly popular destinations, as stated by Getz (2008), events are one of the most common activities developed to reduce seasonality. The second strategy is to identify different demand-side causes. Spotts and Mahoney (1993) stated that matching seasonal motivation with tourism products and services offered is needed to increase visitors during the off-season period. This permits the supply side of the sector to prepare products during the off-season period or to look for new places with different attractions, again aimed at expanding the number of destinations on offer to visit. For instance, tourism agents develop marketing strategies to know new market niches and new tourism products are created to attract new tourist during off-season period or to diversify the tourist destinations. Finally, the price diversification strategy is founded on finding ways to offer products with lower prices during the off-season period (Jang, 2004, Manning & Powers, 1984, O'Driscoll, 1985 or Sasser, 1976).

Lee et al. (2008) added another one, facilitation by state, but this strategy is about to provide facilities to destinations to help to increase the number of tourists, for instance the development of transports infrastructures.

Recently, some authors like Senbeto and Hon (2021) and Medina et al. (2022) presented some interesting strategies about management culture, innovation and efficiency in management. This is a different point of view, focusing the question in improving the management in business, more than other questions.

Finally, we want to present the list of strategies proposed by different researchers outlined by Corluka (2019):

- Introduction or development of festivals and events
- Diversifying into niche products
- Offering off-season holiday packages
- Business travel
- Multiple use schemes
- Circuits' attractions, twin attractions or two-centre holidays
- Special price offers, such as seasonal pricing
- Group booking offers

- Marketing campaigns to attract different markets in different seasons
- Staggering of holidays over a longer period
- Improved and expanded regional infrastructure
- Development of local business networks and partnerships

In these strategies, we can see the effort of the different local planners and business owners to develop strategies to reduce seasonality and, at the same time, to solve one of the biggest issues in the touristic sector. Unfortunately, as stated in Corluka (2019) p.19, "The literature is missing empirical studies with evaluation of the outcomes of applied strategies.". Recently, Rico et al. (2021) presented a paper asking about the Senior programs developed in Spain (Imserso program) or Senbeto and Hon (2021) presented a qualitative research about the strategies applied and its results in Ethiopia. Another interesting question done by Corluka (2019) is which of the strategies are useful in one place and can be transferred to another.

2.2. The Economic Determinants

To contextualize this issue in this doctoral thesis, we will focus on the leading examples from this body of research which are related to the economic determinants of seasonality. We use as a reference paper that of Rosselló et al. (2004), which was the first to use a dynamic model including economic variables to explain the evolution of seasonality.

The link between economic activity and tourism activity has been analysed by many researchers in a variety of ways. Copeland (1991), Hazari and Sgro (1995) and

Lanza and Pigliaru (1999), among others, have all presented research addressing this question. For an in-depth literature review, consult Chatziantoniou et al. (2013), who provide an overview of the main hypotheses and references on the link between tourism and economic activity. Four hypotheses are formulated: tourism-led economic growth (TLEG), economic-driven tourism growth (EDTG), bidirectional causality (BC), and no causality hypothesis (NC). These different hypotheses demonstrate the importance, as well as the complexity, of this question for the tourism industry.

- These four hypotheses are based on the sequence established to understand the relation between tourism and economic development. According to Chatziantoniou et al. (2013), there is evidence that causality indeed runs from the tourism sector to the broader economy — a hypothesis known as the TLEG hypothesis.
- There is the view that economic growth is instead a crucial factor to the increase in tourism income — the so-called EDTG hypothesis.
- A third strand of literature provides evidence that there is BC between tourism and economic growth.
- Finally, some authors report no significant evidence for causality (NC).

We can identify research following these four hypotheses:

- TLEG: Ballaguer & Cantavella-Jorda, 2002; Blake & Sinclair, 2003; Brida et al., 2016; Chingarande & Saayman, 2018; Croes & Vanegas, 2008; Fayissa et al., 2011; Lee & Chang, 2008; Pan et al., 2014; Paramati et al., 2017;

Salifou & Haq, 2017; Schubert & Brida, 2011; Soukiazis & Proença, 2008; Tang & Tan, 2015; Vanegas & Croes, 2003; Vita & Kyaw 2017; Zhang & Cheng, 2019; Zortuk, 2009

- EDTG: Antonakakis et al., 2015; Hussain-Shahzad et al., 2017; Narayan, 2004; Oh, 2005; Payne & Mervar, 2010; Pulido-Fernandez & Cárdenas-García, 2021
- BC: Antonakakis et al., 2019; Apergis & Payne, 2012; Bojanic & Lo, 2016; Chingarande & Saayman, 2018; Hussain-Shahzad et al., 2017; Ridderstaat et al., 2013; Tang & Tan, 2018
- NC: Eugenio-Martin et al., 2004; Katircioglu, 2009; Po & Huang, 2008; Tang, 2013.

Usually, the TLEG hypothesis is the most supported, In fact, Song and Wu (2022) identified more than 100 papers using this hypothesis as the basis of the research. Nevertheless, in this research, Song and Wu (2022) criticised this hypothesis and the methodologies used to sustain this hypothesis. Our paper, however, is not focused on the causes of tourism growth, and we do not explain those hypotheses in detail.

Another key question within the tourism literature looks at how demand within tourism sectors responds to business cycle fluctuations. Gonzalez and Moral (1995, 1996) presented two papers on the relationship between the co-evolution of the wider economy and tourism demand. The analysis looks to discover trends present in the Spanish tourism sector, which are derived from economic data on the years 1979–1994.

Another seminal paper is by Gouveia and Rodrigues (2005), who analysed the synchronisation between tourism demand and the business cycle for different European countries. Another paper showing the correlation between the economic and tourism cycles is by Guizzardi and Mazzocchi (2010), who used a Structural Time Series model to analyse the business cycle effects on tourism seasonality rates. Both research projects conclude that tourism demand is correlated with the business cycle; however, the response is lagged.

Smeral (2012 p.381), states, “The business cycle affects tourism import demand because of the fluctuations in the overall economic activity as well as changes in people’s expectations about their future income and job situations”. In addition, the author finds that income and price elasticity are quite sensitive.

More recently, a body of work has begun linking tourism and economic crises. For example, Hall (2010), Papatheodorou et al. (2010), and Eugenio-Martin and Campos-Soria (2014) highlighted that economic trends have a negative impact on tourist arrivals and expenditure rates. Sala et al. (2014) examine how tourist demand reacts to poor economic perspectives or indicators, as well as other indicators like family debt levels or unemployment. These papers showed that the general economy has a strong impact on tourist demand.

Eugenio-Martin and Campos-Soria (2014) present a broad review of the literature on tourism demand and economic crises. Frechtling (1982) analysed changes in real travel and economic activity for the United States during the economic crisis of the 1980s. Henderson (1999), Law (2001) and Prideaux (1999) analysed the Asian financial crisis of the 1990s, and other authors like Alegre et al (2013), Page et al. (2012), Sheldon and Dwyer (2010) and Smeral (2009) examined the effects of the previous financial economic crisis.

Authors have formed hypotheses on how economic crises affect tourism activity. Eugenio-Martin and Campos-Soria (2014), Page et al. (2012), and Smeral (2009) pointed out that tourists cut back their demand when experiencing an economic crisis. Others, such as Stabler et al. (2009), linked tourism activity to income elasticity. Smeral (2010) was one of the first to analyse the effects of the downturn in tourist activity caused by the global financial crisis. In closer relation to the work presented here, Papatheodouro et al. (2010) and Page et al. (2012) analysed the response in the number of arrivals caused by economic fluctuations.

In addition, Perles et al. (2016) analysed the effects of unemployment in the Spanish tourism sector. Zaharia et al. (2014) analysed the effect of unemployment, and Cafiso et al. (2018) wrote an article about the effects of economic crises and highlighted the fact that in such situations, Italian tourists opt for destinations closer to Italy, thus showing a change in tourist behaviour.

Smeral (2009) and Smeral (2010) presented two reference papers linking the evolution of tourism demand and economic evolution. These two papers analysed the evolution of tourism demand after the 2008 economic crisis, and they presented GDP as one of the economic determinants. Those are not the only papers linking tourism demand and GDP, Eugenio-Martin and Campos-Soria (2014) wrote a document with similar research, linking tourism expenditure cutback and GDP, GDP Growth and tourist origin. Garín-Muñoz and Moreno (2007), Ledesma-Rodriguez et al. (2001) and Song and Witt (2000) used GDP as economic variable to analyse tourism demand.

Eugenio-Martin and Campos-Soria (2014) introduced us to a new important question in tourism literature, as Campos-Soria, García-Pozo and Marchente-Mera (2018), Sheldon and Dyer (2010) or Tse, R.Y.C (2001), the importance of micro and macro data to understand the tourist attitudes. As stated in p.55 "ideally, microdata and macrodata should be combined in the analysis. This approach may be of interest for tourism and hospitality decision-makers who need to understand and anticipate the linkage between GDP and tourists' behaviour."

Focusing in the research done by Rosselló et al. (2004), they used microdata as, gross domestic product (GDP), the price index and exchange rates as key data variables. GDP, or income, is one of the most informative variables when analysing demand, as stated in. In addition, we place particular emphasis on two pieces of research from Turrión-Prats (2018) and Turrión-Prats and Duro (2019).

We follow the lead established by these papers and analyse the economic determinants of tourism seasonality at the European Union (EU) level. One reason to use these variables is that they have been shown to be economically and statistically significant. In addition, we have access to such data through statistical organizations such as EUROSTAT, OCDE, the World Bank or various national statistics institutes.

One economic determinant which few previous researchers have used to analyse seasonality evolution is unemployment rates, and for that reason, as stated in the introduction, we wanted to include this data in our analysis in chapter 5. In that case, Koenig and Bischoff (2010) present a clear overview of state-of-the-art modelling and understanding within the seasonality and unemployment literature. Alegre et al. (2013 and 2019) explained the effects of unemployment over demand attitudes.

Finally, the link between seasonality and inequality are presented. Alam and Paramati (2016) presented a relation between the economic determinants, tourism and inequality. But other authors presented some research in that sense: Incera and Fernandez (2015), Llorca-Rodríguez et al. (2017), Lv (2019), Mahadevan and Suardi (2019), or Raza and Shah (2017).

2.3. Geographical Analysis

Lastly, we want to explain our decision to include specific geographical analysis. We decided to continue the practice outlined in the work of Duro (2016), Duro and Turrión-Prats (2019) and Turrión-Prats and Duro (2019). They analysed different geographical locations across Spanish provinces (e.g., Catalonia) or worldwide regions; however, we have observed that this research is not uniform, and there are areas which are relatively under-studied. In our case we decided to analyse seasonality across EU countries by focusing on a group of central countries to the bloc. In a second round of analysis, we examine these regions at the NUTS 2 level. This level of analysis gives us a broad perspective of seasonality in Europe.

It is clear that the impacts vary by location, which implies that seasonality is a place-specific issue as well as temporal problem. Urban destinations are less affected by seasonality than other places, for example beach or mountains destinations (Cannas, 2012).

Tourism in urban cities is less affected because the supply of tourism goods and services is less correlated to weather or school holidays. Obviously, tourism demand peaks during school holidays, but throughout the rest of the year the fact that these locations offer cultural heritage, and congress and events activities lead to a more linear and stable level of tourism activity. Lopez-Bonilla and Lopez-Bonilla (2006) produced a seminal research project looking at supply side concerns and the respective impacts of seasonality for a range of Spanish regions. However, these authors concentrated their analysis on the supply of accommodation and omitted the analysis of alternative goods and services. This article is highlighted because the authors identified two questions as a significant angle from which to analyse seasonality: regional and supply side effects in tourism, which are two of the principle research aims of this doctoral thesis.

For most mature destinations whose tourism activities are basically concentrated around weather, such as sun and sand or winter destinations, seasonality is an important issue and the planners try to resolve it in different ways, but not with clear success. Therefore, while urban tourism appears less affected, it should be noted that there is a lack of specific research on differences in seasonality patterns between cities and other destinations, or, as posited in Butler and Mao (1997), the non-peak type of seasonality. Duro and Farré (2015) observed that some Spanish provinces' higher rates of urban tourism suffer from less seasonality, or indicate better forecasts for future seasonality, than the mature tourism destinations based on the weather conditions. Those conclusions give us some basic points for seasonality research. One is that the supply of goods and services within tourism is a key point when analysing seasonality. From the literature review presented above, we draw the conclusion that we need more research on the issue of seasonality, and this research should be policy driven. Doing so enables us to pass understanding on to local leaders within the tourism sector in order to produce solutions to real world problems.

As stated previously, first we obtain the evolution of seasonality trends at the country level, which can highlight differences between European countries. We then create groups according to the location of each country: North, Centre and South. This gives us a clearer picture of the differences between these groups and provides some clear results on why seasonality has evolved as observed. In that section we focus on the demand side, but in following that we present a set of conclusions about the tourist products offered by each group. A similar research project was completed by Ferrante et al. (2018), analysing European countries beyond those that form the EU. The clusters of countries in our work in some part mirror those of Ferrante et al. (2018). Instead of using international arrivals, however, Ferrante and colleagues took hotel overnight stays as their key data variable, as it enabled them to gather data from a wider range of countries. However, the weakness of this method is that it excludes those tourists who did not choose this accommodation option.

The second level of analysis uses variation at the NUTS 2 level. Previously, Duro (2016) examined seasonality at the Spanish province level (NUTS 3), but to the best of our knowledge no existing attempts have exploited the NUTS 2 level at EU level. Our research focuses on both the supply and demand side of analysis. This gives us a complete picture of the evolution of seasonality at this territorial level. We obtained relevant information for local planners to solve problems and tackle the impacts of seasonality we have previously outlined.

Table 2.1 Main contributions in Seasonality

Question	Main Contributions
State of the art	Koenig & Bischoff, 2005; Cannas, 2012; Chung (2009); Corluka, 2019
First definitions	BarOn, 1975; Sutcliffe & Sinclair, 1980; Manning & Powers, 1984; Hartmann, 1986; Moore, 1989; Hylleberg, 1992; Butler, 1994; Grainger & Judge, 1996; Baum & Lundtorp, 2001; Lundtorp, 2001; Higham & Hinch, 2002; Cooper et al., 2005
Different structural reasons	BarOn, 1975; Hylleberg, 1992; Butler, 1994; Butler, 2001; Butler & Mao, 1997; Frechtling, 1996; Baum, 1998; Baum & Hagen, 1999; Frechtling, 2001; López-Bonilla & López-Bonilla, 2006; Connell et al., 2015
Natural factors	BarOn, 1973; Hartmann, 1986; Allcock, 1989; Butler, 1994; Butler & Mao, 1997; Baum & Lundtrop, 2001; Koenig & Bischoff, 2005; Bender et al., 2005; Turrion-Prats, 2018; Turrión-Prats & Duro, 2019
Institutional factors	BarOn, 1972; BarOn, 1975; Murphy, 1985; Butler, 1994; Hinch & Hickey, 1996; Rosselló & Sansó, 2017
Push and pull factors	Butler & Mao, 1997; Lundtorp et al., 1999; Kolomiets, 2010; Cannas, 2012; Goran, 2017

Table 2.2 Research in Seasonality—Seasonality impacts

Question	Main Contributions
Effects of seasonality	Sutcliffe & Sinclair, 1980; Yacoumis, 1980; Butler, 1994; Grant, 1997; Baum & Hagen, 1999; Jang, 2004; Cooper et al., 2005; Koenig & Bischoff, 2005; Wall & Yan, 2003; Fernandez-Morales & Mayorga-Toledano, 2008; Chung, 2009; Duro & Farré, 2015
Economic impacts	BarOn, 1975; Sutcliffe & Sinclair, 1980; Manning & Powers, 1984; Williams & Shaw, 1991; Butler, 1994; Jang, 2004; Goeldner & Ritchie, 2003; Rosselló et al. 2004; Koenig & Bischoff, 2005; Cooper et al., 2005; Chung, 2009; Duro, 2016;
Employment impacts	Yacoumis, 1980; Mathieson & Wall, 1982; Murphy, 1985; Mill & Morrison, 1998; Baum, 1999; Common & Page, 2001; Szivas et al., 2003; Cooper et al., 2005; Koenig & Bischoff, 2005; Chung, 2009; Koenig & Bischoff, 2010
Ecological impacts	Manning & Powers, 1984; Butler 1994; Grant et al., 1997; Bender et al., 2005; Chung, 2009
Sociocultural impacts	Mathieson & Wall, 1982; Manning & Powers, 1984; Murphy, 1985; Allcock, 1989; Butler, 1994; Common & Page, 2001; Koenig & Bischoff, 2005; Chung, 2009
Strategies to reduce impacts	Sutcliffe & Sinclair, 1980; Kotler, 1984; Middleton, 1992; Butler, 1994; Moutinho & Witt, 1995; Getz & Nilsson, 2004; Getz, 2008; Lee et al., 2008; Wang, 2011; Corluka, 2019

Table 2.3 Research in Seasonality—Measurement

Question	Main Contributions
Variables used (arrivals, overnights, average spending)	Duro, 2016; Cuccia & Rizzo, 2011; Ferrante et al. 2018; Koc & Altinay, 2007; Rosselló et al., 2004
Gini index	Wanhill, 1980; Lundtorp, 2001; Rosselló et al., 2004; Koenig-Lewis & Bischoff, 2005; Fernández-Morales & Mayorga-Toledano, 2008; Martín Martín et al., 2014; Fernández-Morales et al., 2016; Lau et al., 2017
Theil index	Duro, 2016; Rosselló & Sansó, 2017; Duro, 2018
Other measurements	Duro, 2016; Turrión-Prats & Duro, 2019
Decomposition in tourism seasonality	Cisneros-Martínez & Fernández-Morales, 2016; Duro, 2016; Duro, 2018; Fernández-Morales, 2003; Fernández-Morales et al., 2016; Fernández-Morales & Mayorga-Toledano, 2008; Roselló & Sansó, 2017; Turrión-Prats & Duro, 2019, Duro & Turrión-Prats, 2022; Vergori & Arima (2022)

Table 2.4 Research in Seasonality—Thesis aims

Question	Main Contributions
Economic determinants	Rosselló et al., 2004; Turrión-Prats & Duro, 2017; Turrión-Prats & Duro, 2018; Turrión-Prats & Duro, 2019; Xie, 2020;
Geographical dimension	Cisneros-Martinez & Fernández-Morales, 2013; Duro, 2016; Radic, 2017; Ferrante et al., 2018; Turrión-Prats & Duro, 2018; Šegota & Mihalič, 2018; Turrión-Prats & Duro, 2019, Duro & Turrión-Prats, 2022
Unemployment	Koenig & Bischoff, 2010; Alegre et al., 2013; Incera and Fernandez, 2015; Alam and Paramati, 2016; Llorca- Rodríguez et al., 2017; Raza and Shah, 2017; Alegre et al., 2019, Lv, 2019; Mahadevan and Suardi, 2019

CHAPTER 3. RADIOGRAPHY OF EUROPEAN TOURIST SEASONALITY: A TERRITORIAL ANALYSIS

3.1. Introduction and Methodological Aspects.

3.1.1. Introduction

As stated previously, seasonality is one of the key issues that tourism planners are seeking to resolve. Since the start of the global boom in tourism, particularly from the 1970s, the “Fordism period”, the issue of severe fluctuations in tourism rates has been significant. It has been shown that most economic activities have some form of seasonality patterns, for instance agricultural activities (Kuznets, 1933), but the problem is particularly acute and inherent to tourism.

To summarize, the main reason for an increased interest came thanks to an increase in climate concerns, seasonal activities, and other activities which, when concentrated in a certain period of time, lead to problems which are difficult to solve. As we will see over the next few pages, the rate of seasonality fluctuates from high to low. To help agents in the tourism sector, it is imperative to obtain and provide more information about what is driving these changes.

EU has taken this issue as significant in terms of tourism policy. As indicated by Ferrante et al. (2018), the European Commission and the European Parliament have launched various programmes to combat seasonality by developing off-season tourism activity and encouraging off-season tourism among older people, young people and people with fewer resources.

In the next paragraphs, a brief review of literarure at geographic level is presented. Some attempts to understand seasonality focus on a single country such as Austria or Germany (Bender et al, 2005) or regional provinces such as in Spain by Duro (2016) or Andalusia in Martin Martin et al. (2014), among others.

As previously outlined, Ferrante et al. (2018) produced a similar paper to ours in that they measured tourism seasonality across European countries. They used hospitality overnight stays as a key variable to capture tourist activity. This gave them the chance to obtain data on all target countries; however, in doing so, they lost some information of interest. One strength of their paper was that using two similar groups of countries—a Mediterranean group and North and Central countries—they found similar results. Another similar conclusion presented in Ferrante et al. (2018) is that, along with characteristics of the product on offer, climatic and institutional factors are the main drivers behind seasonality patterns across Europe.

Sustar and Azic (2020) analyse seasonality across a range of Mediterranean countries. In their case, the authors examine seasonality in Croatia, France, Greece, Italy, Portugal and Spain. They chose this set of countries because of the similarities between the types of tourism product these countries offer. For example, the authors highlight that these countries have plenty of sun and activities based around the sea, which leads them to have comparable tourism sectors. Niavis (2020) studied spatiotemporal and tourism destinations, the key contribution being the analysis of coastal destinations throughout the Mediterranean.

Finally, Radic (2017) produce a research about EU and its seasonality excluding institutional factors. Again. their findings show a high seasonality around the Mediterranean. The authors follow the Coefficient of Variation (CV) option to calculate seasonality and only analyse the fact if exist differences between seasonality caused by natural reasons.

Other examples of current literature include Turrión-Prats and Duro (2019), who examine seasonality determinants for Spain's main markets; Fernández-Morales and Cisneros-Martínez (2019), who provides a seasonal decomposition of cruise tourism, Martínez et al. (2019), who analyses the different regions in Spain using a DP2 indicator, and Duro and Turrión-Prats (2022) for Catalonia.

In geographical terms, we chose to analyse seasonality at two levels. The first is at the national level for EU-15 countries. This gave us a clear picture of the trends observed in the data across different countries—for example, identifying which countries show similar patterns of evolution. Along these lines, another valuable piece of information obtained is that some countries can be grouped. Overall, the data provide a rich source from which to extract information on seasonality.

In fact, the EU has taken this issue on as significant in terms of tourism policy. As indicated by Ferrante et al. (2018), the European Commission and the European Parliament have launched different programmes to combat seasonality, trying to develop off-season tourism by encouraging off-season tourism through tourism programmes for old people, young people, or people with few resources. This is evidenced by the interest of these institutions in knowing first-hand the evolution of seasonality at the EU level through the study done in 2019, although the analysis is at a more general or provincial level and its study is limited to some descriptive conclusions about the seasonality or intensity of tourist activity (European Commission, 2019). The second level is the regional level, NUTS-2. Through this exercise we obtain significant information on the supply and demand effects within seasonality. Both levels of analysis are valuable because they each provide new information about tourist behaviour patterns, tourism activities present in these regions, and their influence on seasonality.

As previously mentioned, in the analysis at the regional level, we used the product supply and demand side, whereas for the country analysis we used only the demand side. Data on the supply of tourism goods and services gave us a better basis on which to compare seasonality in different EU regions. This is because these products provide more information than using only tourist arrivals. Obviously, we used the arrivals to calculate the Gini values for every region, but when deciding the groups and analysing the differences between them, variation in the goods and services offered by the tourism sector provided us with key results. These results show that seasonality is quite different when we focus on the supply side of the economy, validating the importance we have placed on this analysis. Regions with more seasonal touristic activity present higher seasonality values compared to regions that offer activities related to urban activities with no seasonal patterns, like events and congresses.

We asked ourselves different questions when planning the thesis and this research. Seasonality is raised as a serious problems of tourist activity. Its negative effects, from an economic, social, and ecological point of view, affect the sustainability of the sector.

There are a number of dedicated political, management and economic efforts to reduce levels of seasonality. Deep knowledge of this problematic area can allow us to rationalize the resources and dedicate them to those problems that they really require priority attention

Therefore, the first question we asked ourselves was whether seasonality at the European level, specifically in the European Union (EU), was high or whether it did not imply worrying levels. Obviously, knowledge of seasonality at the EU level can allow different EU bodies and the Member States to clarify their actions and prioritize their resources. To follow this logic, the next question we asked ourselves was whether levels of seasonality and their evolution were homogeneous between the different countries that are part of the EU. This information is significant in terms of tourism management and policy. More accurate knowledge of seasonality in terms of the different Member States, as we have said, would allow the greatest precision in terms of policies to be applied by managers. Greater seasonality in countries where the type of tourism that exists is due more to the demand produced by the climate than by the product itself would require greater attention from managers. Areas with sun and beach tourism or areas where tourist activity is produced by a product such as congresses or businesses related to urban tourism should have a different policy according to the analyses carried out.

This approach becomes even more significant when the analysis takes place at the regional level. This is again an innovative and important approach. Knowledge of regional seasonality at the EU level has been little analysed, and where it has, this has often been a partial analysis, only fetauring regions in a particular state or area as is explained in previous sections.

Knowing more precisely what seasonality is at the regional level will lead us to have a more concrete idea of what aspects need to be addressed to reduce seasonality, if necessary. The first questions we ask ourselves are as follows:

- Can we identify group of regions with similar seasonality?
- Which regions and groups of regions have higher seasonality and which lower?
- Can we identify seasonality evolution following supply patterns?
- Can similar patterns can be identified between regions, and similar behavior?

We can understand the evolution of seasonality if we treat seasonality when we speak of the behavior of demand in relation to the offered product. Therefore, in regional research, there is a double grouping, one around the demand that reaches the analysed regions of the EU, and a second grouping around the most important products of those regions. This grouping by product will allow us to identify patterns of seasonality according to the tourist activity developed in each region. This grouping can allow us to identify products that may have a better attitude towards seasonality. Although it is already known that some products have better behavior in the face of seasonality, confirmation of this allows to identify possible policies to be developed in each of the regions to reduce the level of seasonality and therefore reduce the negative impacts.

Continuing with the topic of product analysis, identifying the climate issue as a main cause of seasonality, and the fact that Mediterranean regions accumulate a higher level of tourist entry into Europe as a whole, has made us wonder if there is a big difference between the regions that develop their product around the three Ss, sun, sand and sea, and other regions. We explore whether those who have developed other products in addition to sun and sand are able to differentiate themselves clearly from the areas with only the sun, sand and sea product. Possible success stories or good practices identified in the development of these products may identify patterns to apply to other regions with worse seasonal evolution.

A second group of questions are presented, leading to various exercises in analysing and decomposing seasonality data, a common practice to identify the weights and marginalities that occur in the evolution of seasonality, even at country and regional level.

- Does the evolution of European seasonality explain the seasonality of different states and regions?

- What weight does each state and region place on seasonality at the European level?
  - How does the explanatory weight change according to the evolution of tourist arrivals in each state and region?

Throughout the chapter, these questions will be answered, but new ones will also be generated that will lead us to new research and to the implications in terms of policies to be applied by managers and the private sector.

An added value of this research, as Ferrante et al. (2018) explained, is the fact that there is little research analysing similar patterns and identifying seasonality clusters. The main differences between our research and the research conducted by Ferrante et al. are that they use overnight stays and we use arrivals, and they analyse EU-28 as opposed to our EU-15. In addition, they have included Norway and Switzerland, and faced similar problems with the analyse of UK and Ireland due to the lack of data.

As we stated previously, in the second section of this chapter we will try to provide new information about seasonality in Europe and seasonality across some of the European Union's regions at the NUTS 2 level. This research offers the opportunity to analyse seasonality at the EU level, allows us to see trends at the EU and country level, and gives us the opportunity to identify different development depending on the touristic activity developed in the countries analysed. The analysis at NUTS 2 level reinforces the importance of the touristic product to understand the evolution of seasonality. This offers the opportunity to talk about the common policies applied by the EU and the success of these policies.

Governments see this situation of seasonality as a difficulty in terms of possible sustainability imbalances. As mentioned in the introduction, the negative economic, social and environmental effects that result from excessive concentration of tourism activity have led governments to establish policies to reduce seasonality. Thus, programmes such as the European Commission's Calypso, or IMSERSO in Spain, try to develop off-season tourism activities to reduce seasonality and mitigate the negative impacts. However, different governments' efforts do not seem to have reduced seasonality, as we will see in our analysis. The research we present here should allow politicians to see that this is a problem that is still very present in the European tourism sector, and that a higher level of research and new programmess are needed to reduce the problem.

In this chapter, as we have presented in the introduction and in the literature review chapter, one of the main questions to highlight is the question of the geographical area to analyse. In this research, we have chosen the EU-15. As we stated in previous paragraphs, an added value of this chapter is the decision to choose EU-15 because these countries are some of the more significant countries in terms of international arrivals[2], and the evolution of seasonality in this geographical zone could

[2] According to the UNWTO, in 2019, Spain was in second position in the number of international arrivals with 84 million, only behind France with 89 million. Also in terms of income, with 80 billion dollars, behind the USA with 214 billion dollars. At global level, the European region remains the one that receives the most international tourists globally with 744 million international tourists, more than double the number of arrivals compared to the second region (Asia and the Pacific).

offer some interesting patterns. In addition, these countries have some common policies applied by the European Commission and it is interesting to check the validity of these common policies.

Usually, we found analysis at country or regional level as presented by these recent analyses done by Cisneros-Martinez and Fernández-Morales (2013), Duro (2016), Ferrante et al. (2018), and Turrión-Prats (2018), Turrión-Prats and Duro (2019). Where do not attempt to analyse a global area like the EU, but instead research a more specific area, such as Spanish provinces (Duro, 2016) or Mediterranean cruise harbour as in Fernández-Morales & Cisneros-Martínez, 2019. Therefore, it is true that European countries are analysed by Ferrante et al. (2018) and global countries in Duro and Turrión-Prats (2019), but the question of common policies is not applied in these two papers.

The second decision is the analysis at EU regional level. As stated in the chapter 2, it is important to focus the analysis at double level, at demand and at supply level. Strategies to reduce seasonality are applied at both level but, sometimes, more information and data is needed to reach a more successful policies and strategies. At this level only few attempts are found, as stated in the previous paragraph, but none of them at EU level.

3.1.2. Methodological Aspects

The first pertinent question to ask on how to conduct research into seasonality is around measurement. According to Duro (2016), despite there being a significant body of research into methodologies for measuring seasonality, there is little which specifies the best methodology (Fernandez-Morales 2003; Fernández-Morales and Mayorga-Toledano 2008; Lundtorp 2001; Martín Martín et al., 2014; Wanhill 1980). Koenig-Lewis and Bischoff (2005) refer to many other sources of current understanding about the measurement of seasonality (Baron, 1975; Donatos and Zairis; 1991; Drakatos, 1987; Sutcliffe & Sinclair, 1980; Yacoumis, 1980, Yan & Wall 2003; among others). The conclusion of those authors is similar to of Duro (2016) in that it is difficult to decide the best methodology to calculate seasonality.

There exists a range of methodologies that can be applied to measure seasonality. In recent years, the most commonly used methodology has been the Gini index, but there are other methodologies such as the Theil index and the coefficient of variation (CV). These different methodologies are applied to calculate seasonality (Duro, 2016), and the main reason to calculate the different indexes is to try to resolve a range of problems observed in each index. The option to calculate seasonality using different indexes gives more consolidated results and more robust information about seasonality. In this paper, we use the Gini index.[3] Recently, authors such as Lo Magno et al. (2017) have proposed alternative methodologies to study transport issues, alongside other authors who utilized the CV, as in Rosselló and Sansó (2017) or Radic (2017).

[3] We calculated the other indexes, Theil and CV, but the results are very similar to Gini and we decided to use the latter.

Nevertheless, and following Duro (2016), Lundtrop (2001) and Wanhill (1980), the Gini index can be the best approximation for seasonality for three reasons:

- The reduced dependence on the changes in the peak months
- It is highly stable.
- Its low sensitivity to extreme values.

After estimating our model using the Gini index, we provide a decomposition of the results. The aim of the decomposition analysis is to give more information to planners about seasonality and to demonstrate the underlying channels behind the data. In that sense, we chose decomposition by factors, following Duro (2016), Fernández-Morales et al. (2016), and Fernández-Morales and Mayorga-Toledano (2008). Decomposing seasonality is a common practice beyond these papers (for good examples, see Duro, 2018; Fernández-Morales & Cisneros-Martínez, 2019; Rosselló & Sansó, 2017). This analysis gives us the chance to highlight in detail the evolution of Gini values across the EU over recent years and indicates which countries contribute most to the evolution of EU seasonality. We believe that this is one of the most valuable exercises presented by this chapter.

By taking advantage of the time variation in our data, we demonstrate a set of different results over the period studied. The evolution prior to the economic crisis in 2008 is clear, with a stark reduction in seasonality across the EU; after that year, the seasonality increases, and during the last years analysed the evolution is not clear. The process of decomposition gave us the opportunity to clarify our understanding of the origin of the increasing seasonality rates. We identify the countries responsible for the observed evolution and we propose three subsets of countries, North, Center and South, based on the similarity of their tourism products and seasonality evolution.

The next step is to present the Gini Index methodologies.

In mathematical terms, assuming two extreme cases, one in which arrivals in all months are the same (represented by the equidistributional line) and the other in which all the arrivals occur in a single month, representing the actual distribution of arrivals across months with the Lorenz curve, the Gini index measures the ratio of the concentration area, i.e. the area between the Lorenz Curve and the equidistributional line to the area of maximum concentration. There are different ways of measuring such ratio. One way of calculating it is as follows:

$$G = \frac{1}{2\mu}\sum_i \sum_j p_i p_j \left|y_i - y_j\right| \qquad (1)$$

Where i and j can be any two months in the year and p_i and p_j are the relative weights of the observations (months); y_i is the variable measuring tourists flows (in this case, non-resident tourist arrivals), and μ is the annual mean of y. Usually when applied to the measurement of seasonality, the weights for all the observations are equal and equivalent to 1/n, where “n” is the number of months under analysis (therefore, n = 12).

The interpretation of this index is intuitive: the higher the Gini index, the greater the degree of concentration of tourist arrivals. One of its properties is that it gives greater weight to distributional changes occurring at the centre of the distribution (i.e. in the months of annual average demand) and gives asymmetrical weight to changes in the tails (i.e. months with higher and lower demand). Therefore, besides its utility as a synthetic annual measure to compare the evolution of seasonality across years and/or regions or countries, these properties have been highlighted to justify its extended use: the Gini coefficient has little dependence on changes in the peak months; it is more stable than other measures; and it has low sensitivity to extreme values (Baum & Lundtrop, 2001).

Duro (2016) describes the main problem with the Gini index and the option of using the Theil index as a second or alternative methodology. The author highlights that the Gini index gives greater importance to distributional changes taking place in the centre of the distribution and gives asymmetrical weight to changes in the tails.

A very important feature of inequality and concentration measures is their decomposability—i.e. the possibility of calculating the contribution of different components to the total concentration. The literature on inequality measurement emphasizes different possibilities to decompose concentration indexes (Cowell, 1999):

We decided to employ decomposition by factor in which we assess the contribution of each country to total seasonality seen in the EU, understanding the total arrivals to the EU as the sum of arrivals in each of the member countries, and defining each factor as a specific destination (a country or a group or countries). There are several approaches to the decomposition by additive sources, depending on the concentration index chosen to analyse the concentration level. For instance, to analyse the contribution of domestic versus international markets, Duro (2016) uses the natural variance decomposition, which measures the total contribution of each factor as the addition of its individual variance and the cross-covariance. On the other hand, Fernandez-Morales and Cisneros-Martinez (2019), Fernández-Morales et al. (2016) and Fernandez-Morales and Mayorga-Toledano (2008) use the methodology to decompose the Gini index proposed by Lerman and Yitzaki (1985). As the Gini index is not additive, to decompose it by additive components, Lerman and Yitzaki propose to view each source's contribution to the total concentration as the product of the source's own Gini, its share of the total variable under analysis (income in their study), and the correlation of each source with the total rank of this variable[4].

Following the example of the these cited studies, we also decided to use the methodology proposed by Lerman and Yitzaki (1985) because it applies the Gini index, the most widely used indicator of seasonality in tourism studies and it provides an intuitive interpretation of the Gini index component. It not only allows for the estimation of the contribution of each source to total annual seasonality, but also a measure of the

[4] However, and according to Shorrocks (1982), there is no unique rule to conduct a factor distribution of the correlation effects and thus, the contribution of the factors to the total inequality. As a result, the contribution assigned to each component strictly depends on the way the interaction effects are allocated among contributions. This is why the literature does not consider Gini as a decomposable index in these terms (Goerlich, 1998). Therefore, this kind of decomposition, contrary to what happens in the group decomposition, is not quite clear (Duro, 2016).

marginal effect of changes in each destination's share[5], which helps us to understand how changes in arrivals in a particular country affects overall seasonality in the EU.

The decomposition proposed by Lerman and Yitzaki (1985) is based on the covariance approach to calculate the Gini index. Let Y be the variable measuring tourism demand, in our case the number of monthly arrivals of non-resident tourist in Europe. The annual Gini index would be calculated as follows:

$$G = \frac{2}{\overline{Y}} \mathrm{Cov}(Y, F) \qquad (2)$$

where $\overline{Y}$ is the mean of Y, F is its cumulative distribution function, and $\mathrm{Cov}\,(Y, F)$ stands for the covariance between Y and F. Different from the definition of the Gini coefficient explained previously (1), where each month had the same weight, with this method it is possible to allocate weights to the months according to their length, i.e. 31/365 for January or 28/365 for February and so on. The Gini coefficient equals zero when arrivals are the same for all the 12 months, which means no seasonal concentration. On the other hand, unlike continuous variables where the maximum is 1, the restriction of 12 observations per year reduces the range of the Gini index to (0, 1 – 28/365), which is reached when Y is different from zero in February but zero in the rest of the months (Fernández-Morales & Mayorga-Toledano, 2008).

[5] This decomposition provides an easier interpretation of the Gini index components compared to other decompositions of this index, as the one carried out by Shorrocks (1982) or by Dagum (1997), which do not allow for the obtaining of relative and marginal effects

The variable Y can be represented additively as the sum of the arrivals in each country: $Y = Y_1 + Y_2 + \cdots + Y_k$ (therefore in our case, k = 1,.., 13). The Lerman and Yitzaki (1985) approach implies the following decomposition:

$$\mathbf{G} = \sum_{\mathbf{k=1}}^{\mathbf{K}} \mathbf{S_k} \, \mathbf{R_k} \mathbf{G_k} \tag{3}$$

where G is the level of seasonality in the EU as a whole, G_k is the annual Gini index of the country k, S_k is county k's annual share of the total annual value of Y, and R_k represents the correlation between arrivals in country k with the distribution of total arrivals in Europe, this is, the correlation between Y_k and Y defined by: $\frac{\mathrm{Cov}(Y_k,F)}{Y_k,F_k}$, where F and F_k are the cumulative distribution functions of Y and Y_k, respectively. Therefore, the contribution of each country to the overall seasonality in Europe depends on these three components: S_k represents the relative importance of the country k as a tourist destination in the EU, G_k measures the annual seasonality in country k, and R_k gives us an idea of the strength and direction of the linear relationship between the destination k and the distribution of arrivals in Europe. The higher any of these components is in the country k, the higher k' contribution to overall seasonality.

It is important to emphasize that a destination with a relatively high degree of seasonal concentration of arrivals might in fact reduce overall seasonality in the EU if its arrivals are not concentrated in the other countries' peak months because it will show a negative R_k.

Finally, this decomposition method allows for the estimation of the marginal effects of changes in arrivals in each country (Lopez-Feldman, 2006). Consider a change in the number of arrivals in country k equal to $\varepsilon_k Y_k$ (i.e., ε_k is the percentage change and it is assumed to be equally distributed throughout the year). It can be shown that the partial derivative of the overall Gini with respect to this percentage change is: $\partial G / \partial \varepsilon_k = S_k (R_k G_k - G)$. Dividing by G gives the country's marginal effect relative to the overall Gini:

$$\mathrm{RME}_k = \frac{\partial G/\partial \varepsilon_k}{G} = S_k \left(\frac{R_k G_k}{G} - 1\right) \quad (4)$$

In other words, the percentage change in arrivals in country K can increase (or decrease) the overall seasonality in a proportion equal to the RME_k. Which can be written as the country's contribution as a percentage of the overall Gini minus the country's share of total arrivals. The sum of relative marginal effects of all countries is zero and if all countries' arrivals are multiplied by the same ε, the overall Gini is left unchanged.

With this measure, it is possible to estimate the impact that a 1% change in arrivals of non-resident tourists in country k will have on total tourism seasonality in the EU. The estimation of these marginal effects can be particularly useful when evaluating the effect of changes in arrivals patterns related to changes in economic conditions in origin and destination markets, changes in the supply characteristics of particular countries, or even natural disasters and terrorism attacks, among other factors.

Chapter is structured as follows. In the next section results and implications at EU-15 level. The third section NUTS2 level results are presented. The final section provides the mainimplications and future investigations .

3.2. Seasonality in EU-15

3.2.1. Data

Duro (2016) outlines various perspectives on the data sources most often used when studying seasonality. In particular, he uses the number of overnight stays at hotels, as do Cuccia and Rizo (2011), Fernández-Morales (2003), Fernández-Morales and Mayorga-Toledano (2008), and Martín Martín et al. (2014). We want to highlight these references used to be oriented to analyse seasonality through the tourism demand and in a less number using the supply offer. As previously discussed, our aim with this research project is to further our understanding on both the supply and demand effects of seasonality. We begin by analysing seasonality using country arrivals and present a set of empirical facts about the evolution of seasonality across the EU. We then proceed with the analysis of regional seasonality and present our conclusions on supply side effects. To analyse the questions presented above, we use monthly data provided by Eurostat on arrivals of non-residents at tourist accommodation establishments for the period 1996–2019, for which complete monthly data were available for 13 EU member countries: Austria, Belgium, Denmark, Finland, Germany, Greece, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom. Unfortunately, monthly data for France and Ireland are not complete for this period. Finally, we are able to recover data on regions at the NUTS 2 level from 12 countries, excluding the UK and Ireland and we have decided to consider Luxembourg as one region, beside the Belgian's regions.

As indicated in the previous paragraph, we were unable to obtain monthly data pertaining to France, which is the leading country for tourism in Europe. The Institut National de la Statistique et des Études Économiques (INSEE) only provides monthly information at NUTS 1 and NUTS 2 levels from 2010 onwards. In previous years, INSEE provided this information for the peak tourism period, April to September, though this cannot be used to make general conclusions about seasonality throughout the year. From 2010 onwards, even the data are not complete, authors like Rico et al. (2021) or Sustar and Anzic (2019) offer some results on seasonality in France. France has the largest tourism market in Europe and it offers a very broad range of activities and products for tourists. Tourists can enjoy the beaches, mountains, urban life and the countryside. According to data from Eurostat, in 2018, France enjoyed 15 per cent of the arrivals and 11 per cent of the overnight stays recorded across all EU-15 countries. These data show the importance of France within European tourism. Despite this, we proceed with the countries listed above. These countries cover more than 80 per cent of total arrivals in the EU-15 and provide a complete time series at monthly intervals. Nevertheless, Ferrante et al. (2018) and Sustar and Anzic (2019) offer guidelines about seasonality in France and we comment on their conclusions in the results section.

Other important countries to highlight at the NUTS 2 level are the Netherlands and Italy. In the case of the Netherlands, data are available over a long period, but the data are not homogeneous. In the end, we decided to use the four years 2012–2015. For Italy, we found some problems with specific data variables; the period available is short, at only five years, and we observed some minor problems which led us to ignore data recorded for the Lazio region.

Other minor but relevant points about the data are as follows.

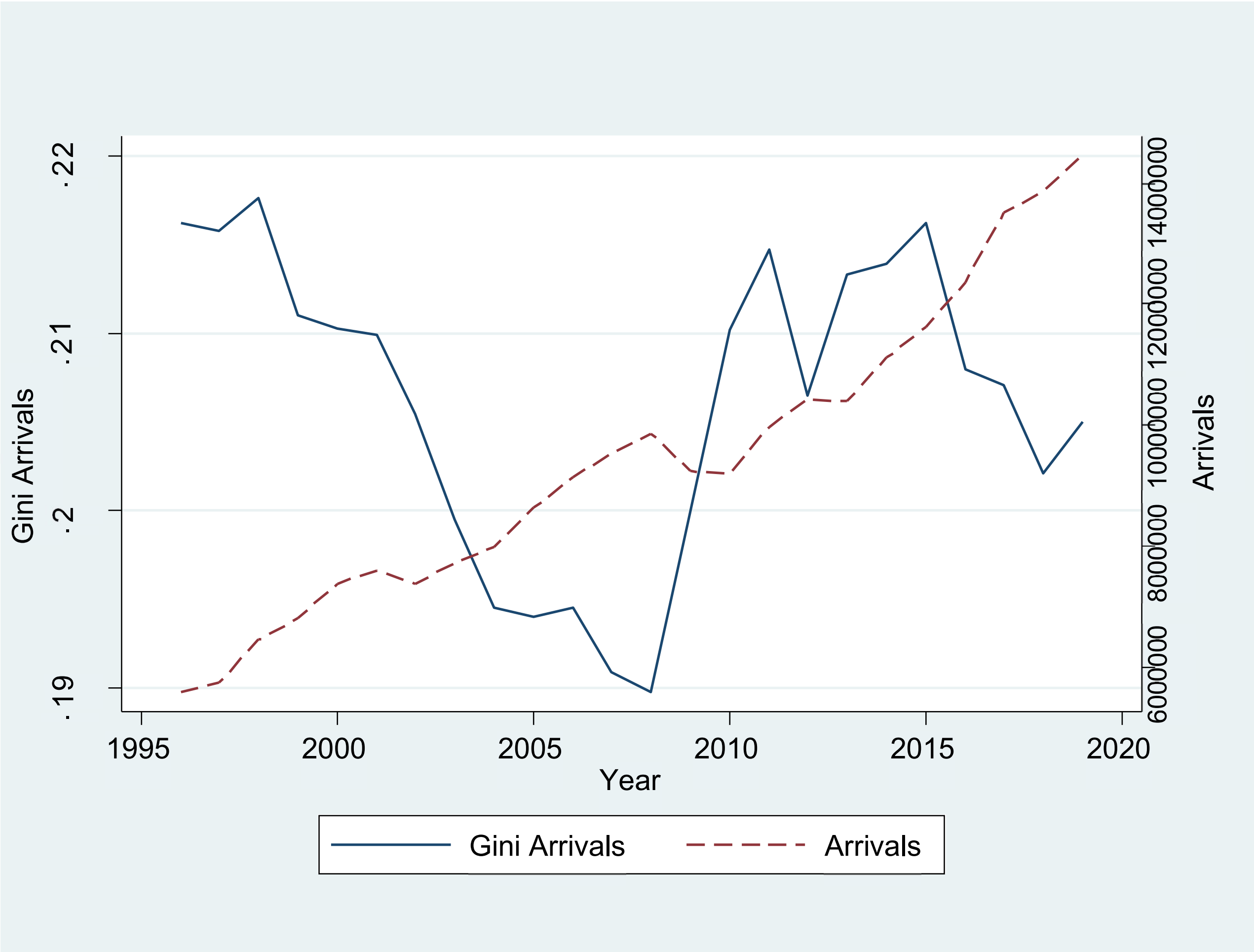
- Some countries provide data at the NUTS 3 level, so we aggregate the different NUTS 3 data to obtain the NUTS 2 data.

- Denmark gave information about occupied rooms rather than arrivals, but both statistics provide similar information.

3.2.2. Global Results

As we said, we want to present an analysis of seasonality across the EU as a whole. We believe that the results are of interest to us as researchers but also to practitioners since they give us an initial description of seasonality over recent years.

Figure 3.1. Arrivals of non-residents and seasonality in the EU (1996–2019)



Source: Compiled by author based on Eurostat

Figure 3.1 shows that the number of arrivals in the EU increased over the 25 years analysed. Tourism was one of the most dynamic economic activities during that period. After the economic crisis of 1993–1994, the world's economy improved and we saw the emergence of the BRIC[6] countries. Growth was especially impressive in China and Russia,

[6] BRIC countries are Brazil, Russia, India and China. These countries experienced significant economic improvement from early 2000 to 2015. There are some common factors amongst these countries: for example, they are highly populous and very large geographically. Despite this, Brazil and Russia suffered some economic difficulties and their evolution had been less positive in recent years.

which led to these countries becoming large sources of outgoing tourists. Tourism has grown across the international market, and Europe is a main destinations, as we can see in the increasing number of arrivals. The trend is increasing, except for in 2001 due to the 9/11 terrorist attacks. Importantly, following the severe financial crisis of 2008–2009, the number of arrivals recovered quickly, and in 2011 the number was larger than in 2008.

Between 1996 and 2019, we can distinguish two different periods which show two contradictory trends in seasonality. The economic recovery after the 1993 economic crisis led to a great reduction in seasonality. This reduction is linked to some economic and social changes related to tourism, such as the emergence of new tourism products developed during those early years. These include an increase in city breaks or green and rural tourism combined with the emergence of low-cost airlines. As we can see, the Gini index reduced in value from 0.22 to 0.19 between 1996 and 2008. Despite this, the financial economic crisis in 2008/2009 sent the Gini figure back to the level recorded in 1996. People reacted to the economic crisis by reducing the number of trips they took due to a lack of confidence in the wider economic situation. The effect was that people concentrated the number of trips in specific periods of the year, and as a result seasonality increased. During the last years, 2015-2018 it seems that seasonality recovers a positive trend, except the last year analysed, 2019, with a higher seasonality value than previous years.

New tourism products developed in the late 1990s, and the interest of governments and companies in taking advantage of the resources held by the tourism sector, will lead to further reductions in seasonality. Obviously, the coronavirus pandemic of 2020 and 2021 has put a stop to the downward trend in seasonality. It is too soon to calculate the overall effect that the pandemic will have on seasonality, but a large fraction of tourist activity during 2020 was recorded in summer. In addition, tourism increased again in 2021 compared to 2020. Both years will record a high level of monthly seasonality.

Gini values obtained in this research are around 0.2. This value, as an average level, could be considered a medium value and is similar to that obtained by Ferrante et al. (2018) (but some areas analysed are around 0.5, specifically in Mediterranean regions, as we will present in the next chapters). During the first period, we can see a seasonality reduction of 15 per cent: this means a reduction of 1.5 per cent annually. We can see a clear demand and tourist arrivals increase. With this situation, we could say that the good economic data, the increasing offseason holiday trips, and the increasing arrivals led to a reduction in seasonality. But with the financial crisis of 2008–2009 this situation changed: we observe a return to the highest values, but with a significant change—the arrivals continue the growing trend. During the last five years, seasonality has shown little reduction.

Turrión-Prats and Duro (2019) found similar results when analysing Spain's seasonality in a similar period. In the first years analysed, seasonality falls with an increase in demand; in a second period, the authors find an increasing seasonality alongside the demand. The same authors, in Duro and Turrión-Prats (2019), found a similar pattern when they analysed developed economies worldwide. A possible explanation is that the traditional and most important tourist destinations suffer more when demand rises. This increase in demand tends to happen during the traditional periods related to climatic conditions (summer or winter) and social factors (school holidays). The impact is that some tradional areas with important tourist activity based on the climate who developed an important effort to reduce seasonality during the first years of the data found that the increasing demand showed a high concentration during months with high demand, resulting in increased seasonality.

As we highlighted previously, Gini values for the EU are around 0.2. In fact, as an average level this is not too high, however it conceals the fact that there are some regions which show relatively much higher, and therefore concerning, seasonality rates. Over the following sections, we show that some countries, particularly in southern Europe, where tourist arrivals are higher than other areas in the north, the Gini index is higher than 0.2. As seen in Figure 3.1, arrivals grew towards the end of the period studied, however seasonality evolved differently over the same period.

As we can see in Figure 3.1, seasonality follows a U-shaped curve until 2016. Clearly decreasing over the years 1996 until 2008, after which it trends upwards. We can state that, before the economic crisis, seasonality had decreased. This leads us to the following hypothesis: the state of the wider economy is the principal driver of seasonality in tourism, however it is not the only cause. We observe that tourist attitudes changed during this time which led to a reduction in seasonality.

It is true that seasonality is highly correlated with the health of the general economy, but to what extent this drives seasonality will be treated in the next chapter. First, we will deal with seasonality variation across EU countries and regions.

Our first method of analysis is to check the validity of the time series used. To do so, we check if we can find a structural break in the period analysed. We apply a test of structural change (the Chow test) with the aim of observing whether or not a significant change occurred in 2008. The Chow test allows us to observe whether a structural change has occurred, based on verification of the errors of two separate estimates of the structural change point, and the third model includes all the period.

Firstly we apply an AR(1) model[7] with the following form:

$$\ln(Gini_t) = \propto + \beta_1 \ln(Gini_{t-1}) + \beta_2 \ln(arrivals_t) + \beta_2 \ln(arrivals_{t-1}) + \varepsilon \qquad (5)$$

where ln is natural logarithm and ε the standard error

Table 3.1 try to establish the relationship between Gini and arrivals considering all the European countries under consideration (13 countries).

[7] An autoregressive (AR) model is a representation of a type of random process that describes certain variable processes in time either in nature, the economy, etc. The autoregressive model specifies that the output variable depends linearly on its previous own values (Garcia-Alvarado, 2014). Gi-Alana et al. (2004) presented some interesting works, as stated in the chapter 2, where they used some AR(1) methodologies to time series in a similar way that is presented in this thesis.

Table 3.1 Model AR (1)

	(1) lngini	(2) lngini	(3) lngini
Ln($Gini_{t-1}$)	0.800***	0.802***	0.769***
	(6.21)	(6.08)	(5.51)
Ln(Arrivals)		0.0130	0.153
		(0.43)	(0.87)
Ln($Arrivals_{t-1}$)			-0.143
			(-0.81)
_cons	-0.318	-0.382	-0.423
	(-1.56)	(-1.49)	(-1.60)
N	20	20	20
R^2	0.682	0.685	0.698

Notes: *t* statistics in parentheses
* p<0.1, ** p<0.05, *** p<0.01

The results show that only model (1) is significant, and we apply the Chow test for this model.

Table 3.2 Chow-Test

	(1) lngini
Ln($Gini_{t-1}$)	1.006***
	(6.23)
y2008	-0.618
	(-1.71)
y2008* Ln($Gini_{t-1}$)	-0.404*
	(-1.77)
_cons	-0.00247
	(-0.01)
N	20
R^2	0.778

Notes: *t* statistics in parentheses
* p<0.1, ** p<0.05, *** p<0.01
F(2, 16) = 3.45
Prob >F = 0.0569

Therefore, the number of observations is few, just 20 years, we can see in Table 3.2, the null hypothesis that there is no structural break in 2008 can be rejected only at the 10 per cent significance level.

We then check the validity of the relationship between arrivals and seasonality. Again, we apply a Chow test to examine whether the parameters (slopes and the intercept) of one group are different from those of other groups. In this case, the groups are determined by group 2008.

TABLE 3.3 TEST OF STRUCTURAL CHANGE: CHOW TEST

	(1) Ln(Gini)	(2) Ln(Gini)	(3) Ln(Gini)
Arrivals (ln)	-0.135*** (-2.98)	-0.134*** (-2.96)	-0.207*** (-3.46)
Arrivals (ln) squared	0.0169* (1.94)	0.0172** (1.98)	0.0257** (2.16)
Year 2008 or later		-0.0627 (-1.49)	-0.339*** (-3.02)
y2008*Ln(Arrivals)			0.191** (2.09)
y2008*Ln(Arrivals)^2			-0.0236 (-1.36)
_cons	-1.342*** (-24.38)	-1.320*** (-23.18)	-1.215*** (-17.51)
N	294	294	294
R^2	0.050	0.057	0.082

Notes: *t* statistics in parentheses
* p<0.1, ** p<0.05, *** p<0.01
F(3, 288) = 3.29
Prob >F = 0.0212

As we can see in Table 3.3, we can reject the null hypothesis and conclude that a structural change occurred between the two periods, before 2008 and after 2008.

For the last model, the null hypothesis is that the two periods (before 2008 and after 2008) have equal parameters for arrivals (and arrivals squared). Rejection of the null hypothesis means that the two periods do not share the same slope of arrivals.

The null hypothesis that there is no structural break in 2008 can be rejected at the 5 per cent significance level.

This structural change indicates that some external shock has occurred, changing the economic situation before and after the 2008/2009 financial crisis. This economic crisis led to a change in tourist attitudes after 2008. The number of arrivals continued to increase but the trip characteristics changed. People concentrated on trips during summer holidays and reduced the number of short trips. There were significant changes in tourists' attitudes, like cutting expenditure or reducing overnight stays during their trips (Gutierrez, et al., 2014).

The second stage in our analysis is to check if the relationship between arrivals and the Gini index are appropriate. As we can see in Figure 3.1, the Gini index presents a U-curve form until 2016, and we want to establish the presence of a curvilineal relationship to confirm the linear relation between Gini index and arrivals.

$$\ln(Gini) = \propto + \beta_1 \ln(arrivals) + \beta_2 \ln(arrivals)^2 + \varepsilon \qquad (6)$$

As we can see in Table 3.4, the linear relation between the Gini value and the arrivals is confirmed.

Table 3.4 Curvilineal relationship between Gini and Arrivals

	Ln(Gini)
Arrivals (ln)	-0.135***
	(-2.98)
Arrivals (ln) squared	0.0169*
	(1.94)
_cons	-1.342***
	(-24.38)
N	294
R^2	0.050

t statistics in parentheses
* p<0.1, ** p<0.05, *** p<0.01

This change in trend observed in the Gini value is significant both at the time it occurs, and in its meaning in relation to the evolution of tourist arrivals. First, we find that the Gini value in the analyzed period is decreasing as the years progress and arrivals increase. In this case, the results would confirm the established ideas that an increase in the number of tourist arrivals would cause a progressive reduction in seasonality. But after the financial crisis we find a clearly different situation, with a continuous increase in tourist arrivals, there is also an increase in Gini values, although with a more irregular evolution, but clearly greater than before 2009. As indicated above, we find a very clear change in the type of arrivals after 2009, with a greater presence of travellers from countries such as China, which explain the increase, but also the concentration in periods of high activity, especially around moments of already strong tourist activity.

However, it is worth emphasizing, as we have done before, that the variability of the Gini value is not too significant, we are talking about only 1 or 2 tenths, since the beginning of the series. This stable value of around 0.2, and which can also be considered relatively low, could indicate a certain stability of seasonality and that it could hardly be lowered at the global level of the EU. Therefore, the concentration of policies to reduce seasonality could be directed to those countries or regions with greater problems in this aspect.

Following these tests of validity, we will continue with the analysis of each of the EU-15 countries.

3.2.3. European Seasonality and Countries

Individual Analysis

In this section, we want to measure and present the evolution of seasonality both within and across countries, using tourist arrivals as the main variable of interest. The following section is structured as follows. In page … we see Figure 3.3., we present plots for each country. We use these graphs to comment on the trends observed in seasonality within each country whilst also discussing patterns which emerge across different countries. We present the decomposition analysis to check the importance of each country in the evolution of seasonality across the EU as a whole.

Finally, we present a set of further additional plots and figures to shed more light on the analysis of countries at group level.

As previously highlighted, seasonality in the EU has two key stages, one prior and after to 2009. This pattern however is not so clear when we analyse country by country.

We observe a clear pattern during the first years of analysis in which the Gini values decrease until 2008-2010. After that period, the index varies irregularly. Table 3.5 and Table 3.6 presents the main Gini index figures by country and we discuss some conclusions about the results by showing patterns which emerge in tourist demand.

Table 3.5 Gini values per country

	1996	2006	2019
Austria	0.176	0.154	0.154
Belgium	0.142	0.103	0.106
Denmark	0.406	0.324	0.251
Finland	0.297	0.222	0.142
Germany	0.179	0.152	0.131
Greece	0.421	0.429	0.473
Italy	0.251	0.253	0.267
Luxembourg	0.285	0.212	0.156
Netherlands	0.192	0.145	0.135
Portugal	0.242	0.212	0.197
Spain	0.238	0.206	0.201
Sweden	0.302	0.373	0.312
United Kingdom	0.190	0.170	0.161

Source: Compiled by author

Before advancing to analysis of the plots presented in Figure 3.3, we want to add some comments about France. Sustar and Azic (2020) estimated Gini values of around 0.12–0.13 for the years 2007–2017 for France. They used overnight stays at accommodation establishments instead of arrivals, but the values obtained are quite similar, despite some exceptions at the regional level (for example, in Corsica). The conclusion we draw from this is that France does not show a high level of seasonality at the national level. If we follow Ferrante et al.'s (2018) clustering, we find that France produces similar results to northern or central countries, as defined by our research project. It is not possible to put France in only one of those groups because Sustar and Azic (2020) do not gave the Gini values prior to 2007, and it is not possible to check the rate of seasonality prior to the economic crisis.

Now we comment on a range of other countries.

- Sweden and Denmark suffered the highest seasonality values but at opposite times. Denmark had its highest value (0.4058) at the beginning of the period (1996) and Sweden in 2004 (0.4117). As stated in Baum and Lundtrop (2001), these countries are greatly affected by climate and holidays are concentrated around the weather. The authors saw high levels of seasonality in summer destinations; meanwhile, in other regions, the Gini values are lower, around 0.2 or less.
- Denmark, Finland, Germany, Luxembourg, the Netherlands, Belgium and Sweden saw a positive trend in seasonality values. However, the index for Sweden and Belgium varies irregularly across time.
- Greece is the country with the highest Gini values. The Gini value remains at over 0.4 for the entire period studied and shows the worst trend of all the countries analyzed.
- Portugal, Spain and Italy present comparably high figures. It is true, however, that the rate does not exceed 0.3, which implies that seasonality was not particularly severe throughout the period analysed. Ferrante et al. (2018) and Turrión-Prats and Duro (2019) found similar results in their research on the countries highlighted in the last three points.

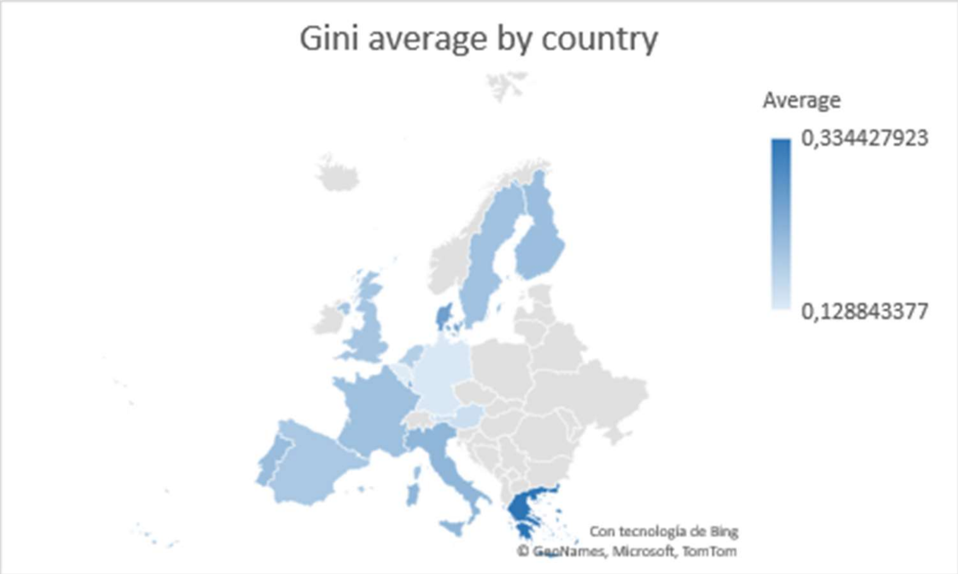
- The southern area consisting of Greece, Spain, Italy, and Portugal shows a worsening seasonality rate, while the number of tourist arrivals increased substantially during the period. All these countries experienced significant reductions in seasonality during the final years, while Italy and Greece showed a little increase during the final year.
- As observed by Ferrante et al. (2018) and Turrión-Prats and Duro (2019), we observe that the direction of the seasonality trend depends on the geographical group of countries under study. Northern and central countries show rather different patterns compared to southern countries.
- For countries such as Italy, Greece and Spain, the most well-known tourism product is related to beach and coastal attractions. It is natural, therefore, that this product is very seasonal; however, at the same time, these countries have developed alternative tourism products over recent decades. These include various urban destinations, cultural heritage and events over which seasonality has less influence. As highlighted by Duro (2016), despite these positive developments, the increasing number of arrivals and the rise in demand for seasonal products like cruise tourism have led to negative trends in seasonality.

To look deeper into seasonality within the EU and to understand the U-shape observed over time, one of the main questions to resolve is the effect that differences between the peak season and low season have on seasonal patterns. Here we define a positive trend as one where the difference is smaller, and negative means that the difference is larger.

Our analysis shows that countries with the highest number of tourist arrivals, like Spain, Italy, Greece, Germany and Austria, showed a negative trend in seasonality. The difference grew after 2008, and only some smaller countries (in terms of tourist arrivals) like Denmark, Finland, Luxembourg or Belgium had a positive or no clear trend. We can conclude that from 1996 to 2008 the majority of countries demonstrated a positive trend; however, two countries, Spain and Greece, recorded irregular time series variation. Some years saw positive improvements; other years reversed the trend and recorded negative changes. These patterns give us a first indication of why seasonality within the EU presents a U-shape form. In addition, tourist arrivals increased year on year across the different countries studied. If we combine these two conclusions, worsening seasonality trends and increased tourist arrivals, the increasing seasonality in the second part of the period studied is clearly understandable.

Figure 3.2 (below) presents the Gini average by country. This figure shows that Greece and Denmark have the worst average values, around 0.3, whereas Germany, Austria and Belgium record the best at around 0.1.

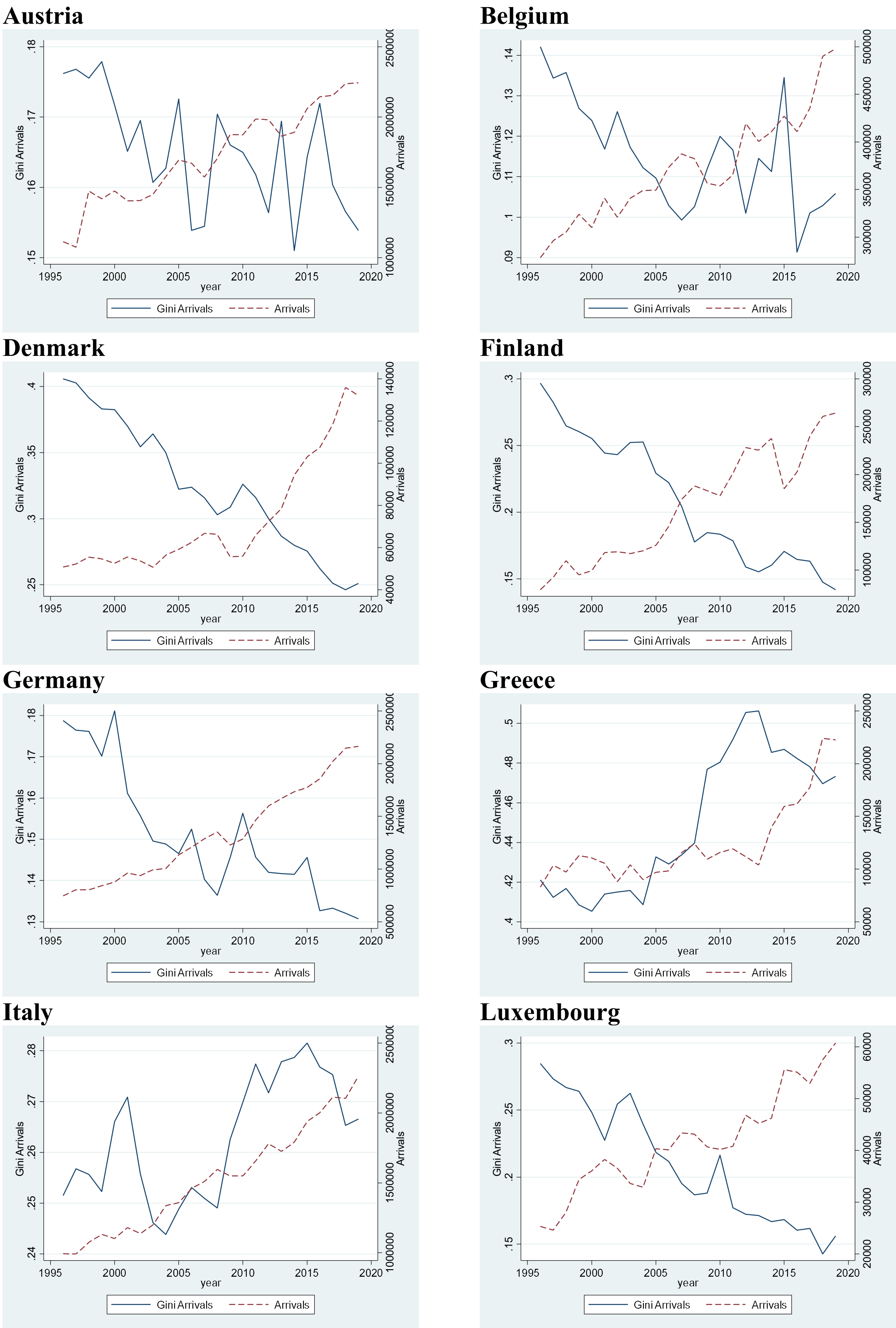
Figure 3.2 Gini Average per country



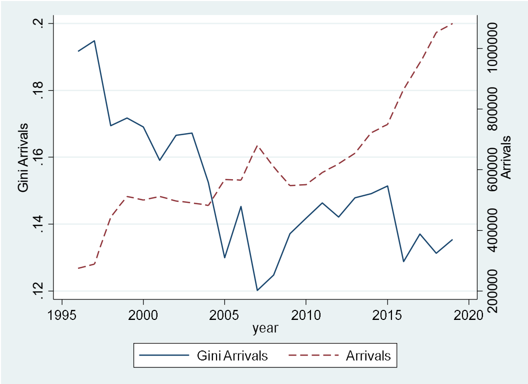
Source: Compiled by the author based on Eurostat

More relevant to our question is the change in seasonality values over the period in question. We observe that only Greece continues to record high values. Other countries, like the UK and Denmark, obtained lower values of around 0.3 to 0.2. Finland and Portugal improved over the period while others, like Spain, Italy or France, remained similar.

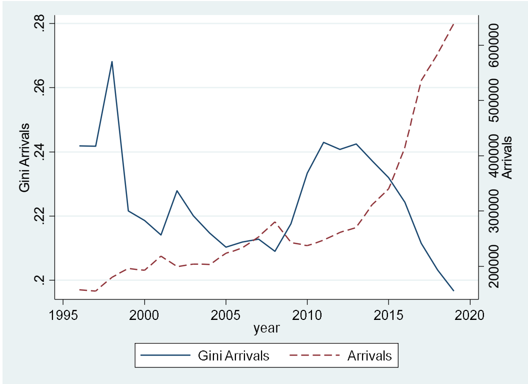
Figure 3.3 Arrivals of non-residents and seasonality per country



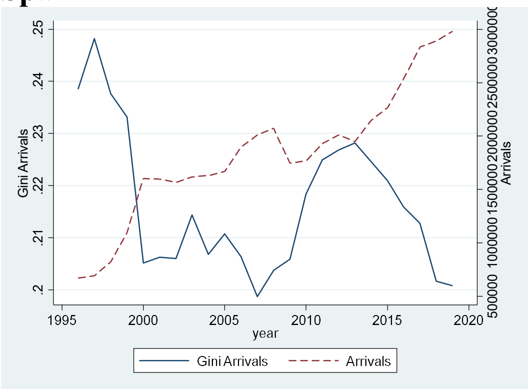
Netherlands



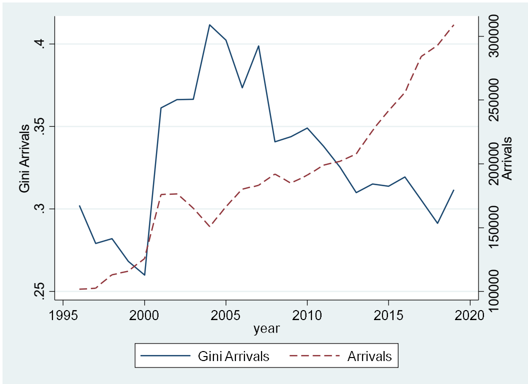
Portugal



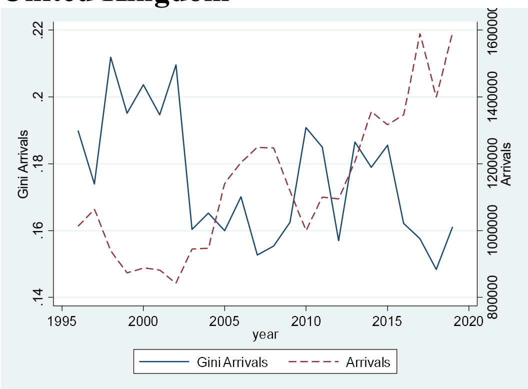
Spain



Sweden



United Kingdom



Source: Compiled by the author based on Eurostat

As we can observe in the country's plots, one evolution is common: the increasing number of arrivals of international tourists. The trend shown in the first plot is confirmed when we analyse country by country: all of them saw an increase in arrivals. However, when we analyse seasonality, the evolution differs between countries. Firstly, in Italy and Greece, the evolution is very similar to the plot presented in Figure 3.1: there was a decrease until 2008, an increase after that year, a decrease from 2015 and a little increase in the last year. Portugal and Spain follow a similar pattern to Greece and Italy, but during the last period seasonality clearly falls and there is no increase. The next group comprises countries from the Centre-North of Europe: Belgium, Denmark, Finland, Germany, Netherlands and Sweden with increasing arrivals and a reduction in seasonality. Finally, the last group includes Austria, Luxembourg and the United Kingdom. In this group, the seasonality evolution is not so clear, even irregular: all of them presented lower seasonality and a little increase in the final year, except Austria. For Austria, the values have a small range, only from 0.15 to 0.18.

This analysis allows us to conclude in a similar way to Ferrante et al. (2018) on the distribution of groups or clusters.

In Table 3.6, we find the main data on arrivals and Gini, per country and grouped in big areas. In Figures 3.4 to 3.7, we see the evolution of every zone and of every country. As we can see in Figure 3.4, the south is the area with the highest Gini values, confirming the seasonality problem suffered in these countries, with tourism strongly related to the summer season. Meanwhile, the centre zone has least seasonality and shows a clear reduction trend. The last area, the north, suffers high seasonality because most of the tourist arrivals are concentrated in seasonal times, summer or winter depending on the tourist product. Some countries in the northern area, such as Denmark and Sweden, have tourist destinations with high seasonality, as Baum and Lundtrop (2001) presented.

Table 3.6 Main data and questions per area and country

		Lowest Gini value	Highest Gini value	Lowest arrivals (Year)	Highest arrivals (Year)	Comments
North	Finland	0.1418 (2019)	0.2968 (1996)	1.7 M (1996)	3.2 M (2019)	Clear reduction in seasonality values. Growing number of arrivals
	Denmark	0.2623 (2016)	0.4058 (1996)	1.7 M (2009)	3.0 M (2019)	Clear reduction in seasonality values. Growing number of arrivals
	Germany	0.1307 (2016)	0.1811 (2000)	15.1 M (1996)	39.4 M (2019)	Low Gini values. Clear reduction in seasonality values but irregular evolution in specific years. Growing number of arrivals.
	Belgium	0.0913 (2016)	0.1421 (1996)	5.8 M (1996)	9.3 M (2019)	Low Gini values. Clear reduction from 1996–2007; after that, irregular evolution. Growing number of arrivals.
	Netherlands	0.1202 (2007)	0.1916 (1996)	6.5 M (1996)	20.1 M (2019)	Low Gini values. Clear seasonality reduction from 1996 to 2005. Growing number of arrivals.
	Sweden	0.2599 (2000)	0.4117 (2004)	2.3 M (1996)	7.4 M (2019)	High Gini values. Irregular seasonality evolution. Growing number of arrivals.
South	Spain	0.1987 (2008)	0.2482 (1997)	18.6 M (1996)	67.6 M (2019)	First year’s clear reduction in seasonality values. Increasing seasonality values after 2009. Growing number of arrivals.
	Greece	0.4054 (2000)	0.5063 (2013)	6.2 M (1996)	25.0 M (2019)	High seasonality. Growing Gini values. Irregular arrivals evolution but mostly increasing.

	Italy	0.2438 (2004)	0.2815 (2015)	29.3 M (1996)	65.0 M (2019)	High seasonality. Growing Gini values. Growing number of arrivals.
	Portugal	0.1966 (2019)	0.2688 (1998)	4.5 M (1996)	16.2 M (2019)	Irregular Gini evolution. Growing number of arrivals.
Centre	Austria	0.1510 (2014)	0.1779 (1999)	13.8 M (1997)	27.9 M (2019)	Low Gini values. Irregular seasonality evolution since 2001. Continuous growing arrivals.
	United Kingdom	0.1484 (2018)	0.2119 (1998)	15.0 M (2003)	29.1 M (2019)	Low Gini values. Irregular seasonality evolution since 2001. Irregular evolution of arrivals, but mostly increasing.
	Luxembourg	0.1427 (2019)	0.2848 (1996)	0.7 M (1996)	1.04 M (2019)	Clear reduction in seasonality values. Irregular evolution of arrivals, but mostly increasing.

Source: Compiled by author

Decomposing Seasonality by countries

As mentioned, a strength of using the Gini index to analyse seasonality is that we are able to decompose the results and look at which channels are causing the seasonality observed. In this case we apply the next methodology:

$$G = \sum_{k=1}^{K} S_k R_k G_k \qquad (7)$$

where *Sk* is the share of each country in total arrivals in Europe; *Gk* is the Gini index of arrivals in each country; and *Rk* is the correlation between arrivals in country k and the distribution of total arrivals in Europe. Results are presented in Table 3.7, and in the following paragraphs results are analyzed in detail.

Table 3.7 Results of decomposition of seasonality by country

	1996			2008			2019		
	Sk	*Gk*	*Rk*	*Sk*	*Gk*	*Rk*	*Sk*	*Gk*	*Rk*
Austria	0.112	0.176	0.722	0.010	0.303	0.929	0.089	0.154	0.581
Belgium	0.046	0.142	0.947	0.013	0.178	0.809	0.030	0.106	0.939
Denmark	0.017	0.406	0.963	0.024	0.341	0.963	0.010	0.251	0.987
Finland	0.014	0.297	0.927	0.099	0.170	0.459	0.010	0.142	0.555
Germany	0.121	0.179	0.994	0.037	0.103	0.873	0.125	0.131	0.990
Greece	0.049	0.421	0.984	0.129	0.136	0.975	0.080	0.473	0.994
Italy	0.233	0.251	0.995	0.005	0.187	0.957	0.207	0.267	0.994
Luxembourg	0.006	0.285	0.957	0.053	0.125	0.905	0.003	0.156	0.979
Netherlands	0.052	0.192	0.890	0.106	0.155	0.958	0.064	0.135	0.883
Portugal	0.036	0.242	0.964	0.046	0.440	0.991	0.051	0.197	0.965
Spain	0.144	0.238	0.993	0.216	0.249	0.994	0.215	0.201	0.989
Sweden	0.019	0.302	0.963	0.036	0.209	0.961	0.024	0.312	0.990
United Kingdom	0.150	0.190	0.928	0.226	0.204	0.987	0.093	0.161	0.980
Total Gini		0.2162			0.190			0.205	

Source: Compiled by author based on Lerman and Yitzhaki (1985) and Stark et al. (1986)

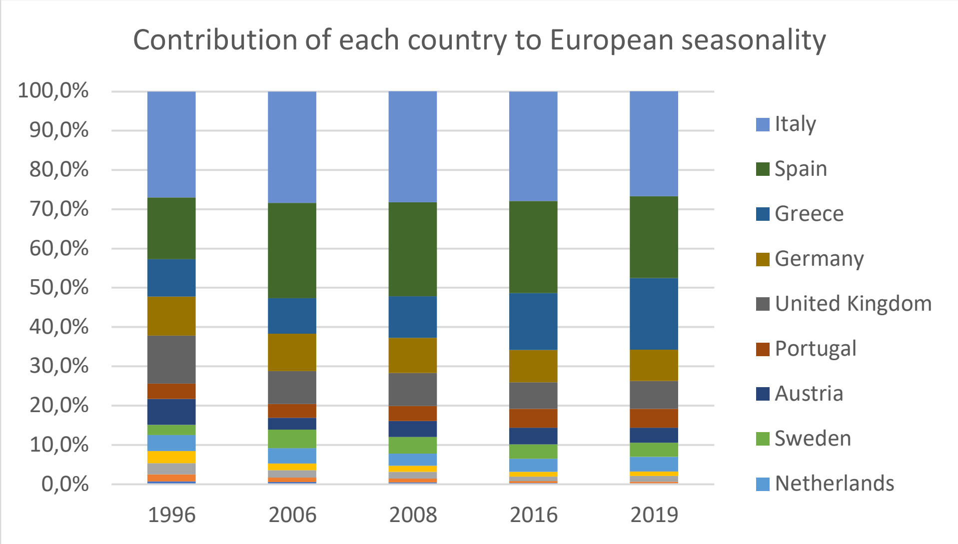
Table 3.8 and Figure 3.8 show that at the country level, we see that Spain and Italy are the largest contributors to EU seasonality, and by a significant margin. This fact persists throughout the time period analysed. Among the remaining countries, only Greece reached a comparable figure of higher than 10 per cent of the explanation of the Gini index recorded within the EU. This confirms previous analysis: the southern area is the most significant when looking to understand seasonality across the EU.

Table 3.8. Gini decomposition by source: share of each country in EU seasonality

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	*2006*	*2007*
Austria	0.0660	0.0560	0.0541	0.0483	0.0407	0.0402	0.0357	0.0475	0.0393	0.0319	0.0302	0.0337
Belgium	0.0289	0.0280	0.0259	0.0248	0.0224	0.0213	0.0242	0.0240	0.0216	0.0206	0.0187	0.0177
Denmark	0.0305	0.0287	0.0254	0.0235	0.0223	0.0219	0.0204	0.0219	0.0209	0.0186	0.0172	0.0165
Finland	0.0175	0.0158	0.0148	0.0131	0.0127	0.0128	0.0132	0.0149	0.0144	0.0122	0.0115	0.0104
Germany	0.0992	0.0962	0.0948	0.0926	0.0994	0.0846	0.0830	0.0829	0.0918	0.0921	0.0949	0.0898
Greece	0.0948	0.1026	0.1040	0.0967	0.0949	0.0882	0.0849	0.0885	0.0814	0.0943	0.0905	0.1035
Italy	0.2697	0.2695	0.2608	0.2549	0.2731	0.2877	0.2776	0.2672	0.2760	0.2777	0.2841	0.2881
Luxembourg	0.0072	0.0071	0.0066	0.0070	0.0060	0.0053	0.0065	0.0068	0.0062	0.0057	0.0051	0.0046
Netherlands	0.0413	0.0494	0.0479	0.0490	0.0449	0.0421	0.0421	0.0455	0.0396	0.0362	0.0391	0.0318
Portugal	0.0392	0.0411	0.0490	0.0374	0.0340	0.0334	0.0369	0.0365	0.0367	0.0350	0.0351	0.0371
Spain	0.1579	0.1720	0.1696	0.2137	0.2215	0.2216	0.2223	0.2474	0.2320	0.2332	0.2425	0.2335
Sweden	0.0254	0.0215	0.0227	0.0210	0.0204	0.0441	0.0457	0.0475	0.0583	0.0572	0.0472	0.0544
United Kingdom	0.1226	0.1121	0.1245	0.1180	0.1078	0.0968	0.1074	0.0696	0.0818	0.0855	0.0841	0.0789
Total Europe Gini index	**0.2162**	**0.21575**	**0.21763**	**0.21104**	**0.21029**	**0.2099**	**0.20543**	**0.19953**	**0.19456**	**0.19405**	**0.19451**	**0.19086**
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	***2017***	***2018***	***2019***
Austria	0.0407	0.0331	0.0267	0.0289	0.0333	0.0320	0.0359	0.0378	0.0424	0.0420	0.0330	0.0387
Belgium	0.0175	0.0191	0.0193	0.0183	0.0155	0.0169	0.0164	0.0192	0.0113	0.0127	0.0145	0.0144
Denmark	0.0151	0.0144	0.0149	0.0145	0.0141	0.0131	0.0128	0.0128	0.0123	0.0117	0.0120	0.0118
Finland	0.0098	0.0084	0.0076	0.0080	0.0069	0.0062	0.0062	0.0064	0.0052	0.0051	0.0037	0.0040
Germany	0.0901	0.0925	0.0980	0.0871	0.0937	0.0903	0.0881	0.0910	0.0821	0.0794	0.0824	0.0791
Greece	0.1056	0.1329	0.1239	0.1316	0.1255	0.1304	0.1372	0.1364	0.1451	0.1511	0.1856	0.1827
Italy	0.2820	0.2882	0.2808	0.2850	0.2940	0.2814	0.2767	0.2768	0.2794	0.2766	0.2669	0.2670
Luxembourg	0.0043	0.0041	0.0037	0.0033	0.0035	0.0032	0.0033	0.0032	0.0029	0.0028	0.0023	0.0025
Netherlands	0.0314	0.0326	0.0342	0.0329	0.0321	0.0352	0.0378	0.0367	0.0330	0.0364	0.0375	0.0373
Portugal	0.0382	0.0362	0.0367	0.0372	0.0395	0.0405	0.0438	0.0407	0.0480	0.0486	0.0483	0.0477
Spain	0.2398	0.2150	0.2255	0.2325	0.2418	0.2289	0.2262	0.2186	0.2343	0.2289	0.2148	0.2082
Sweden	0.0423	0.0435	0.0401	0.0367	0.0345	0.0306	0.0322	0.0336	0.0363	0.0347	0.0339	0.0354
United Kingdom	0.0835	0.0801	0.0887	0.0842	0.0658	0.0914	0.0833	0.0868	0.0677	0.0700	0.0652	0.0712
Total Europe Gini index	**0.18979**	**0.19994**	**0.21023**	**0.21482**	**0.20646**	**0.21328**	**0.21294**	**0.21566**	**0.20799**	**0.2071**	**0.2021**	**0.2050**

Source: Compiled by author following Lerman and Yitzhaki (1985) and Stark et al. (1986)

Figure 3.8 Contribution to overall seasonality in the EU



Source: Compiled by author

We observe these effects in the contribution of each country to arrivals and seasonality rates across the region as a whole. Spain and Greece saw an increase in the percentage of total arrivals choosing to visit their respective countries, which is correlated with increasing seasonality. Nevertheless, Spain is the country with the greatest percentage increase and therefore makes the largest contribution to seasonality rates. It is true that the absence of France takes away from the significance of this analysis; however, we think that it is useful to understand the patterns observed in seasonality in more detail.

The numbers clearly show that where tourist arrivals to the EU and regional seasonality are concerned, Italy is an important country. Spain and Italy together explain more than 50 per cent of the tourism seasonality in the EU, mostly driven by their comparative advantage in offering beach holidays and the increasing supply of cruises over recent years[8]. They are home to the four main seaports in the Mediterranean: Barcelona, Genoa, Venice and Civitavecchia (Rome). The case of Greece is quite different. It ranks seventh for arrivals, contributing around 5 per cent, while its impact on seasonality within the EU is significant—for example around 18 per cent in 2019. The other countries all demonstrate a weak contribution to seasonality, only Germany and the United Kingdom passing the 5 per cent mark (7.9% and 7.1% respectively in 2019). We therefore conclude that southern EU countries are the principal contributors to the trend observed in seasonality, since they contribute over 50 per cent of the value recorded.

Another set of questions arising are around the reduction in the distribution of seasonality among the European countries. The increasing importance of the southern countries compared to other regions has led to seasonality being concentrated in that area. We observe that the evolution of seasonality has not been homogeneous across the EU, and this means that finding common ground for political solutions can be problematic. EU tourism policy must vary by country and be designed with different aims. It is true that Mediterranean areas have undergone similar changes in how seasonality affects their markets, but we still observe variance in the absolute value of seasonality and the components of supply and demand within the sector depending on the country analysed. While the tourism sector in Greece is characterized around the

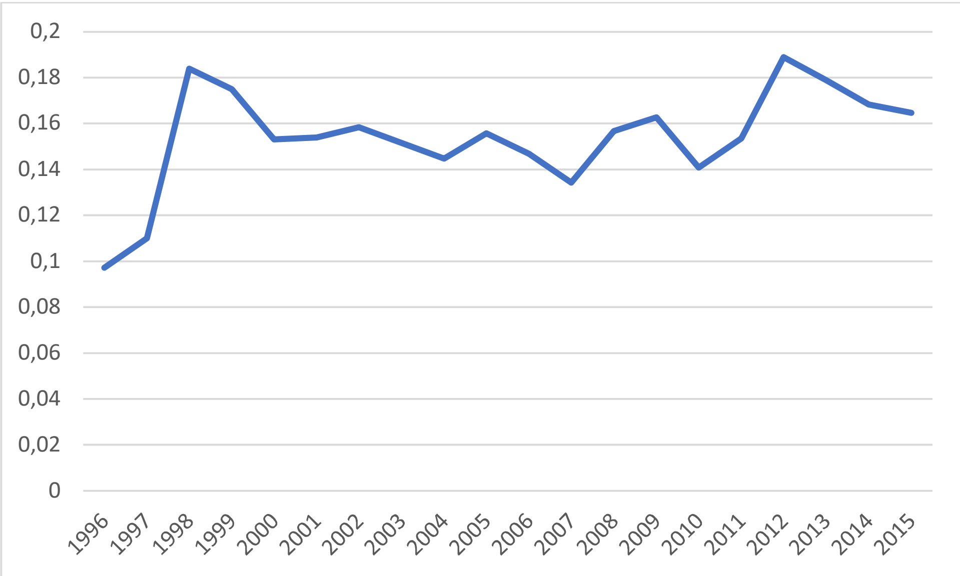
[8] Vergori and Arima (2022) presented a research on transport modes and seasonality, where they found that cruises are the second transport modes to generate seasonality, only road modes have higher levels.

coast, Italy and Spain have destinations that attract touristic activity all year round, such as Barcelona, Rome, Madrid or Milan, among others.

To understand this question further, we tracked the evolution of differences between seasonality values across the countries studied. The values are seen in Figure 3.9. The question we ask is whether the differences have tended to increase or decrease over the period under study. We observe that there are some years, just after the economic crisis, where the differences grew, showing similar results to our country analysis. We have discussed how the Mediterranean countries, which saw a considerable increase in tourist arrivals, amplified the importance of seasonality across EU. At the start of the period studied, the differences between countries exceeded 0.18; however, the differences steadily reduced until the economic crisis. Post crisis, the differences grew again. Overall, we note that the increase in arrivals to the south of Europe, coupled with the increase in seasonality, led to divergence between regions. The gap between countries that suffered the most from seasonality and those in which seasonality was weak widened.

The reduction in seasonality values between 1996 and 2008 occurred in parallel to an increasing contribution of the southern area to the explanation of seasonality. In 1996, the contribution of that area was 56 per cent, rising to 66 per cent in 2008. The financial crisis emphasized this trend and for five years, from 2011 to 2015, this value increased further to around 70 per cent. Clearly, countries in other areas reduced their seasonality during the years in question, except Belgium and Austria. The increasing number of trips to cities due to changes in tourist preferences implied more trips in off-peak seasons. Across the Mediterranean, an increasing demand for cruises or the presence of more low-cost companies in coastal areas led to increasing seasonality.

Figure 3.9 Evolution of the Gini differences



Source: Compiled by author

The final test applied aims to examine the importance of marginal effects, RME_k. The results are presented in Table 3.9.

Marginal Effects of Changes in Arrivals in Each Country

RME is the marginal effects of changes in arrivals in each country—i.e. the impact that a 1 per cent change in the respective country will have on total seasonality—given by:

$$RME_k = \frac{\partial G / \partial e_k}{G} = S_k \left(\frac{R_k G_k}{G} - 1 \right) \quad (8)$$

We wanted to check which channels take effect when there is a change in arrivals. This provides a further indication of the relevance of these countries to the discussion on seasonality. First of all, we should explain the information provided by a positive or negative sign. A negative sign indicates a negative contribution to seasonality, while a positive sign indicates a positive contribution. A negative sign therefore implies that for every 1 per cent increase in arrivals, seasonality worsens (Gini values increase). Conversely, a positive sign indicates that for every 1 per cent increase in arrivals, seasonality improves (Gini values decrease).

Table 3.9 Gini decomposition by marginal effects (RME_k)

	1996	2008	2019
Austria	-0.0462	-0.058	-0.050
Belgium	-0.0175	-0.01952	-0.015
Denmark	0.0137	0.00492	0.002
Finland	0.0038	-0.00313	-0.006
Germany	-0.0215	-0.0385	-0.046
Greece	0.0454	0.05959	0.103
Italy	0.0366	0.06572	0.060
Luxembourg	0.0015	-0.00026	-0.001
Netherlands	-0.0111	-0.02134	-0.027
Portugal	0.0029	0.0021	-0.004
Spain	0.0138	0.01353	-0.007
Sweden	0.0065	0.01783	0.012
United Kingdom	-0.0278	-0.02293	-0.021

Source: Compiled by author

Italy and Greece have the strongest impact on seasonality when the number of arrivals increases by 1 per cent. The number of arrivals to Spain increases in every period, again confirming the relevance of seasonality within the country on seasonality across the bloc. Despite this, the marginal effect of increasing arrivals in Spain is less severe than for Italy and Greece. In particular, we observe that seasonality in 2019 was stronger in Italy and Greece, reflecting the importance of arrivals during the peak seasons, and the negative sign in Spain, reflecting that for that year the contribution to seasonality was positive. Probably, as previously highlighted, the increasing importance of cruise tourism during the summer and the increasing number of arrivals from countries like Russia and China have driven seasonality up. Between the other countries, we highlight Sweden and Denmark. These countries, as we said at the beginning, suffer high seasonality due to their tourist activity (Baum & Lundtrop, 2011) and this leads to a negative RME_k. In some years the values for these countries are even higher than for Spain or Portugal. These data could indicate that the increasing number of arrivals in Spain and the diversification of its tourist activity is leading to better EU seasonality. The question is whether this tendency is confirmed in the coming years.

Nevertheless, these two countries in the North, Sweden and Denmark, have a reduced impact on seasonality. In fact, Denmark only represents 1.2 per cent of EU seasonality and Sweden 3.5 per cent, compared with Italy's 26.7 per cent or Spain's 20.8 per cent. This is shown in Table 3.7 and is coherent with the number of arrivals (Table 3.10).

Table 3.10 Share of total arrivals in Europe

	1996	2008	2019
Luxembourg	0.6%	0.5%	0.3%
Denmark	1.7%	1.0%	1.0%
Finland	1.4%	1.3%	1.0%
Sweden	1.9%	2.7%	2.4%
Belgium	4.6%	3.6%	3.0%
Portugal	3.6%	3.5%	5.1%
Greece	4.9%	4.6%	8.0%
Netherlands	5.2%	5.7%	6.4%
Austria	11.2%	9.3%	8.9%
United Kingdom	15.0%	10.8%	9.3%
Germany	12.1%	12.5%	12.5%
Italy	23.3%	21.9%	20.7%
Spain	14.4%	22.7%	21.5%

Source: Compiled by author

Seasonality and Groups

Finally, an analysis per group of countries is presented. We defined three different group of countries, North, Center and South.

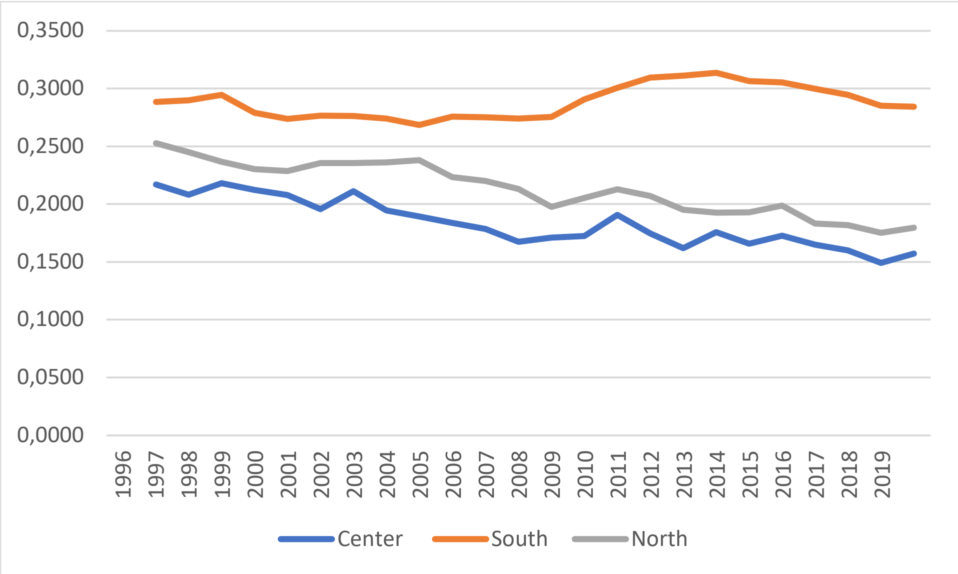
North: Belgium, Denmark, Finland, Germany, Netherlands and Sweden.

Center: Austria, Luxembourg and United Kingdom.

South: Greece, Italy, Portugal and Spain

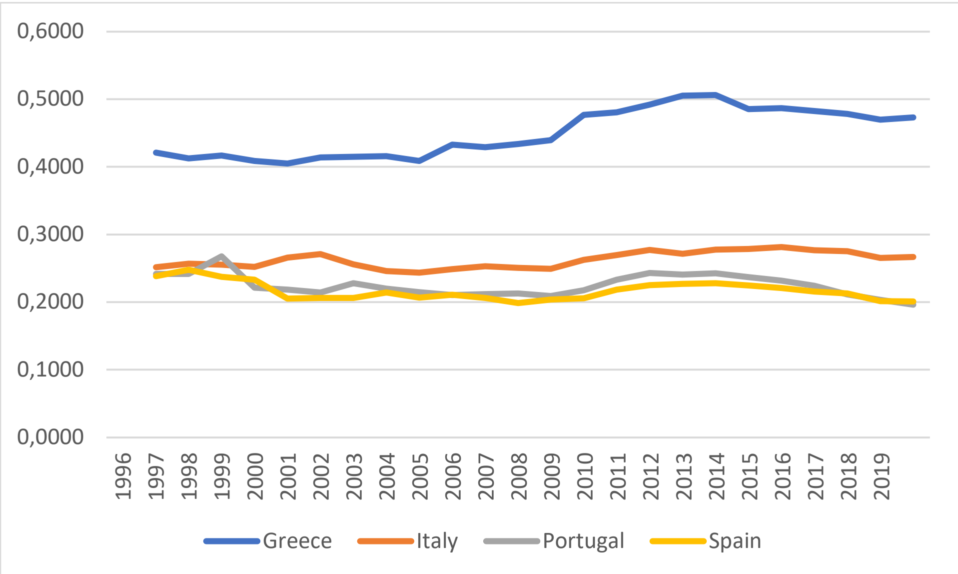
In Figure 3.10 is presented the evolution of seasonality for every group of countries, where we can see how the South countries is increasing seasonality in the last years, with a clear divergent evolution to the other group of countries. Figure 3.11 to 3.13 presented the evolution of every country by groups where is confirmed the previous evolution of a reduction in seasonality values of the different countries conforming groups North and Center, and the growing significance of two countries in the South Group, Greece and Italy.

Figure 3.10 Gini average per group of countries



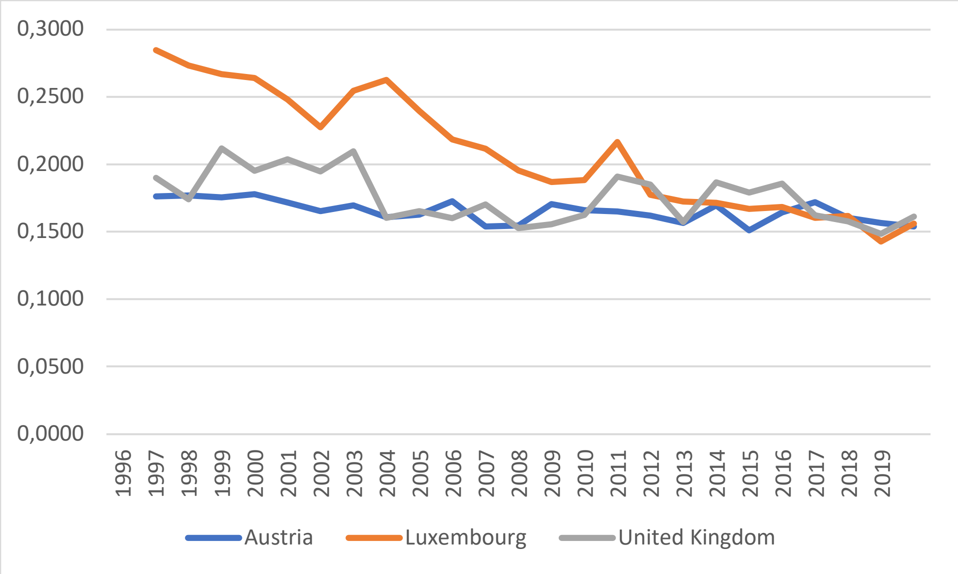
Source: Compiled by author

Figure 3.11 Gini values for countries in the south



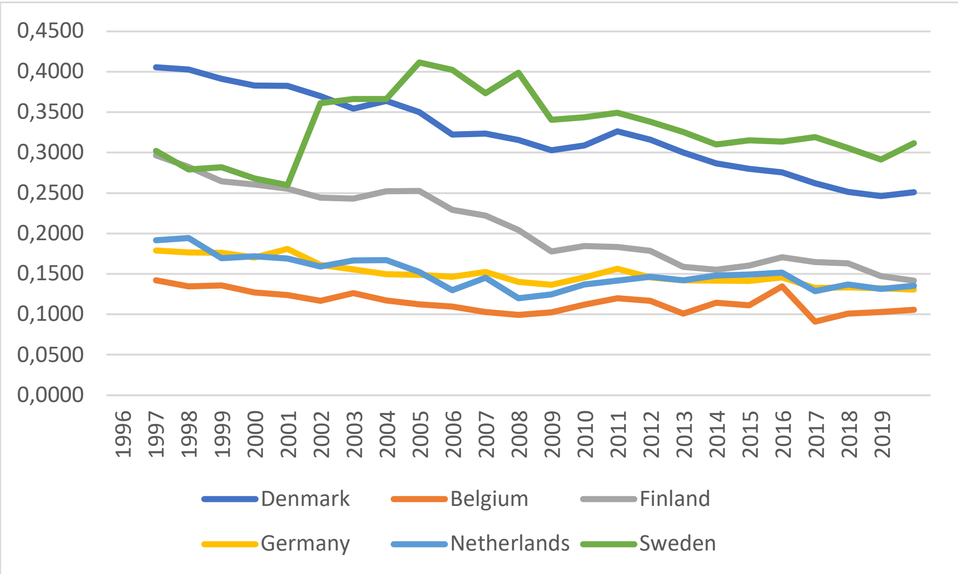
Source: Compiled by author

Figure 3.12 Gini values for central countries



Source: Compiled by author

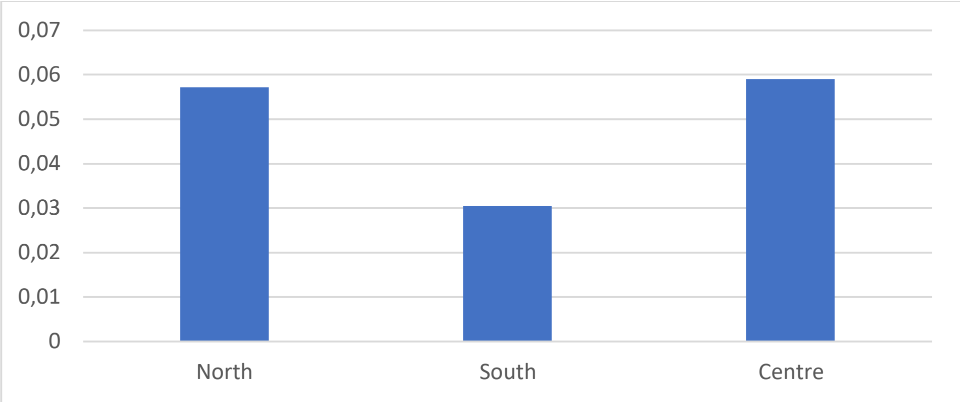
Figure 3.13 Gini values for countries in the north



Source: Compiled by author

To confirm that the country grouping is correct, we looked at whether the differences in Gini values are correlated amongst countries within the same group. To do so, we applied a Gini of Ginis calculation. As observed in the Table 3.7, differences between countries within the same group are low, especially in the south, where the difference is only 0.03; the other groups record low values of around 0.05. These values indicate low dispersion between the countries in the groups.

FIGURE 3.14. Gini of Ginis per group of countries



Source: Compiled by author

Next, we go deeper into analysing seasonality, following the process of decomposition. We can see which group of countries explains the EU seasonality. In addition, we see the evolution of every group and the marginal effects on seasonality when we have an increase in demand.

Table 3.11 presents the decomposition by groups. Obviously, southern Europe (Spain, Italy, Greece and Portugal), where tourism is mainly based on summer tourism, is the area with greatest contribution to EU seasonality. The research conducted by Fernández-Morales and Cisneros-Martínez (2019) confirms our findings. The southern area has important activity during the summer related to climatic activities, and this could be more significant in cities with harbours, like in Greece. More than 50 per cent of the seasonality observed in the EU in 1996 is concentrated in southern Europe, and the situation is worse from 2016, where 70 per cent stems from this group of countries. Countries in the centre and north of Europe arrivals (the UK, Germany and Austria) record considerable numbers of tourists, but their seasonality is much less significant.

Table 3.11. Decomposition of the EU seasonality

	Seasonality Europe[9] (Gini index)	**Relative contribution to overall seasonality in the EU**		
		North	Centre	South
1996	0.2162	0.1958	0.2427	0.5615
1997	0.2158	0.1752	0.2395	0.5853
1998	0.2176	0.1851	0.2314	0.5835
1999	0.2110	0.1734	0.2240	0.6027
2000	0.2103	0.1545	0.2220	0.6235
2001	0.2099	0.1424	0.2267	0.6309
2002	0.2054	0.1496	0.2286	0.6218
2003	0.1995	0.1239	0.2366	0.6395
2004	0.1946	0.1273	0.2465	0.6262
2005	0.1941	0.1231	0.2368	0.6401
2006	0.1945	0.1193	0.2285	0.6521
2007	0.1909	0.1173	0.2205	0.6622
2008	0.1898	0.1284	0.2061	0.6655
2009	0.1999	0.1173	0.2104	0.6723
2010	0.2102	0.1191	0.2141	0.6668
2011	0.2148	0.1164	0.1974	0.6862
2012	0.2065	0.1026	0.1967	0.7007
2013	0.2133	0.1266	0.1923	0.6811
2014	0.2129	0.1225	0.1936	0.6839
2015	0.2157	0.1278	0.1997	0.6725
2016	0.2079	0.1130	0.1803	0.7068
2017	0.2071	0.1148	0.1800	0.7052
2018	0.2021	0.1005	0.1839	0.7156
2019	0.2050	0.1124	0.1820	0.7055

Source: Compiled by author following Lerman and Yitzhaki's (1985) decomposition approach

[9] Note that France is not included.

In Table 3.12, marginal effects per group of countries are presented. Again, Southern countries are responsible for the evolution of seasonality. As we can see in all the years, the South has a positive value, meaning that an increasing demand results in an increasing seasonality. Furthermore, Centre and North countries present a negative value. Again, the area in the South, with a very attractive tourist activity during the summer, is the great contributor to seasonality. Greece, Italy and Spain, around the Mediterranean, and Portugal offer a high activity during the summer around the Atlantic coast.

Another question to highlight is the increasing values along the period. We can see that the marginal effect is increasing around the Southern group of countries, from 0.0986 in 1996 to 0.1648 in 2019, with a maximum value of 0.1698 in 2012. These four Southern countries, as stated previously, concentrate around 55% of the arrivals and the activity is related, basically, around summer, sea and sun products. The mature destinations and the new activities around the Mediterranean, like cruise products, are some of the most attractive tourist activities in Europe. In addition, some of the other tourist products, like cultural and heritage destinations in these countries, are located in cities or regions around the Mediterranean, for instance, Venetia or Barcelona.

Table 3.12. MARGINAL EFFECTS PER GROUP OF COUNTRIES

	North	Centre	South
1996	-0,0261	-0,0725	0,0986
1997	-0,0328	-0,0833	0,1162
1998	-0,0469	-0,0618	0,1086
1999	-0,0454	-0,0614	0,1068
2000	-0,0371	-0,0588	0,0959
2001	-0,0350	-0,0664	0,1014
2002	-0,0336	-0,0635	0,0971
2003	-0,0328	-0,0793	0,1121
2004	-0,0265	-0,0848	0,1112
2005	-0,0367	-0,0927	0,1294
2006	-0,0393	-0,0887	0,1280
2007	-0,0474	-0,0883	0,1357
2008	-0,0597	-0,0812	0,1409
2009	-0,0581	-0,0904	0,1485
2010	-0,0573	-0,0840	0,1414
2011	-0,0680	-0,0815	0,1494
2012	-0,0767	-0,0932	0,1698
2013	-0,0769	-0,0780	0,1549
2014	-0,0769	-0,0774	0,1543
2015	-0,0714	-0,0706	0,1420
2016	-0,0829	-0,0765	0,1594
2017	-0,0832	-0,0747	0,1579
2018	-0,0795	-0,0846	0,1641
2019	-0,0807	-0,0723	0,1530

Source: Compiled by author

3.3. European seasonality and product-type regions

3.3.1. Preliminary considerations

A key question throughout this research project is whether analysis at the country level gives a realistic view of seasonality. Countries are made up of different regions and when we analyze seasonality at the country level, we merge all tourist activities across regions into one. As highlighted in Senbeto and Hon (2019), the tourism literature has paid more attention to the demand side than the supply side. It is important to consider the reasons and behaviours behind tourists' decisions when analyzing seasonality.

At the country level, the number of arrivals is a standard measure of demand, and there is limited development of supply side measures. They are most often discussed when explaining specific attitudes. Analysis of the demand side of the sector has given us a partial understanding of tourist activity and seasonality. It is for this reason that it is valuable to use regions as the unit of analysis, as in doing so we can incorporate the supply perspective. We are interested in whether conducting an analysis at the regional level and focusing on the importance of the supply side will give us a more detailed picture of EU seasonality. For instance, the story is very different when we analyze some Mediterranean regions like the Balearic Islands, or capital areas such as Île de France, in terms of both rate of supply and arrivals frequency. In addition to differences in arrivals, seasonality is not constant within a country. Furthermore, tourist activity can vary across time and inter-country regions.

To confirm that the analysis at NUTS II level is relevant and to complete the analysis of the supply side, we want to check whether the results found at the country level are correlated with results found at the regional level. To do this, we use a simple regression model. The findings suggest that there exists a relationship between regional Gini values and country Gini values.

As we have previously outlined, our analysis of previous data has provided a signal on the differences between countries depending on their tourism activity. These signals are stronger when we look at the NUTS II level. This granularity of data offered additional opportunities for research giving an insight into every region. The subsequent analysis will dig deeper into the differences between some European regions and examine their influence over seasonality at the country and European level.

We previously have concluded that the main drivers of EU seasonality are southern and predominantly Mediterranean countries, so our first line of analysis is to examine whether this holds true at the regional level. The NUTS II level gives us the opportunity to be more concrete when forming conclusions on how Mediterranean countries contribute to seasonality across the EU. Another question we wanted to answer is whether the trends observed in seasonality at the country level are reflected in the regional analysis. The increasing values in southern Europe increase the difference with the other European countries.

Using data at the NUTS II level presents certain problems because the data is only available for 5 years. Despite this short period, we are able to draw interesting conclusions on seasonality. Data is obtained from different periods depending on the country and region, for that reason in some figures and tables the period is longer than other tables, where we only stated for 5 years: 2011-2015. In that case for all the regions in the EU-15, including France but excluding the UK and Netherlands for 2011 where a methodological change exists.

Tourism in Europe is centred around two principal destinations or types of tourism. One is the Mediterranean coastal area and the Mediterranean islands of Spain, Italy and Greece. The second is the capital and business zones of Ile de France, Attica and Bayern among others. In that sense, Fernandez-Morales and Cisneros-Martinez (2019) produced a fascinating paper which looks into the Mediterranean regions and the seasonality they experience as a result of the tourist demand for cruise holidays. They calculated the decomposition of seasonality channels to understand the relevance of each region as defined in their study.

Analyzing the supply side of seasonality, as done by Martinet al. (2014), requires defining different tourist activities. For Andalusia and Spain, the authors defined four areas that each provide a distinct form of tourism: inland areas, inland capitals, coastal capitals, and coastal areas.

Following their lead, to analyze seasonality at the EU-15 regional level, we have defined a set of areas under which we can classify different regions. The results permit us to define the following areas: Capital areas; Mediterranean islands; Atlantic islands; Coastal Mediterranean areas; Mountain areas; Business areas; Atlantic coast; Other areas. In Annex 1 reader can fin the specific regions considered in each type.

The subdivision of our data into these regions gave us a wide range of tourism products on offer throughout the EU, as well the chance to extract and give structure to relevant background information on each sub-region. Further detail on these regions is presented in the annex. In the next section, we introduce the results found using this level of analysis.

3.3.2 Results

When we analyze the Gini index by region, we observe that in some regions, seasonality is higher in comparison to the country average. Investigating this result further will provide a useful source of information about seasonality in the EU. In Annex 2 we provide the Gini values and International arrivals per region.

First of all, we analyzed a cross-sectional data set to see whether the evolution of Gini values observed at the regional level was correlated to the values seen at the national level. To increase the sample size and ensure the validity of our analysis, we used all the data available. As we can see in Table 3.13, the Gini index calculated at the national level explains the variation in the Gini values observed at the regional level. These results give us the chance to analyze to what extent seasonality at the regional level mirrors that seen at the national level.

Table 3.13 Gini values per region vs per country

	Sum of Squares	*Degrees of Freedom*	*Mean Square Values*
Model	0.024	1	0.024
Residual	0.003	24	0.000
Total	0.027	25	0.001

Gini Regions	*Coef.*	*Std. Err.*	*t*	*P>/t/*	*[95% Conf.*	*Interval]*
Gini Countries	0.604	0.043	14.28	0.000	0.517	0 .691
Constant	0.171	0.006	29.01	0.000	0.159	0.183

Number of observations = 26
F(1, 24) = 203.97
Prob > F = 0.0000
R-squared = 0.8947
Adj R-squared = 0.8903

Source: Compiled by author

The next step is to present some preliminary information about seasonality at the regional level. Dividing the regions into groups of Mediterranean, island regions or capital and business areas, allows us to extract some clear facts from the data. Table 3.14 shows the Gini values per group of regions.

TABLE 3.14. Gini values per group of regions

	2011	2012	2013	2014	2015
Capital Areas	0,0958	0,0940	0,0946	0,0968	0,0949
Mediterranean islands	0,4549	0,4576	0,4640	0,4697	0,4706
Atlantic islands	0,1620	0,1580	0,1607	0,1510	0,1390
Coastal Mediterranean areas	0,2307	0,2342	0,2390	0,2364	0,2395
Mountain areas	0,1913	0,1900	0,1973	0,1869	0,1965
Business areas	0,1226	0,1109	0,1118	0,1115	0,1156
Atlantic coast	0,1811	0,1669	0,1725	0,1754	0,1766
Other	0,1521	0,1408	0,1497	0,1486	0,1447

Source: Compiled by author

Firstly, islands report larger seasonality values in comparison to the business and capital areas. For example, when we check seasonality values for the Mediterranean islands we see that, except for Sicily, all the islands have values around 0.4 and 0.55. These islands see huge increases in the number of arrivals during summer. For example, the numbers arriving to Sardinia increase by over 10 times and those to the Balearic Islands increase 30 times.

We should mention that an alternative pattern is observed along the Mediterranean coast. This is likely due to the fact that the supply of tourism products in those areas is more diversified than on the islands. For example, Catalonia reports a seasonality value of 0.2 while Emilia-Romagna reports 0.3. In comparison to these areas, the capital and business regions all report a seasonality value lower than 0.2. This indicates that those areas receive tourists throughout the year, and they do not see any great differences between the low and peak seasons.

We defined other areas as either mountain areas, Atlantic coasts, Atlantic islands, cultural, heritage, oenology or green areas. All the regions analyzed within those areas have lower values. The highest values are around 0.3 (0.309 for Valle d'Aosta-Mountain area, Italy and the Algarve with 0.301, the Atlantic coast, Portugal). The former is a popular destination for skiing and other snow based activities, while the latter is a typical beach holiday destination, which is in line with previous findings.

The first stage of our analysis demonstrated a clear pattern across the islands and coast of the Mediterranean, where seasonality is more severe and follows a worse trend than other regions within the EU-15. Using only five years of data, it may be difficult to find clear patterns, however we can highlight some statistics and variation within the data which support our previous analysis.

If we analyze the evolution of seasonality within regions located in the Mediterranean and across southern Europe in which the main type of tourism on offer is based around alternative activities to beach holidays, we can use them as a baseline to compare the effect of being located in the Mediterranean. For instance, Attica and Madrid display some poor results alongside a worsening trend over the last five years. Attica reports the highest rate of seasonality among capital areas at over 0.15. While Madrid shows a very low initial rate but a strong upward trend since seasonality in Madrid has increased by 3% over recent years. In comparison, Lisbon suffered relatively high values during the same years, but with a much more stable progression.

When we examine the data on the Mediterranean coast and islands, we see that those areas suffered the highest values. Every region located around the coast records a seasonality value of at least 0.15 and reaching 0.32 in some cases. But the most significant values arise in the Mediterranean islands where all regions (except Sicily) surpass 0.4, with the Ionian islands and Southern Aegean (Greece) recording the worst values of over 0.5 and 0.6 respectively.

The last major group to consider is the mountainous area, where tourist activity is considered seasonal and highly correlated with the weather. We observed that they had some significant values, around 0.2, but only in one case did seasonality breach the 0.3 mark, in the Valle d'Aosta (Italy).

Business areas or regions usually form part of wider areas, with different and diversified tourist activities. For example, Catalonia, which possess a diversified tourism sector, with a strong summer destination but, at the same time, with events tourism or heritage attractions with high number of arrivals. This destination reports lower seasonality values. Therefore, some regions which are common destinations for summer tourism, such as the Algarve (Portugal) and Mecklenburg (Germany) and are located on the Atlantic coast display a seasonality rate of around 0.3. We found similar patterns in other areas. Regions such as West Greece and Tuscany[10], in which Cultural Heritage tourism is very popular, report comparatively high seasonality values of over 0.25. As I stated previously, business regions usually have a diversified tourism but this situation do not conduct to low seasonality values.

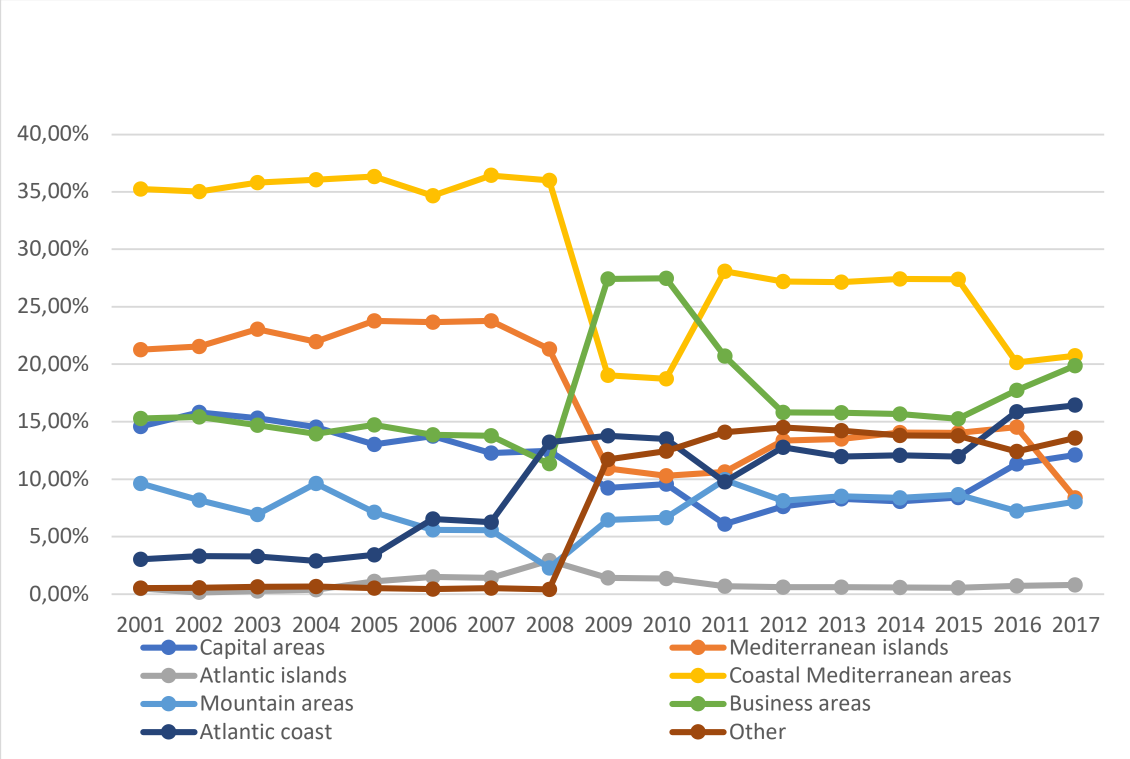
The previous analysis highlights regions around the Mediterranean (e.g. the Balearic and Greek Islands) as the worst affected by seasonality over recent years. In addition, we observe that these areas around the Mediterranean which offer very seasonal activities record the worst trends in comparison to other EU regions. As we saw in previous chapters, arrivals to EU countries have increased over the last ten years and this fact remains at the regional level. If we focus our analysis on the Mediterranean areas, increasing arrivals cause a reduction in seasonality values. To support this

[10] It is true that these areas are beside the sea, but the main tourist activities are related to cultural heritage.

conclusion, we must analyze the remaining groups to provide a robust analysis into seasonality at the regional level. We conducted a similar exercise as in the previous chapter, and check the correlation between differences in Gini values observed at the regional level.

As we can see in Figure 3.1, the results mirror those recorded at the national level across the same period: a slight increase during the first few years and then a slight reduction in differences until the economic crisis. After which they increase slightly before reducing over the final few years. These results once again confirm our hypothesis that the Mediterranean regions underwent an increase in seasonality during the years studied, which when combined with increasing arrivals led to major differences between regions.

Figure 3.15 Gini's evolution by group of regions



Source: Compiled by author

Another relevant question is presented in Figure 3.15, where we present the evolutin of every group of regions in the EU-15 seasonality[11]. One clear evolution is that the importance of the different regions has become more equal at the end of the data. At the beginning, we see a clear importance of the "Mediterranean coastal area", but the other areas became more important in understanding the seasonality in the EU-15 with all of them, except for "Atlantic islands", being around 10% and 20%.

It is important to highlight the 2009 and 2010 evolution, during these years the main contributor to tourism seasonality has been "Business area", with a 27% of the

[11] In that case, all the data available is included to see the complete period and the maximum of information. In some countries and regions data is obtained for a longer period, but the other analyse is restricted to just 5 years, when we can include all the regions.

contribution over seasonality, reflecting the effects of the financial crisis when international trips for mandatory reasons, for instance business or family reasons became more significant, in front of leisure trips which became less important.

"Atlantic coast" is another group of regions with a significant change. This area explained just 3% of the seasonality in the first year and at the end explained more than 16%. This demonstrates that we found more areas with developed tourism activity, but with a similar problem to the "*Mature destinations*"[12], the activity is mainly restricted to the summer.

Another question arises in relation to the areas described as "Other". At the beginning of the data collection, this group of regions has little importance in explaining seasonality, but some of these regions are now more significant for tourism activity, for instance, Toscana (Italy). Probably, some of these regions have grown in tourism activity, in fact Toscana has risen during the last years due to the rural and heritage activity around Florencia and the Renaissance cities.

[12] We refer to "*Mature destinations*" those who have developed tourism products at an early stage and developed its tourism activity around traditional products and highly seasonal.

TABLE 3.15 Detailed Decomposition Gini values by products-Type Regions

	1999			*2008*			*2015*		
	Sk	Gk	Rk	Sk	Gk	Rk	Sk	Gk	Rk
Capital areas	0.2039	0.1097	0.9054	0.1633	0.0734	0.9361	0.218	0.0707	0.9752
Mediterranean islands	0.0863	0.3443	0.9933	0.0295	0.4185	0.9801	0.0228	0.459	0.9948
Atlantic islands	0.0621	0.0526	0.2096	0.0335	0.0558	0.8599	0.023	0.0467	0.9298
Coastal Mediterranean	0.3057	0.1655	0.9669	0.1387	0.1588	0.9989	0.1389	0.1857	0.998
Mountain areas	0.2118	0.1784	0.3535	0.1409	0.1079	0.513	0.1311	0.1059	0.7199
Business areas	0.1183	0.1942	0.9228	0.2825	0.1151	0.9924	0.2126	0.1175	0.9876
Atlantic coast	0.0096	0.4551	0.9643	0.0774	0.2061	0.9928	0.1137	0.1799	0.9975
Other	0.0025	0.3378	0.8671	0.1342	0.1135	0.96	0.1399	0.122	0.9885
		0.1388			0.1175			0.1241	

Note: where *Sk* is the share of each country in total arrivals in Europe; *Gk* is the Gini index of arrivals in each region; and *Rk* is the correlation between arrivals in region k and the distribution of total arrivals in Europe

Compiled by author based on Lerman and Yitzhaki (1985), and Stark, Taylor and Yitzhaki (1986)

The last exercise we undertook, following that of the previous chapter, was a decomposition of the Gini values to check the importance of each region to EU-wide seasonality. Our results are presented in Table 3.15 and Table 3.16 for Marginal Effects.

In the decomposition exercise, we observed significant changes between the years 1999 and 2015. Initially, the results reinforce a common theme of this research, that sunny beach side destinations are the greatest contributors to the Gini index observed at the regional level.

In 1999 the most significant regions for determining the Gini index were the "Mediterranean Islands", followed by "Mediterranean coastal" regions then the capital and business areas. The values are quite different between these areas though, 35% for the "Mediterranean coastal", 21% "Mediterranean islands" and around 15% for the "Capital" and "Business" areas.

When considering the data on arrivals, we observe that only the "Mediterranean coastal" regions are of comparable importance, at around 30%. The other groups which record large contributions to arrivals are the Capital and Mountainous regions, at around 20%. Analysis before and after the economic crisis shows that immediately prior to the economic crisis, values were similar. Coastal areas and islands in the Mediterranean led the way in explaining seasonality values. Despite this, they are not the only areas of interest since the arrivals rate in other regions increased over the period, for example in the Atlantic coast regions.

For the year 2008, we must note that the business regions are important contributors to the Gini values calculated at the regional level. Their contribution is the largest of all region types, as 27% of the seasonality observed came from those regions. In second place were the Mediterranean regions and amongst the remaining groups the "Atlantic coast" and "Other" regions were also relatively significant. In addition, business regions exceed the "Mediterranean coast" along with the other groups, in the number of arrivals recorded.

This initial observation is reinforced when considering the year 2015 in which the number of regions contributing to seasonality across the EU-15 is larger than at the beginning of the period studied. The same phenomenon is observed in arrivals and they are even more distributed across groups. In 2015 there are 6 groups which received more than 10% of total arrivals, and these groups explained 80% of the observed seasonality. The main difference between 2015 and 1999 though is the distribution among groups. In 1999, we observe four groups which explained 85% of the observed seasonality, which three of them with more of a 20%. In comparison, in 2015 we found five groups who explained more than 80%, all of them with more than of a 10% of the seasonality explanation.

This analysis demonstrates a clear pattern across the regions of the EU. During the 21st century many destinations have placed significant emphasis on developing new tourism products. Cases such as the business group are valuable examples. However, they were not the only source of new developments since there were a range of others. For instance, in the Bayern region they developed the range of activities on offer beyond their well-established business tourism sector to include cultural heritage attractions and eco-friendly tourism.

The Atlantic coastal region has also been well developed to transform tourism into the leading economic resource for the area, for example in the Algarve and along the French coast. The decomposition calculations performed provide a valuable insight into which areas are the sources of seasonality across the EU, but they also reveal the ways in which these regions have developed over the past few decades in more general terms.

Table 3.16 Gini Decomposition by Source: Marginal Effects (RME_k)

	1999	*2008*	*2015*
Capital Areas	-0.058	-0.0677	-0.0969
Mediterranean islands	0.1263	0.0734	0.061
Atlantic islands	-0.0571	-0.0198	-0.015
Coastal Mediterranean	0.0467	0.0486	0.0685
Mountain areas	-0.1156	-0.0745	-0.0506
Business areas	0.0344	-0.0077	-0.0138
Atlantic coast	0.0207	0.0574	0.0507
Other	0.0027	-0.0097	-0.0039

Compiled by author based on Lerman and Yitzhaki (1985), and Stark, Taylor and Yitzhaki (1986)

Finally, we want to show the last results obtained applying the marginal effects. As we can see in the table, only two groups change from positive to negative, “Other” and “Business Areas”. The other areas keep the same sign, with different values. It is not surprising that “Capital areas” presented a negative value, as these regions presented high tourist activity year round and, in fact, more arrivals mean better seasonality. Another group with no surprising sign is the “Mountain area”, where activities are available throughout the year. The problem is that only “Capital Areas” present better numbers at the end of the period, with similar arrivals. It is clear that the Mediterranean areas present a positive sign, with more arrivals and more impact on seasonality.

It is important to highlight two areas. First “Business areas”, that present a change in the sign. This area starts with a positive sign and ends with a negative one. In fact these regions are the ones with a higher diversification in tourist products in the last years. The second area is “Atlantic Coast”, where the number of tourist arrivals has become more important in the last years, with arrivals growing from 3% to 16% . As we can see in Table 2 the impact on seasonality has increased in the last years.

One clear conclusion is that the coastal areas are the main tourist destination, and obviously the summer period is the more appropriate time to visit these areas. Again, we find a social reason to understand seasonality evolution: summer and the school holidays.

3.3.3 Discussion and policy implications

The research at NUTS2 level gives us more information about seasonality at the European level. We considered several interesting questions about which regions' seasonality is important and what tourist products have been developed in the regions analyzed.

First, the analysis at regional level is interesting because the proximity and knowledge about the tourist products developed give us a detailed picture of every region. The information about the level of seasonality and its evolution combined with information on the tourist product developed could give us some valuable information about the activities that generate more seasonality and the ones with less impacts.

One of the solutions proposed by the authors, like in Jang (2004), is to diversify tourist activity, developing activities during the off-season period. But, in some cases, as we can see in the results obtained in this research, developing new products generates some positive evolution during the first years, but after some time, when the new product is known, the social factors become more significant. When this occurs, seasonality returns to normal levels, or to worst numbers, because this new activity is then added to the old activity, arrivals may be more important, and seasonality as well.

We have seen this in regions where cultural or events activities have been developed in recent years. For instance, the Atlantic coast area, as stated in Moreira (2018), where the activities developed during off-season periods, around Nautical touris, like surf, kite-sur, among others, leads these regions to be more known by tourists, to an increasing arrivals during summer season and to an increasing importance over the European seasonality.

A second question to highlight is to confirm that Mediterranean island and coastal destinations have the worst seasonality. The evolution of these regions demonstrates that either they are not able to develop activities in the off-season or the ones developed, following policies like Calypso[13], are not enough to improve seasonality levels. Again, social factors become most significant in understanding seasonality evolution.

For this reason, one of the policy implications is to devise efficient solutions to reduce the effects of social factors. It is clear that school holidays and the summer weather are the perfect combination for a high number of tourists. But if our desire is to reduce seasonality impacts, we should act on this question.

On the other hand, business areas are one of the interesting group to evaluate and follow. First, the Gini value has a positive evolution along the years analyzed, and second is the group with a positive evolution about the effects over seasonality as the

[13] Calypso program, developed by the European Comission, promotes the tourism activity, where one of the programs is to promote tourism along different social groups, young people, older people, with one main objective to reduce seasonality. https://europlan.pixel-online.org/news.php?id=114

marginal values show. In that case, they offer a positive value at the beginning and a negative value at the end of the data. The point is that this negative value is growing.

In terms of policy implications, it is clear that it is important to observe and export the policies developed in regions where tourism activities are developed along the year, as Capital or Business areas. In that case, events are the main tourist product developed in these areas but, at the same time, the professional trips to these regions are present all over the year. These business regions have developed tourist activities complementary to the main ones, improving their tourist offer. Another question to highlight is the fact that these activities, main and complementary ones, are not exclusive in summer, and this leads to a reduction of seasonality.

We want to highlight the importance of obtaining data at the regional level; the more detailed the information, the more knowledge about seasonality. It is important to maintain the compilation of this data and to increase the information obtained. The European Commission and member countries should address this. It is difficult to give good recommendations with a lack of data.

3.4. Concluding remarks

This chapter has analyzed the trends observed in seasonality in greater depth and has examined possible underlying channels for the patterns observed in the data. We analyzed the EU-15 members' seasonality rates at both a country and regional level.

We decided to use the Gini index to calculate seasonality, but we checked our results for robustness with other measurement statistics, such as the Theil index, and the results are very similar. First, we see that seasonality at the EU-15 level has developed non-linearly over the period studied. After an initial period in which seasonality reduced, after the economic crisis seasonality grew steadily until it once again began to decrease in the final years studied.

Beyond this initial analysis, the rates of seasonality calculated at the country level showed significant variation across countries. Southern European countries, especially countries around the Mediterranean, show the largest increases in seasonality and simultaneously the worse trends. This is accompanied by an increasing number of arrivals to those countries. On the basis of this analysis, we conclude that the increase in seasonality was driven by the southern European countries. When we highlight the percentage of total seasonality produced by each country, the distribution of seasonality across the EU is centred around these southern countries.

Spain and Italy demonstrated an important channel, whereby an increase in demand leads to higher seasonality across the EU. We broke down the EU-15 Gini arrivals by country, to highlight which had the strongest influence on EU-wide trends. We found more supporting evidence that the tourism sectors of Mediterranean coastal countries, especially Spain, Italy and Greece, were key determinants of seasonality across the EU. The increasing number of tourist arrivals, likely stemming from an increase in cruise liners and increased demand from BRIC countries, has increased activity in the spring and summer seasons. This has increased the importance of these countries in the EU-15 seasonality decomposition.

These methods of analysis all examine tourist demand, but other researchers have highlighted the importance of supply side concerns when looking to understand seasonality in tourism. To combine the demand and supply side, we analyze arrivals at the regional level, defined by the NUTS II. To obtain the seasonality rate for each region and to clearly define the most important tourist activity in each region, we define a set of groups to which we allocate each region, e.g., island or coastal areas. The analysis at the country level confounds a diverse range of within country tourist activities and sometimes makes it hard to identify common trends in seasonality across countries.

The main objective of examining trends at the regional level is to utilize variation at that level to combine supply and demand data which will give us a clearer picture of patterns in seasonality and the reasons for the trends observed. We see that the regions and islands around the Mediterranean, in which the key tourism activities are centred around good sunny weather and beach side holidays, suffer the most from seasonality. The reason for this is that their tourism sector is not well diversified. We reach this conclusion by comparing these regions to comparably similar ones in which the tourism sector offers a wider variety of products. This was further demonstrated by the capital and business regions which have a significantly more diversified tourism sector as well as significantly lower seasonality rates.

The analysis at the regional level provided us with an interesting perspective on the evolution of seasonality across the continent. Some of the groups which were relatively less important at the start of the period studied, became much more significant over time, mostly due to them diversifying and meeting tourists' demands.

This means that there are “Business” regions or “Atlantic Coastal” regions which increased in importance for understanding the seasonality evolution.

Probably, the evolution of climate in the next decades could change the evolution of seasonality. Warmer weather will have a huge effect over the tourism activity, as stated in Scott et al. (2012), especially over coastal destinations, Jones and Phillips (2017), and Mountain regions, Burki et al. (2003), where the main tourist products depend on the natural conditions.

This section has provided further understanding and a range of interesting insights into seasonality and European tourism. We can state that tourism sectors have become more diversified over recent years and that the relevance of seasonality is increasingly even among regions. This trend towards a more equal distribution could help to improve the trajectory of seasonality for the region as a whole.

This thesis could give us new insights over seasonality in Europe. In fact, this research confirms that seasonality is a difficult problem to solve, and the policies applied during last decades are not successful to reduce this problematic. An EU’s common policy or a policy just referred to demand side or product side are not useful. We have demonstrated that countries or regions who are extremely depending on one type of tourist product, specially the related to climate as seaside or mountains, suffer a high level of seasonality. But, at the same time, a development of new tourist products in these areas not lead to a reduction of the seasonality. It is imperative a development of social policies to distribute holidays along the year to permit the reduction of seasonality.

Another interesting question observed in our research is, zones where the tourist products are more diversified could have a worst seasonality evolution due to the increasing knowledge of these areas and its products. The policies applied to develop new products during the off-season leaded to an increasing tourist arrival during the high season. It is important to highlight that the development of new products it is not the best policy to reduce the seasonality, due to the situation with the institutional factors. In addition, managers tend to promote these new products, obviously the effect is, more arrivals in high season.

These interesting conclusions came from the confirmation of the methodology of decomposition as a good tool to research on seasonality. The knowledge of the importance of every area analyzed and in a second step, the marginal effects, give us a chance to go deeper in the analysis of seasonality. But in a case as EU with common policies, the data obtained could give better insights of the results of the policies applied, as we have observed, specially in the regions chapter.

For future research it will be interesting to increase the tourism demand data of the new products developed to reduce seasonality. These data could give us interesting information about if to develop new products to reduce seasonality has positive effects or not. Another question to evaluate is if these new products are capable to attract new tourism in off-season or, some years after its development, has increased the number of tourists during the peak-season. This is an important initiative to evaluate one of the main strategies applied to reduce seasonality. Even the data at EU level is not available, every country, or the main ones at least, collect data for every region.

As stated in previous paragraph, climate change and the effects over tourism and seasonality at country and regional level will be another interesting and important research line. Tourism activity will change in the next decades due to the climate evolution, and obviously seasonality will show new patterns.

Annex 1 Table of regions and groups of regions

Research on the main tourism products in every region was analysed. The classification is based on this research. Some regions could be in a different group, but we have tried to be accurate in this sense.

Group name	Country	Region
Capital areas	Austria	Wien
	Belgium	Région de Bruxelles-Capitale
	Denmark	Hovedstaden
	Finland	Uusimaa
	France	Ile-de-France
	Germany	Berlin
	Greece	Attica
	Italy	Lazio
	Netherlands	Noord-Holland
	Portugal	Área Metropolitana de Lisboa
	Spain	Madrid
	Sweden	Stockholm
Mediterranean islands	France	Corsica
	Greece	Crete; Ionian Islands; North Sea; Southern Aegean
	Italy	Sardinia; Sicily
	Spain	Balearic Islands
Atlantic islands	Portugal	Azores; Madeira
	Spain	Canary Islands
Coastal Mediterranean areas	France	Languedoc-Roussillon et Midi-Pyrénées; Provence-Alpes-Côte d'Azur
	Greece	Macedonia; Peloponnese
	Italy	Campania; Emilia Romagna; Veneto
	Spain	Andalucía; Catalunya; Comunitat Valenciana
Mountain areas	Austria	Niederösterreich; Salzburg; Tirol, Vorarlberg
	Finland	North & East Finland
	France	Auvergne et Rhône-Alpes
	Germany	Baden-Württenberg
	Greece	Thessaly
	Italy	Bolzano; Piemonte; Trentino; Valle d'Aosta
Business areas	Austria	Oberösterreich
	Belgium	Province d'Anvers; Province de Flandre orientale
	Denmark	Sjælland
	Germany	Bayern; Hamburg; Hessen; Niedersachsen; Sachsen
	Italy	Lombardy
	Netherlands	Drenthe; Limburg; Noord-Brabant; Zuid-Holland
	Spain	País Vasco
	Sweden	West Sweden
Atlantic coast	Belgium	Province de Flandre occidentale
	France	Aquitaine, Limousin et Poitou-Charentes; Bretagne; Nord-Pas-de-Calais et Picardie; Normandie; Pays de la Loire
	Germany	Mecklenburg-Vorpommern; Sachsen-Anhalt
	Netherlands	Friesland; Groningen
	Portugal	Alentejo, Algarve; Centro; Norte

Other	France	Alsace, Champagne-Ardenne et Lorraine; Bourgogne et Franche-Comté; Centre-Val de Loire
	Germany	Bremen; Nordrhein-Westfalen; Rheinland-Pfalz; Schleswig-Holstein
	Italy	Tuscany
	Netherlands	Utrecht
	Sweden	East Middle Sweden; South Sweden
	Greece	West Greece

Compiled by author

Annex 2: European Regions, seasonality and demand

		Gini					Mean Arrivals
	Region	2011	2012	2013	2014	2015	2011-2015
Capital Areas	Attica (Greece)	0,155183	0,188625	0,162338	0,189054	0,190797	3142489,5
	Berlin (Germany)	0,087087	0,077985	0,080338	0,075726	0,073423	11255850
	Bruxelles (Belgium)	0,057758	0,055699	0,051392	0,061953	0,051873	3266095
	Hovedstaden (Denmark)	0,136327	0,124753	0,131125	0,119303	0,116107	4828394,2
	Ile de France (France)	0,057758	0,055699	0,051392	0,061953	0,051873	32505150
	Lisboa (Portugal)	0,133304	0,133887	0,133933	0,135532	0,126301	4524680,2
	Madrid (Spain)	0,054905	0,054819	0,059729	0,063075	0,063763	10171311
	Noord-Holland (Netherlands)		0,086719	0,090727	0,07897	0,08053	9482000
	Stockholm (Sweden)	0,095626	0,087233	0,10117	0,095084	0,091817	6749453,8
	Uusima (Finland)	0,083687	0,0753	0,080328	0,084664	0,093328	3052634,8
	Wien (Austria)	0,096777	0,093511	0,098644	0,099028	0,103612	5893684,8
Mediterranean islands	Corse (France)	0,413115	0,40958	0,425618	0,425378	0,433646	1363649
	Crete (Greece)	0,493472	0,499449	0,502807	0,508602	0,49796	2863453
	Illes Balears (Spain)	0,456629	0,462417	0,460705	0,467691	0,464405	8543652
	Ionian Islands (Greece)	0,528559	0,544498	0,557195	0,562336	0,566772	1152954
	North Sea (Greece)	0,464523	0,464874	0,467932	0,492472	0,497844	294816,8
	Sardegna (Italy)	0,458625	0,461581	0,458209	0,459178	0,473876	2273565
	Sicilia (Italy)	0,276026	0,272516	0,284463	0,291103	0,294752	4230711,6
	Southern Aegean (Greece)	0,548381	0,545911	0,555473	0,551046	0,536285	2713556
Atlantic islands	Açores (Portugal)	0,280181	0,284052	0,286394	0,280974	0,255036	355468,6
	Canarias (Spain)	0,052474	0,044021	0,050853	0,045607	0,041088	8141750
	Madeira (Portugal)	0,153507	0,146139	0,145113	0,126651	0,121156	1092978
Coastal mediterranean areas	Andalucia (Spain)	0,163495	0,164136	0,174785	0,172497	0,165856	15310004
	Campania (Italy)	0,234717	0,244533	0,243969	0,25143	0,278036	4533869
	Catalunya (Spain)	0,205567	0,19863	0,204845	0,202972	0,198609	16672895
	Comunitat Valenciana (Spain)	0,164268	0,166599	0,168483	0,164079	0,16112	7218299
	Emilia-Romagna (Italy)	0,305146	0,301377	0,302847	0,303909	0,320095	8985280
	Languedoc-Roussillon et Midi-Pyrénées (France)	0,220048	0,21302	0,214811	0,205222	0,205663	8949002
	Macedonia (Greece)	0,238143	0,258885	0,268547	0,271785	0,26865	2005354
	Pelopponese (Greece)	0,269422	0,299036	0,299599	0,30363	0,298857	912376
	Provence-Alpes-Côte d'Azur (France)	0,206034	0,196765	0,210218	0,197402	0,201494	10920507
	Veneto (Italy)	0,300334	0,299486	0,301903	0,29117	0,297101	15219514
Other	Alsace, Champagne-Ardenne et Lorraine (France)	0,117999	0,111621	0,116404	0,115165	0,119249	8270173
	Bourgogne et Franche-Comté (France)	0,168694	0,16754	0,171104	0,161196	0,163807	4948502
	Bremen (Germany)	0,075102	0,0545	0,074586	0,073256	0,071906	1153269
	Centre-Val de Loire (France)	0,193544	0,184374	0,192851	0,186933	0,192087	3972275
	East Middle Sweden (Sweden)	0,085924	0,089613	0,100164	0,103268	0,089966	2199795
	Nordhein-Westfalen (Germany)	0,073893	0,064366	0,067625	0,070023	0,06699	20554061

	Rheinland-Pfalz (Germany)	0,196742	0,183961	0,192023	0,186835	0,188193	8192317
	Schleswig-Holstein (Germany)	0,262619	0,252492	0,263533	0,253398	0,248672	6472863
	South Sweden (Sweden)	0,106913	0,108012	0,123131	0,121761	0,131079	2375497
	Toscana (Italy)	0,257204	0,26111	0,271271	0,264173	0,26691	11617751
	Utrech (Netherlands)		0,067653	0,071555	0,075203	0,073092	1089750
	West Greece (Greece)	0,240229	0,265608	0,274576	0,288496	0,247759	622849,8
Mountain areas	Auvergne et Rhône-Alpes (France)	0,105221	0,100108	0,105947	0,098108	0,104918	12650690
	Baden-Württenberg (Germany)	0,135861	0,125393	0,132081	0,128018	0,128004	19004998
	Bolzano (Italy)	0,204664	0,205062	0,219175	0,208403	0,219193	5836993
	Niederösterreich (Austria)	0,176433	0,157837	0,161345	0,168344	0,171367	212896,7
	Piemonte (Italy)	0,125882	0,135549	0,133822	0,120876	0,136714	4151427
	Salzburg (Austria)	0,206839	0,199595	0,216065	0,195974	0,208473	535568,6
	Thessaly (Greece)	0,180749	0,201161	0,188872	0,181626	0,19684	768150
	Trentino-Alto (Italy)	0,22677	0,226902	0,2382	0,230733	0,241072	9145896
	Tyrol (Austria)	0,223471	0,225143	0,238824	0,208586	0,21961	850359,1
	Valle d'Aosta (Italy)	0,305863	0,304586	0,299905	0,310879	0,325578	959061,4
	Voralberg (Austria)	0,213277	0,208704	0,236448	0,20513	0,210644	184057,04
Business areas	Anvers (Belgium)	0,100939	0,098164	0,083676	0,083206	0,086248	1694232
	Bayern (Germany)	0,135582	0,129396	0,128895	0,129257	0,132857	31845175
	Drenthe (Netherlands)		0,127976	0,112608	0,114739	0,136308	456250
	Flandre orientale (Belgium)	0,130275	0,116569	0,107395	0,113611	0,114873	854871,6
	Hamburg (Germany)	0,080001	0,075158	0,084548	0,077006	0,073447	5779026
	Hessen (Germany)	0,089994	0,084273	0,082862	0,086273	0,088191	13341585
	Limburg (Netherlands)		0,087405	0,097442	0,099493	0,090987	1705360
	Lombardia (Italy)	0,092799	0,098814	0,105271	0,101313	0,109176	12834907
	Midjylland (Denmark)	0,114249	0,106591	0,109827	0,09944	0,110243	1219582
	Niedersachsen (Germany)	0,156166	0,148932	0,158858	0,152519	0,151754	12901681
	Noord-Brabant (Netherlands)		0,071203	0,069732	0,063152	0,063206	1657040
	North & East (Finland)	0,127568	0,12387	0,122486	0,118238	0,119351	2506826
	Oberösterreich (Austria)	0,159867	0,161347	0,158713	0,161872	0,175051	220415,4
	Pais Vasco (Spain)	0,14546	0,145099	0,150705	0,149232	0,151823	2486116
	Sachsen (Germany)	0,120609	0,114382	0,11763	0,119204	0,122398	7133404
	Sjaelland (Denmark)	0,134324	0,133278	0,13096	0,136379	0,144281	573820,4
	West Sweden (Sweden)	0,13416	0,101507	0,107375	0,111169	0,119427	3714840
	Zuid-Holland (Netherlands)		0,086601	0,095778	0,098048	0,095567	3303750
Atlantic coast	Alentejo (Portugal)	0,174305	0,181935	0,193339	0,208479	0,196752	708851,4
	Algarve (Portugal)	0,30316	0,311269	0,312007	0,307193	0,307953	3295838
	Aquitaine, Limousin et Poitou-Charentes (France)	0,192016	0,189444	0,188288	0,190469	0,192042	9043953
	Bretagne (France)	0,180858	0,164857	0,178877	0,175431	0,172866	4258385
	Centro (Portugal)	0,167036	0,163386	0,1742	0,185717	0,18039	2264569
	Flandre occidentale (Belgique)	0,197518	0,18022	0,167547	0,178741	0,165046	3160591
	Friesland (Netherlands)		0,171896	0,162678	0,161752	0,209663	763500
	Groningen (Netherlands)		0,060458	0,074444	0,090261	0,074275	413000

	Mecklenburg (Germany)	0,277392	0,263543	0,272817	0,259497	0,264705	7103252
	Nord-Pas de Calais et Picardie (France)	0,094394	0,085414	0,092452	0,093481	0,092441	5570014
	Normandie (France)	0,160956	0,160899	0,179153	0,174356	0,17066	4777209
	Norte (Portugal)	0,143477	0,133651	0,143831	0,144992	0,146441	2905466
	Pays de la Loire (France)	0,128559	0,121623	0,131939	0,139448	0,145807	3974565
	Sachsen-Anhaldt (Germany)	0,153509	0,148529	0,143876	0,146858	0,154651	2974607

Source: Compiled by autor based on EUROSTAT
Note: Netherlands changed the methodology system in 2011

Annex 3 Gini's percentage by group of regions

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Capital areas	14,59%	15,81%	15,31%	14,53%	13,03%	13,75%	12,27%	12,46%	9,25%
Mediterranean islands	21,26%	21,55%	23,05%	21,97%	23,76%	23,65%	23,78%	21,33%	10,93%
Atlantic islands	0,49%	0,15%	0,28%	0,37%	1,10%	1,49%	1,40%	2,93%	1,41%
Coastal Mediterranean areas	35,24%	35,02%	35,81%	36,05%	36,32%	34,65%	36,43%	36,01%	19,04%
Mountain areas	9,62%	8,19%	6,94%	9,62%	7,12%	5,60%	5,57%	2,28%	6,46%
Business areas	15,27%	15,43%	14,70%	13,93%	14,73%	13,87%	13,77%	11,34%	27,42%
Atlantic coast	3,02%	3,31%	3,29%	2,89%	3,42%	6,54%	6,26%	13,23%	13,78%
Other	0,52%	0,54%	0,62%	0,65%	0,52%	0,45%	0,53%	0,42%	11,71%
	2010	2011	2012	2013	2014	2015	2016	2017	
Capital areas	9,56%	6,10%	7,61%	8,28%	8,06%	8,40%	11,33%	12,11%	
Mediterranean islands	10,29%	10,62%	13,36%	13,50%	14,05%	14,02%	14,54%	8,38%	
Atlantic islands	1,37%	0,70%	0,61%	0,60%	0,58%	0,54%	0,73%	0,81%	
Coastal Mediterranean areas	18,74%	28,08%	27,21%	27,15%	27,41%	27,40%	20,15%	20,74%	
Mountain areas	6,64%	9,95%	8,11%	8,50%	8,37%	8,64%	7,22%	8,05%	
Business areas	27,48%	20,71%	15,82%	15,78%	15,67%	15,26%	17,73%	19,88%	
Atlantic coast	13,49%	9,76%	12,76%	11,98%	12,08%	11,97%	15,87%	16,44%	
Other	12,45%	14,08%	14,51%	14,21%	13,80%	13,77%	12,42%	13,59%	

Compiled by author

Chapter 4. Economic determinants of international arrivals and tourism seasonality: An European Union analysis

4.1 Introduction

Since the early stages of tourism research, two research topics have dominated the literature: one is formed of questions around the causes and effects of seasonality, and the other examines the link between the tourism sector and the wider economy. The aim of this chapter is to merge these two topics and examine the impact that fluctuations in key macroeconomic variables, such as Gross Domestic Product (GDP), prices, unemployment and income inequality, have on seasonality. First, we look at how seasonality has evolved over recent years. Following Duro (2016), we use the Gini coefficient to measure the level of seasonality in a given country. Then, we use a Hausman–Taylor estimator for error-components model, a type of panel-data random-effect model, to estimate the coefficient of a range of economic determinants of seasonality. Following Rosselló et al. (2004), we select a main set of economic variables as our independent variables, namely the gross domestic product (GDP), relative prices (RPs), and exchange rates (ERs). In a final section, we introduce some new variables to check the importance of these to the seasonality's evolution, in that case, unemployment and income inequality.

As we have demonstrated in previous chapters, seasonality has increased in recent years in the EU as a whole. At the same time, there has been a considerable increase in global demand for tourist goods and services, a fact that can intensify the negative impacts of tourism on destinations. This thesis has shown that seasonality evolves differently and has different impacts depending on the country in which it occurs. Mediterranean countries have the strongest impact on seasonality across the EU as a whole. Due to these initial results, and the existing diversity, we decided to study the effect of macroeconomic variables by different groups of countries. In particular, we distinguish between the countries between belonging to the Mediterranean region from those that do not. We do this to determine whether significant differences exist in the effect of economic variables on seasonality for these groups.

In this chapter, we try to answer additional questions about seasonality to understand the economic determinants hidden in the evolution of seasonality. Following Rosselló et al. (2004), who presented a seminal study about these determinants in the Balearic Islands, and Duro and Turrión-Prats (2019), who studied this question at the world level, we use income as the macroeconomic determinant. However, we decide to focus the research at the EU geographical level, using data from all countries travelling to EU destinations. One of the values added of this research is the geographical choice, as we are trying to determine the impacts of seasonality in the most visited area in the world[14], which suffers a critical problem with seasonality, especially in Mediterranean areas. Knowledge of the economic determinants could give us the option to obtain a certain forecast of the evolution of seasonality, its negative impacts, and the way to reduce these impacts.

[14] As stated in the introduction chapter, based on UNWTO data, Europe is the area defined by this institution with most international arrivals and some of the EU countries are the most popular destinations in the world, as France, Spain, Italy, among others.

Our research questions are as follows:

- What are the macroeconomic determinants behind the evolution of seasonality?
- If we add another economic determinant, different from the original research, is it significant? Does it give us new information?
- Does this analysis give policy makers the option to better adapt the tourist sector to the evolution of seasonality following the economic forecast?
- Are our findings similar or different to the previous literature?

As we said, we follow the research conducted by Rosselló et al. (2004) and Duro and Turrión-Prats (2019). Similar research was also conducted by Xie (2020), but only for Norway.

The contribution of this chapter is twofold. On the one hand, it contributes to the understanding of seasonality in Europe from the point of view of economic determinants, which has received little attention in previous literature. Another interesting contribution is the inclusion of new macroeconomic determinants in the methodological model, unemployment and inequality, which opens a new line of research in this matter. The second contribution of this research is to offer some help to develop new policies to reduce seasonality, in line with the conclusions of this research.

The chapter is structured as follows. In the first section, we provide a literature review. In the second section, we analyse the evolution of the seasonality index. The third section is dedicated to presenting the methodology used, and finally, we present the results and conclusions.

4.2 Previous evidence

As stated in chapter 2, the link between economic determinants and tourism demand has been well established by the tourism literature. Most papers in recent years have focused on how demand is linked to economic crises. Although we do not focus precisely on that question in this chapter, those works provide a solid reference point for methodologies on how to analyse the link between macroeconomic determinants of seasonality. In the next paragraphs some research theories about the link between economy and tourism are presented.

As discussed previously, several studies on tourism demand have shown that it is highly dependent on the evolution of economic activity in origin countries and on the relative cost of living in the destination country. However, evidence on the elasticity in the number of arrivals to different economic factors in the country of origin is mixed. For instance, Ledesma-Rodríguez et al. (2001) studied arrivals to Tenerife from 13 markets and found arrivals to be elastic in the long run with respect to income and inelastic with respect to prices or transport costs. However, Garín-Muñoz and Montero-Martín (2007), who studied arrivals to the Balearic Islands from 15 of its key markets, found that while demand is inelastic to income and price in the short run, elasticity is greater than one in the long run, implying an increasingly sensitive response. In addition, they found that demand was elastic with respect to changes in transport costs in both the short run and the long run. Ekanayake et al. (2012) presented a similar model for the United States using similar variables as used by Rosselló et al. (2004): real GDP per capita, tourism prices, real Exchange Rate (ER), and travel costs. In their research, the authors found elasticities consistent with previous research.

Maloney and Montes Rojas (2005) used the General Method of Moments (GMM), defined by Blundell and Bond (1998). They measured the tourism price elasticity in Caribbean countries, with bilateral data (tourists came from the United States, Canada, the United Kingdom, Germany, the Netherlands, Italy, and Spain) from 1990 to 2002. They estimated a relatively large price elasticity of 4.9.

Duro and Turrión-Prats (2021) analysed the main empirical factors for seasonality in Catalonia using a GMM dynamic panel data model for the period 2000–2014. They find that an increase in income in markets that contribute significantly to arrivals to Catalonia would be positive not only in terms of annual demand but also in terms of its seasonal distribution. In addition, their results highlight the relevance of other economic factors when explaining variation in tourism seasonality, particularly price and transport cost variables. It is also worth mentioning that these authors found observable behavioural differences for some of the main source markets. In particular, Italian tourists are more sensitive to price changes, while German tourists' income elasticity is more positive and higher than other tourists' elasticities. Furthermore, the ER for a British tourist has a lower effect on concentration in Catalonia than for tourists from other markets. Croes and Vanegas (2008) and Mello et al. (2002) observed these differences in tourist demand patterns with respect to the source country in question.

We followed Rosselló et al. (2004), who published a paper analysing the relationship between seasonality and a range of economic variables in the Balearic

Islands. They employed the Gini index to analyse and measure seasonality, while the economic variables used were GDP for the country of origin and the Real Prices (RP) indices, specifically the consumer price index (CPI) and ERs. These variables are widely used throughout tourism research to link demand and economic fluctuations.

Rosselló et al. (2004) reduced the sample for their study to the countries that were the largest sources of tourists heading to the Balearic Islands: Germany and the United Kingdom. We took their estimation as a reference point when designing our estimation equation. Their results demonstrate a negative relation when GDP and prices are positively correlated with the Gini index and the RP statistics, and for the British, the ERs were significant for a higher Gini index. As explained by Rosselló et al. (2004, p.706): "In other words, as consumers' incomes increase (decrease), the distribution of arrivals throughout the year tends to be smoother (more concentrated). On the other hand, as relative prices increase (decrease), the Gini-coefficient increases (decreases). Then, as prices in the destination increase (decrease), the distribution of arrivals throughout the year tends to be more concentrated (smoother)." More recently, some authors, such as Xie (2020), in a research project to study seasonal patterns in Norway. Results were consistent with those found by Rosselló et al. (2004) and the more recent research by Duro and Turrión-Prats (2019).

As we presented in the introduction, we want to expand the macroeconomics determinants to open a new research line in seasonality. As is said, we included unemployment and inequality in the methodology proposed. In that sense, the inclusion of these two variables, and the original ones, are very related to income. The main research line is to check the effects of income over seasonality. The exercise presented in this thesis is a first proposal to be developed in the next years.

One of the questions that we have in mind concerns the effects of an economic crisis on tourism demand, as stated in Gonzalez and Moral (1995), Gouveia and Rodrigues (2005), Guizzardi and Mazzocchi (2010) and Smeral (2012) when discussing tourism demand and business cycle. Another body of literature involves the direct link between tourism and economic crises as in Eugenio-Martin and Campos-Soria (2014), Hall (2010) and Papatheodorou et al. (2010). Following economic theory, an economic crisis generates unemployment and following tourism theories, unemployment reduces tourism demand, as explained previously, via income. We want to continue with this line and determine the effects of unemployment on seasonality.

Usually, researchers have focused the question on employment, as stated in Juznik-Rotar et al. (2022) and numerous papers on this question (Ahlert, 2008; Brown & Connelly, 1986; Elkan, 1975; Farver, 1984; Townsend, 1992; Williams & Shaw, 1988).

Crouch (1996), Lim (1997) and Witt and Witt (1995) presented research on the main determinants of economic demand in the tourism sector. They highlighted income and prices as the main explanatory variables to understand tourism demand while they ignored unemployment. This may be because unemployment is highly correlated with income or simply that they did not find a significant link between tourism demand and unemployment. More recent literature, for example Guizardi and Mazzochi (2010), has tried to understand demand patterns during the business cycle, using similar variables as our previous work, including income, consumer prices and exchange rates. Smeral

(2012) also used these same variables to analyse how tourism demand responds to the business cycle. Alegre et al. (2019) presented the link between unemployment and tourism travels at European Union (EU) level, where they found that when unemployment rises by 10%, the tourism demand falls.

Koenig and Bischoff (2010) present a clear overview of state-of-the-art modelling and understanding within the seasonality and unemployment literature. The main research focus is on the effects on human resources in Krakover (2000) or skills, in Murphy (1985). The economic impacts are usually related to investments, or the fixed costs paid by business management (Manning & Powers, 1984; Sutcliffe & Sinclair, 1980; Williams & Shaw, 1991). Despite these examples, there is a lack of literature relating seasonality and unemployment directly. In analysing the underlying channels which determine seasonality, we observed a link between seasonality and unemployment, and this link has led us to believe that seasonality is affected by changes in inequality.

The link between unemployment and inequality is a common research topic within the economic literature. Martinez et al.(2001) investigated unemployment and inequality in Organisation for Economic Co-operation and Development (OECD) countries, Elhanan et al. (2010) looked at outcomes of both across the global economy. Furthermore, Koske et al. (2012) demonstrated the link between inequality and income. Maestri and Roventini (2012) developed an approach to link inequality and macroeconomic factors and in doing so, provided references to similar research in different countries such as Blundell and Etheridge (2010) for the UK or Heathcote et al. (2010) for the US. In addition, there exists some research projects focused on Spain

(Pijoan-Mas & Sanchez-Marcos, 2010), Italy (Jappelli & Pistaferri, 2010) and Greece (Matsaganis & Leventi, 2014), which all aim to improve our understanding of this important economic connection.

In recent years, the literature on seasonality has produced several papers on the consequences of the state of the wider economy for seasonality within the tourism sector. Eugenio-Martin and Campos-Soria (2014), Page et al. (2012) and Smeral (2009) show that tourist's cutback their tourist activity in times of economic crisis. Alternatively, Stabler et al. (2009) linked the evolution of tourism activity to income elasticity. Smeral (2010) was one of the first to analyse the effect of a downturn in tourism when the world was suffering from a clear and demonstrable global economic crisis.

Zaharia et al. (2014) examined unemployment rates and Perles-Ribes et al. (2016) extended their work by specifically examining the effects of unemployment in Spain's touristic sector. Furthermore, Cellini and Cuccia (2016) wrote an article about the effects of the economic crisis and the fact that tourists choose to visit closer destinations in Italy. In a recent paper, Aznar et al. (2019) explained the link between seasonality and unemployment in the Balearic Islands, but the analysis by these authors is the usual way to link these two variables, seasonality affects unemployment rates and by extension, the labour market, as in Baum (1999) or in Murphy (1985).

An interesting body of literature linking unemployment and tourism was compiled by Alegre et al. (2013 and 2019), where they presented some interesting papers about the effects of unemployment on tourism attitudes, basically demand attitudes. They concluded that increasing unemployment changes the perspectives of tourist spending. For instance, a rise in unemployment generates a reduction of trips as households decide to reduce the budget destinated to tourism.

In another study, Nicolau and Mas (2005) presented different situations, economic and sociocultural, influencing the decision to go on vacation. In that case, the authors presented the occupational situation as a substitute of income. However, the authors make a clear difference within the economic situation and the sociocultural factors, such as availability of leisure time and its distribution throughout the year.

Finally, another line of study examines the link between tourism and inequality. Wen and Tisdell (1997) wrote an interesting article about the importance of tourism in order to reduce inequality in China. Tosun et al. (2003) wrote a similar research paper about Turkey, Manyara and Jones (2007) for Kenya, Blake et al. (2008) for Brazil, Lee and O'Leary (2008) and Lee (2009) for the USA and Croes (2014) for Costa Rica and Nicaragua. Looking more recently, we find other prominent examples of research in this field which include Alam and Paramati (2016), Incera and Fernandez (2015), Llorca-Rodríguez et al. (2017), Lv (2019), Mahadevan and Suardi (2019), or Raza and Shah (2017), which have all demonstrated the link between these two key variables. One of the most recent papers on this question is that written by Llorca- Rodríguez et al. (2020) who examined the contribution of domestic and inbound tourism to efforts to reduce poverty. This work though found some contradictory results to those on the relationship between tourism and inequality. They found that a relationship between economic growth or unemployment exists, but the sign is different across years and countries. This question is well explained in Alam and Paramati (2016). As tourism has grown, there have been a set of economic indicators, such as prices or average salaries, which point to a worsening level of inequality.

TABLE 4.1 MAIN RESEARCH ON THE LINK BETWEEN ECONOMIC ACTIVITY AND TOURISM

Question	Authors
Tourism and economic activity	Copeland (1991) Hazari & Sgro (1995) Gonzalez & Moral (1995) Gonzalez & Moral (1996) Lanza & Pigliaru (1999) Gouveia & Rodrigues (2005) Guizzardi & Mazzocchi (2010) Stabler et al. (2010) Smeral (2012) Chatziantoniou et al. (2013)
Tourism and economic crisis	Frechtling (1982) Henderson (1999) Prideaux (1999) Law (2001)
Financial economic crisis	Smeral (2009) Sheldon & Dwyer (2010) Page et al. (2012) Alegre et al. (2013)
Tourism and economic problems	Hall (2010) Papatheodorou et al. (2010) Page et al. (2012) Eugenio-Martin & Campos-Soria (2014) Sala et al. (2014) Cafiso et al. (2016)
Tourism and unemployment	Zaharia et al. (2014) Perles-Ribes et al. (2016)
Main Methodologies applied	<u>Demand elasticity</u> Ledesma- Rodríguez et al. (2001) Maloney & Montes Rojas (2005) Garín-Muñoz & Montero (2007)

	Dynamic panel data Seetaram & Petit (2012) Turrión-Prats & Duro (2017) Turrión-Prats & Duro (2019) Random-effects model Rosello et al. (2004) Duro & Turrión-Prats (2019) Xie (2020)

In the next section, we present the data alongside our methodology, to analyse the link between economic determinants and seasonality in Europe, following the proposal of Rosselló, et al. (2004). We present the results according to different models, one of which treats countries as a single unit of analysis. In a second step, we differentiate between Mediterranean countries and non-Mediterranean countries. The main reason for this is because we want to observe whether differences exist between countries, as seen by Duro and Turrión-Prats (2019), who used the distance from the equatorial line to observe significant differences in seasonality values. The final exercise is to introduce two new macroeconomic determinants in the model proposed, inequality and unemployment.

4.3 Methodology and data

To study the economic determinants of seasonality, we analyse the case of international tourism arrivals in 14 European countries[15] by country of origin. We use data on monthly arrivals of non-residents at hotels and similar accommodation

[15] Countries analysed are UE-15, except Ireland due to the lack of data.

establishments retrieved by Eurostat according to a geographical breakdown. For those countries, Eurostat provides data on arrivals from 41 countries,[16] including the 14 countries under analysis, from 1990 through 2011. For our specific sample, the earliest observations are from 1994 (see in the countries included).

The units of observation in this study are the origin–destination country pairs. For each country pair, we selected only those years for which data for each of the 12 months were available. Given the possible origin-destination pairs and the years available for each pair[17], the initial sample consists of 5,947 units of observation with complete data on arrivals across the selected years. However, the final sample used in the regression analysis is significantly reduced due to a lack of continuity in some series, as well as some missing data in the variables used as regressors. Therefore, we use an unbalanced panel of fewer than 4,000 observations in most of the models. It is important to highlight that this is the first time this type of analysis is carried on for a panel in which the unit of observation (each pair origin-destination) is observed across several years. In the research conducted by Rosselló et al. (2004) or Xie (2020), the analysis refest to a single destination, only one region or country. The research over multiple destination-origin countries gives us the opportunity to obtain more comprehensive results about the economic determinants effects over seasonality.

[16] Including all European countries with data and Australia, Brazil, Canada, China, Japan, Korea, South Africa, and the United States.

[17] It should be noted that not all the EU countries received visitors from all the 41 origin countries, and the time span can be different for each pair observed.

Our dependent variables are the number of arrivals in the destination country from each partner country per year and the level of seasonal concentration of tourists per year. The data used in this model is the same in the previous chapter, reflecting a consistency and a continuity in the research of this thesis. To measure annual seasonality, we use the Gini coefficient derived from the Lorenz curve, a widely used indicator in the literature on seasonality (Fernández-Morales, 2003; Fernández-Morales & Mayorga-Toledano, 2008; Lundtorp, 2001; Martín Martín et al., 2014; Rosselló et al., 2004). Following Jenkins (2006), the Gini coefficient was specifically calculated using the following expression[18]:

$$Gini\ coefficient = 1 + \frac{1}{n} - \left[\frac{2}{\mu * n^2}\right] \sum_{i=1}^{N} (n - i + 1) y_i \quad (1)$$

where y_i denotes the number of arrivals in the month i (months are ranked in ascending order of y_i), n is the number of observations (12 months), and μ is the arithmetic mean of arrivals per year.

The Gini coefficient ranges between 0 and 1, but in this case, since the data set has only 12 observations per year, the range is between 0 and 0.9167. The coefficient equals 0 when the number of arrivals is the same over all months, and the maximum value occurs when all the arrivals are concentrated in one single month. Therefore, the higher the Gini index, the greater the degree of seasonality. In addition, the Gini coefficients satisfy the Pigou–Dalton condition, which implies that annual seasonality will be

[18] It was calculated using the command "ineqdeco" in Stata. Stephen P. Jenkins, 1999. "INEQDEC0: Stata module to calculate inequality indices with decomposition by subgroup," Statistical Software Components S366007, Boston College Department of Economics, revised 15 Feb 2021.

reduced if there is a “transfer” of arrivals from a month with a high number of visitors to another with a lower number of visitors. Following Rosselló et al. (2004), we use the following logarithmic transformation of the Gini coefficient to allow the dependent variable to vary in the range -∞ to +∞[19]:

$$G^* = ln\left(\frac{G_t}{1-G_t}\right) \tag{2}$$

As we mentioned before, the main economic determinants of tourism demand should be the tourists’ income level and the price levels for tourist goods and services in destination countries, as well as prices for substitute destinations, which, in turn, are affected by fluctuations in ERs. Unfortunately, some of these variables cannot be observed directly or there are no available data. Following Rosselló et al. (2004), we use the per capita GDP for the country of origin as a proxy for tourists’ income level. Variation in tourist goods and services prices is captured by RPs and ERs, which are both used to get relative prices and as a direct determinant. The RPs in origin and destination countries are calculated as the ratio of consumer prices across countries in a common currency:

$$RP_t = \frac{CPI_t^d}{CPI_t^o} \times EX_t \tag{3}$$

where RP_t stands for the RPs between the destination country and the origin country; CPI represents the consumer price index; the superscripts d and o indicate destination and origin, respectively; and EX_t is the nominal ER between the destination

[19] In the previous chapter the Gini Index specification is different, but the aim in this chapter is to follow the Rosselló et al. (2004) model and to be consistent in this way.

country's currency and the origin country's currency expressed as the number of units of the origin country's currency per one unit of the destination country's currency. Therefore, RP_t measures the RP of a destination's basket of goods and services in terms of an origin's basket of goods and services.

Data on GDP per capita are taken from the World Bank's World Development Indicators database; data of CPI are taken from the OECD (base year is 2010); and data on ERs are taken as annual averages (in some cases based on monthly averages) and come from the International Monetary Fund, the European Central Bank, the Bank of England, the Sveriges Riksbank (Sweden's central bank), and the Nationalbankens Statistikbank (Denmark's central bank). In Table 4.2. is presented the main statistics of every variable.

Table 4.2. Descriptive Statistics

Variable		Mean	Std. Dev.	Min	Max	Observations
Number of international arrivals in country *i* from destination *j* per year	Overall	22,381	141,695	4	6,949,894	N = 5,947
	Between		63,976	12	972,964	n = 557
	Within		119,055	-790,599	6,052,316	T-bar = 10.68
Tourism Seasonality (*Gini index)*	Overall	0.233	0.111	0.031	0.695	N = 5,947
	Between		0.099	0.056	0.625	n = 557
	Within		0.042	0.019	0.620	T-bar = 10.68
Partner GDP per capita (US$ PPP)	Overall	30,361.6	13,530.0	4,431.3	91,049.5	N = 5,947
	Between		13,107.7	6,723.2	86,470.6	n = 557
	Within		4,983.9	5,416.8	51,347.9	T-bar = 10.68
Relative price (*relative price of a destination's basket of goods and services in terms of an origin's basket of goods and services*)	Overall	266.5	8,259.4	0.0	328,053.1	N = 5,947
	Between		5,094.3	0.1	110,851.5	n = 474
	Within		6,588.2	-110,587.9	217,464.9	T-bar = 11.53
Exchange rate (*units of origin currency units per one destination currency unit*)	Overall	150.8	4,399.2	0.0	200,000.0	N = 5,831
	Between		2,558.2	0.1	59,451.8	n = 543
	Within		3,560.4	-59,300.8	140,699.0	T-bar = 10.74
Partner level of employment (*in millions*)	Overall	16.1	28.8	0.1	146.1	N = 4,852
	Between		27.0	0.2	142.3	n = 419
	Within		1.2	4.0	25.1	T-bar = 11.58
Partner level of unemployment (*in millions*)	Overall	7.63	4.09	1.79	24.9	N = 5947
	Between		3.83	2.75	24.8	n = 557
	Within		2.10	0.69	16.2	T-bar = 10.68
Partner level of income inequality (*Gini index*)	Overall	0.301	0.040	0.220	0.41	N = 2,002
	Between		0.042	0.239	0.41	n = 333
	Within		0.010	0.266	0.33	T-bar = 6.01

Overall refers to the whole dataset. *Between* to the variation of the means to each individual (across time periods). *Within* refers to the variation of the deviation from the respective mean to each individual.
Source: Compiled by author

4.3.1. Estimation Methodology

To estimate the importance of the main economic determinants of international tourism arrivals and seasonality, we use a Hausman–Taylor estimator for error-components model, a panel-data random-effect model in which some of the covariates are correlated with the unobserved individual-level (origin–destination pair) random effect.

Following Seetaram and Petit (2012, 131), “by nature, all panel data models are dynamic since they are taking into account the time series dimensions of the sample.” However, the main difference between the standard static fixed effects (FE) and random effects (RE) models, on the one hand, and dynamic models on the other hand, is that the latter specifically model the effect of lagged dependent variables.

Following Wooldridge (2002), the choice between random and fixed effects depends on the correlation between the variables of the model and the unobserved heterogeneity (μ_i). .

FE models check the relationship between explanatory variables and dependent variables within an individual group. We can explain two limitations in these techniques. One is that some between-group variation can be omitted, and only variables with enough variation over time can be analysed consistently. The modeller will solve these problems by using different techniques. As stated by Seetaram and Petit (2012), “FE models may additionally include an error component which changes over time but not for each unit, and it is treated as a constant in the model.”

The other technique to use is random effects (RE). In this technique, the unobserved and independent variables are uncorrelated. One advantage of using RE is that it permits the study of time-invariant factors. The problem with this technique is that you must include all relevant data. If omitted variables exist, then coefficients can be biased. As stated by Seetaram and Petit (2012, p.7): “The choice between FE and RE depends on whether μ_i is correlated to any of the other explanatory variables of the model (Wooldridge, 2002). When such a correlation exists, the fixed effect technique is superior. Otherwise, the random effect is more parsimonious and gives more efficient estimates (Wooldridge, 2002).”

Random effects and fixed effects models are used widely in econometrics for panel data, although fixed-effect model is more commonly used since it eliminates all the commonality within an individual (or a country, in our case), therefore the unobserved individual heterogeneity is controlled for. However, in a fixed effect model, any covariates that are constant within an individual cannot be included in the estimation. On the other hand, a random-effect model can have a time-invariant variable in the regression, but it assumes orthogonality between error term and the individual effects, which is often not true (Hsiao and Pesaran, 2004).

To overcome such limitations, the Hausman-Taylor model uses a “mixed” structure to include a time-invariant variable and model unobserved individual heterogeneity. According to Hsiao and Pesaran (2004), it is “mixed” in the sense that it is between fixed effect and random effect, or a mixture of both.

As noted in the previous section, we followed the option proposed by Duro and Turrión-Prats (2019), who analyse the importance of economic determinants along with a measure of distance to the equator, which proxies for climate conditions. In our case, we use a territorial variable, being a Mediterranean country or not. This variable captures the variation in climate and the type of product on offer. This is a valuable addition because it constitutes a link between the supply within tourism markets and seasonality. The other reason to include this variable is the differentiate behaviour, in seasonality terms, of the area of the Mediterranean. This is the area with highest seasonality values and a higher impact over EU seasonality. It is important to collect more information about the reasons of seasonality, because more information could lead to better policies to reduce seasonality.

Given that our model includes both a time-invariant Mediterranean countries dummy and the time-invariant unobserved RE μ_i, we use the Hausman–Taylor estimator, a panel-data RE model based on instrumental variables, which allows for the inclusion of time-invariant explanatory variables and in which some of the covariates are correlated with the unobserved individual-level RE (Hsiao and Pesaran, 2004).

In particular, we estimate an RE model of the form.

$$y_{ijt} = \beta_1 ln\ GDP_{ijt} + \beta_2 lnRP_{ijt} + \beta_3 lnEX_{ijt} + \beta_4 lnArrivals_{it} + \beta_4 Meditteranean + \mu_i + \epsilon_{it} \quad (4)$$

where μ_i is the unobserved, panel-level RE, and ϵ_{it} is the idiosyncratic error. The GDP, the real price RP, and the ER are all assumed to be exogenous. While the international demand measured by the international arrivals varies over time, it may be endogenous, that is, correlated with μ_i (correlated with individual characteristics of each origin–destination country pair) but orthogonal to ϵ_{it}. Finally, $Meditteranean$ is a time-invariant variable assumed to be uncorrelated with both μ_i and ϵ_{it}.

Thus, our referential model is similar to the employed in the literature and, therefore, it allows to make a comparative analysis to the existing international evidence adding the EU case. Observe, nevertheless, that we have additionally included total arrivals to be consistent with the previous chapter analysis.

4.4 Results

To analyse the economic determinants of seasonality in the EU, we used the Hausman–Taylor estimator. Our model estimates the coefficient on the economic determinants defined by Rosselló et al. (2004): GDP, RPs, and ERs. In addition, we include a time-invariant Mediterranean countries dummy variable to control for the geographical effects of this area, inspired by Duro and Turrión-Prats (2019).

We present three different methods of determining the validity of our model and show that we find similar results when using different concentration indexes. Model 1 uses the Gini index transformed following the example of Rosselló et al. (2004), model 2 for the Gini calculated as usual, and model 3 utilises the Duro and Turrión-Prats (2019) proposal of using coefficient of variation (CV). Thus, we follow the recommendation suggested in Duro (2016) for using alternative indexes. Table 1A in the Appendix provides a brief description and a statistical summary of the Gini values obtained and used in this paper.

Table 4.3 Effect of origin country's macroeconomics on tourist seasonality

Hausman–Taylor estimator for error-components models

	(1) Gini arrivals transformed (ln)	(2) Gini arrivals (original, ln)	(3) Coefficient of variation arrivals (ln)
GDP per capita (ln) – origin	0.204***	0.163***	0.136***
	(4.59)	(4.74)	(3.65)
Relative price (ln, CPI only)	-0.0123	-0.0164	-0.010
	(-0.64)	(-0.99)	(-0.61)
Exchange rate (ln)	0.0167**	0.0130**	0.0143***
	(6.18)	(6.16)	(6.21)
Arrivals (ln)	-0.114***	-0.0914***	-0.0647***
	(-12.99)	(-13.41)	(-8.06)
Mediterranean countries	0.554***	0.409***	0.384***
	(9.49)	(9.08)	(8.09)
Constant	-2.519***	-2.533***	2.797***
	(-5.93)	(-7.68)	(7.88)
Observations	5465	5465	5411
Chi-squared	627.055	643.358	443.823
Rho	0.844	0.841	0.831
sigma_u	0.566	0.437	0.459
sigma_e	0.243	0.190	0.207

t statistics in parentheses. * p<0.10, ** p<0.05, *** p<0.01
All models include a year fixed effect.

The *t* statistics indicate that all the coefficients, except the RPs, are significantly different from zero. The estimated sigma-u and sigma-e are 0.8 and 0.5, respectively, indicating that a large fraction of the total error variance is attributed to the panel-level RE μ_i. In particular, "Rho" is the share of the estimated variance of the overall error accounted for by RE, while the Wald chi-square statistic indicates the overall significance of the coefficients.

The results indicate that GDP, ERs, and the geographical location of the country are significant determinants of seasonality for all models proposed. Furthermore, the zscore increases for the price indexes when we use the CV (1.90 at 90%). In all cases, the sign remains constant, and all values are highly significant, except for the price index in model 3, which is consistent with other findings.

In all models, the coefficient on GDP is positive, which shows that an increasing GDP level is correlated with worsening seasonality. These results are consistent with the findings reported by Xie (2020) for Japan, but different from those found by Rosselló et al. (2004) and Duro and Turrión-Prats (2019). In our case, we can interpret this fact in the following way. At the European level, an increasing GDP level implies that more people can afford to take trips, and these trips have been registered at country level. One alternative explanation for the different results stems from differences in the data and objectives of the other papers compared to ours. Rosselló et al. (2004) only used data for the United Kingdom and Germany, whereas Duro and Turrión-Prats (2019) used worldwide data. Our research is defined only for Europe and follows a different methodology in comparison to prior work. We include a wide range of countries and alternative control variables, such as if country belongs to the Mediterranean zone and the influence of the type and breadth of products offered in each country. These differences can explain the divergence between our results and others.

The coefficient on ERs is also positive, but small in absolute value. A strengthening of an ER tends to increase tourist activity in destinations that have relatively weaker currency, since tourists' domestic currencies go further. In the European case, since only a handful of countries do not use the Euro, we can only really look at the response of British and Swedish tourists. In both cases, a strengthening of their currencies produces the outcome described. In the case of non-European countries, fluctuations in ERs have led to an increase in concentration of tourist arrivals. For this variable, our results match those found by Rosselló et al. (2004). This provides further supporting evidence that the coefficient on ERs is positive, such that when ERs increase (decrease), seasonality values increase (decrease).

The joint adoption of the Euro in a great number of countries across Europe has reduced the significance of ER fluctuations. Nevertheless, Rosello et al. (2004) observe that the ER is a significant factor when we analyse the tourists coming from the United Kingdom, while it is insignificant for German tourists, as to be expected. A similar conclusion is drawn from our research, since our model estimates a significant effect for tourists arriving from source countries that have a different currency.

Finally, we find the most significant results when we check whether the country belongs to the Mediterranean area (Greece, Italy, and Spain). Seasonality is more severe in Mediterranean countries than the rest. Our empirical results confirm that tourist activity in Mediterranean countries is highly seasonal, more so than other areas that offer a different type of tourist activity. These results are consistent with the existing literature. For instance, Ferrante et al. (2018) propose a division of the European countries that is similar to the one utilised here.

We also find that using different types of concentration indexes produces similar results. As a further extension, we test whether the Gini transformation used by Rosselló et al. (2004) and re-applied in this paper produces consistent results under a variety of model specifications.

4.5. New macroeconomic determinants

The last test we have applied is to introduce new macroeconomic determinants in our model. In that case we continue to check the income effects over seasonality. In previous paragraphs we have analysed GDP per capita, and continuing this line we included two new variables related to income: unemployment and Gini inequality index.

We focused our analysis in the Mediterranean countries. One of the main economic problems facing Mediterranean countries in the EU is unemployment. At the same time, these countries are among those receiving the largest numbers of tourist arrivals. Additionally, they were severely impacted by the financial and debt crises and observing the data on arrivals and unemployment, our hypothesis is that tourism activity appears to affect unemployment.

First, studying correlograms allows to establish the link between both time series.[20] In doing so, we observed some significant values. Unemployment is highly significant when treated as a dependent variable when explaining the evolution of the Gini index. When unemployment increases, the Gini index tends to decrease, indicating a worsening of seasonality within the tourism sector.

This research is interested in the link between unemployment and seasonality within the EU-15 countries for those countries which reported a significant number of observations. For that reason, Ireland and France were excluded from the analysis. We

[20] Correlograms is a statistic technique who allow us to study a possible relation between two data series. As stated in Mauricio (2008), time series could present a similar or different relation and it is necessary to check what kind of relation is.

present the plots in two different groups, the first one corresponds to countries in which we cannot see a clear relation or no relation between both time series: Austria, Luxemburg, Germany, Sweden, Netherlands or the United Kingdom. The second group demonstrates a relationship and is formed by: Belgium, Denmark, Finland, Greece, Italy, Portugal and Spain.

Figure 4.1 Relation between unemployment and seasonality

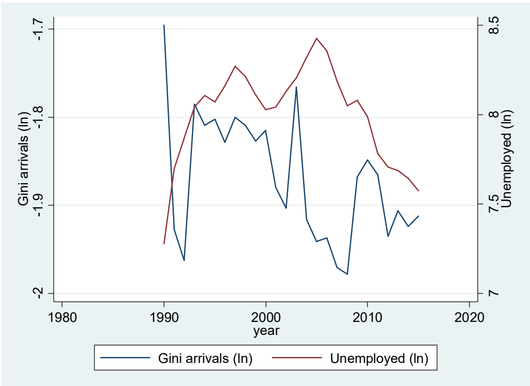
Series in levels (logarithms)

COUNTRIES WITH NO CLEAR RELATION

Austria

Luxemburg

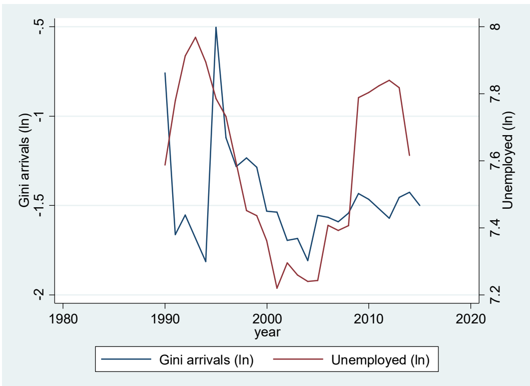
Germany



Sweden

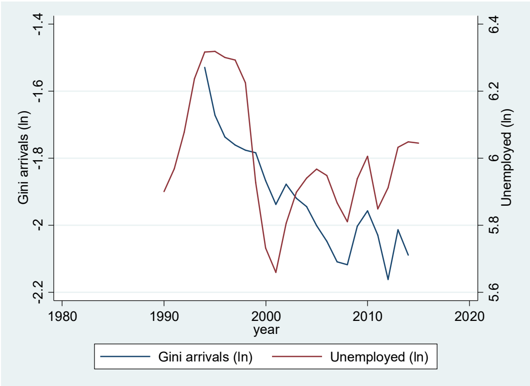
Netherlands

United Kingdom



COUNTRIES WITH RELATION

Belgium



Denmark

Finland

Greece

Italy

Portugal

Spain

Source: Compiled by authors

A clear link in some countries is observed, particularly in those in which the tourism sector is more important to the wider economy. Austria is the only country where the tourism impact on GDP is important (it reaches a 13.5% GDP) but there is no relation between the two series. In Austria, the contribution of the tourism sector to GDP is large. Despite this, employment in the sector is less relevant than other countries. For that reason, the focus is on the countries in which tourism provided the largest percentages of total employment: Greece, Italy, Portugal and Spain. It is true that some other countries present similar patterns, but the importance of the touristic sector is diminished for example as is the case of Belgium, Denmark and Finland. As discussed in the previous paragraphs, the case of the southern EU countries is more interesting since they were more severely affected by the economic downturn of 2009, in addition these countries are the ones with higher seasonality values, and they are some of the countries with higher international arrivals. Table 5.1. presents arrivals per country and macroeconomic data related to tourism, and Table 5.2. macroeconomic data after the financial economic crisis.

TABLE 4.4 ARRIVALS IN MILLIONS, GDP DIRECT AND INDIRECT CONTRIBUTION AND EMPLOYMENT DIRECT AND INDIRECT IN % FOR 2015

COUNTRY	International arrivals	GDP direct	GDP total	Employment direct	Employment total
Austria	22.0	4.8	13.5	5.3	7.0
Belgium	7.1	2.5	6.1	2.6	6.6
Denmark	8.7	2.0	6.9	3.0	8.0
Finland	2.3	2.1	6.3	2.1	6.7
Germany	26.8	3.9	8.9	7.0	14.5
Greece	23.6	7.6	18.5	11.3	23.1
Italy	50.7	4.2	10.2	5.0	11.6
Luxembourg	0.7	1.8	5.1	2.5	7.2
Netherlands	10.8	1.8	5.5	6.0	9.5
Portugal	10.1	6.4	16.4	7.9	19.3
Spain	68.2	5.8	16.0	5.2	16.2
Sweden	4.9	2.5	9.6	3.7	11.2
United Kingdom	28.2	3.7	11.2	5.3	12.7

Source: UNWTO Highlights and World Travel and Tourism Council.

TABLE 4.5 GDP AND UNEMPLOYMENT EVOLUTION 2008–2010

	GDP			Unemployment		
COUNTRY	2008	2009	2010	2008	2009	2010
Austria	1.17	−3.55	1.80	4.13	5.30	4.82
Belgium	0.75	−2.28	2.70	6.97	7.91	8.29
Denmark	−0.51	−3.55	1.80	3.43	6.01	7.46
Finland	0.72	−8.27	2.99	6.36	8.24	8.39
Germany	0.82	−5.57	3.95	7.53	7.74	6.97
Greece	−0.23	−4.31	-5.46	7.76	9.62	12.72
Italy	−1.07	−5.52	1.65	6.72	7.75	8.36
Luxembourg	−0.83	−5.43	5.77	5.05	5.11	4.35
Netherlands	1.20	−3.77	1.33	2.75	3.41	4.45
Portugal	0.20	−2.98	1.90	7.55	9.43	10.77
Spain	1.12	−3.57	0.01	11.24	17.86	19.86
Sweden	−0.72	−5.11	5.69	6.23	8.35	8.61
United Kingdom	−0.63	−4.33	1.92	5.61	7.54	7.79

Source: OCDE

From observing the variation of both series across time, a clear relationship between them is observed. During the previous economic crisis, as unemployment increased, the evolution of the Gini index indicated an increase in seasonality. That link was not so clear for previous years, probably because the economic context was not strictly the same across the four countries. Spain, Portugal, Italy and Greece for example did not experience the same rates of employment during the years in question. However, as we can observe in Table 4.5, those countries suffered the most during the said economic crisis, as shown by the economic indicators.

Those figures indicate that during the last economic crisis, a strong link between unemployment and seasonality appeared. That link appears to have persisted after the economic crisis finished.

As is seen in Table 4.6., unemployment and inequality are included in the models. When we applied the different variables, some interesting results appears. First, when only unemployment in origin is included, collinearity appears. Second, the best results appears when we included Unemployment in origin and Gini (Income) in destination, as is seen in model (1). Both variables are significant and other variables, as GDP, remain in similar values in comparison to results presented in Table 4.3. A question arises here about the effects and the model. The inclusion and significance of inequality in origin, allow us to continue, in a future line of research, to evaluate the causes and effects of seasonality, looking for better models and methodologies to help managers to reduce the level and the effects of seasonality.

Another question to highlight is the sign obtained. The sign obtained is negative, which it means that the increasing unemployment in origin leads to a lower seasonality. This sign is consistent with the tourist products developed in the Mediterranean. The most popular touristic productes in this area are traditional and cheap products. When unemployment is growing, less people make tourist travels, especially people with less income. In the other hand, people with higher income are less affected by unemployment and the number of touristic trips is the same. But, the question arises when we compare the obtained GDP/capita sign, positive, and the unemployment and inequality sign, negative. It is supposed that an increasing income leads to a reduction on seasonality, and the three variables are related to income. Two questions to highlight. First, should we analyse at more detailed level? The geographical analysis in this chapter is treated as a whole, not detailed by markets. An analysis more individualized could give a valuable information and possible explanation of these results. Second question is the different signs obtained. Is there some effect or question hided or not evident? These two questions could lead to an extension of the research on seasonality.

This exercise gives the chance to continue the research of economic determinants. Both variables could lead the research in seasonality to another step, including more variables and more concepts.

Table 4.6. Effect of origin/destination country's macroeconomics on tourist seasonality

Hausman–Taylor estimator for error-components models

	(1) lnginit	(2) lnginit	(3) lnginit	(4) lnginit
GDP per capita (ln) – origin	0.140** (1.97)	0.300*** (3.53)	0.193*** (3.01)	0.192*** (3.00)
Relative price (ln, CPI only)	0.208** (2.09)	0.510*** (3.92)	0.256*** (2.68)	0.244** (2.55)
Exchange rate (ln)	0.00478 (0.57)	0.00386 (0.56)	0.00489 (0.59)	0.00491 (0.59)
Income unequality - Gini index origin (ln)		-0.186 (-1.25)		
Gini Index (Income)-destination	-3.499*** (-6.92)		-3.501*** (-6.92)	-3.571*** (-7.05)
Unemployed (ln) – origin	-0.0434* (-1.69)			
Unemployed (ln)-destination				0.0483 (1.60)
yr2003	-0.0668 (-0.99)	-0.0745 (-0.74)	-0.0709 (-1.05)	-0.0694 (-1.03)
yr2004	-0.152*** (-2.84)	-0.0692 (-0.72)	-0.158*** (-2.97)	-0.161*** (-3.02)
yr2005	-0.0573 (-1.07)	-0.0170 (-0.17)	-0.0655 (-1.23)	-0.0691 (-1.30)
yr2006	-0.163*** (-3.02)	-0.134 (-1.34)	-0.171*** (-3.17)	-0.173*** (-3.21)
yr2007	-0.225*** (-4.09)	-0.176* (-1.72)	-0.231*** (-4.21)	-0.230*** (-4.19)
yr2008	-0.255*** (-4.57)	-0.207** (-2.02)	-0.262*** (-4.71)	-0.263*** (-4.73)
yr2009	-0.258*** (-4.62)	-0.198** (-1.98)	-0.276*** (-5.04)	-0.287*** (-5.22)
yr2010	-0.173*** (-3.05)	-0.137 (-1.37)	-0.195*** (-3.54)	-0.210*** (-3.77)
yr2011	-0.146** (-2.55)	-0.145 (-1.42)	-0.169*** (-3.02)	-0.184*** (-3.25)
Arrivals (ln)	-0.0557*** (-5.11)	-0.0738*** (-5.59)	-0.0552*** (-5.06)	-0.0563*** (-5.15)
mediterraneo	0.755*** (9.21)	0.636*** (7.17)	0.755*** (9.23)	0.736*** (8.89)
Constant	-1.276* (-1.69)	-4.136*** (-5.04)	-1.891*** (-2.86)	-1.939*** (-2.92)
Observations	2462	2002	2462	2462
Chi-squared	349.725	257.489	346.731	349.090
Rho	0.921	0.916	0.920	0.921
sigma_u	0.774	0.716	0.771	0.773
sigma_e	0.227	0.216	0.227	0.227

t statistics in parentheses
* $p<0.10$, ** $p<0.05$, *** $p<0.01$
Source: Compiled by author

4.6 Discussion and implications

The aim in this chapter was to determine the importance of different economic variables in explaining seasonality at the European level. We followed Rosselló et al. (2004) in using GDP per capita, ERs, and the RP index as our independent economic variables and Duro and Turrión-Prats (2019). After applying the Hausman–Taylor estimator, we found that these economic variables are significant determinants of the variation in seasonality.

Regarding the questions of the economic variables present in the model:

The key variable to highlight is GDP per capita. We found that the coefficient on our GDP measure was positive, so that when GDP per capita increases, seasonality becomes more severe. This result is contradictory to previous examples within the literature. We interpret this in the following way. For European countries, an upward trend in GDP per capita implies an increasing number of trips for tourists, thanks to the income effect. People are wealthier and can therefore afford more holidays. This leads to an increase in demand, without changing the preferences for travel. This means that these new tourists tend to travel during that same time periods as other tourists, such as during school holidays. This situation therefore implies an increase in the severity of seasonality. In that sense, a growing GDP could lead to a better evolution in equality, and a positive evolution for the disadvantaged classes. This group used to take holidays in the peak season, following the institutional factors as scholar or job holidays, and tends to visit cheaper destinations as the coastal zones.

One of the chances to capture this effect is to include unemployment and inequality as variables in the model defined. The decision made was to maintain the model as is defined by the previous authors, and to develop a new specification and a new model to try to capture this situation.

The ERs are also significant when we estimate our coefficients using each of the different models. The sign on our estimated coefficient here matches that found in previous research. A stronger ER means improvement in seasonality trends because it leads to a smoother distribution of trips throughout the year. This is because ERs affect all tourist trips, not only those during peak times. For instance, business trips are highly influenced by the ER and occur in off-peak as well as peak periods.

Finally, we return to the question of the effect of being a Mediterranean country on seasonality. The Mediterranean area is highly affected by seasonality, since the principal product on offer is centred on beachside holidays, and these trips are highly concentrated in summer. At the same time, it is one of the most attractive areas in Europe, so arrivals are naturally high. When we introduce a variable that controls for the distinction between Mediterranean and non-Mediterranean countries, all the economic determinants become significant. For other parts of Europe, or when we analyse Europe as a whole, the economic determinants lose significance. As we demonstrate in previous research, tourist activity in other parts of Europe is less centred around the beach and therefore not so concentrated in the summer.

This paper can help us to understand the movements and trends seen in seasonality as a function of the economic situation of each country and the EU. Another issue is that the methodology helps us to have some forecast of the evolution of seasonality. It can help policy makers and company owners to predict when tourists will choose to take trips and therefore can help them to control seasonality rates and limit the negative effects on people and the wider economy. In that sense, the economic predictions could help to develop marketing strategies to make the season longer, for instance using prices or tourism products in off-peak season.

To expand the research is to analyse the effects of every single market. In this chapter market is see as a one single market, but we can refine results and effects if we are capable to divide every market.

Finally, we have included new economic determinants to our model, unemployment and inequality. Results obtained are interesting and both variables are significative. But one of the questions to highlight is the different sign obtained between GDP per capita and unemployment and inequality. The different sign indicates that three different variables, all related to income, lead to opposite effects over seasonality: Improving GDP leads to a better seasonality evolution, and better situation in unemployment and inequality leads to a worst seasonality value. These results should be analysed in more detail, and it is a possible new research line. This is an interesting line to continue in the next research actions, due to the implications of the causes of seasonality, how to prevent and how to solve problems caused by seasonality.

4.7. Concluding Remarks

In this chapter we have followed the methodology proposed by Rosselló et al. (2004) to check the significance of the economic determinants proposed by the authors, in this case GDP, Exchange Rate and Price Evolution, on seasonality at EU-15 level.

Our proposed models follow the methodological modification proposed by Duro and Turrión-Prats (2019), and we use the Hausman–Taylor estimator, a panel-data RE model based on instrumental variables, which allows for the inclusion of time-invariant explanatory variables (being a Mediterranean country), and in which some of the covariates are correlated with the unobserved individual-level (origin–destination pair) random effects.

An aspect to highlight is in opposition to previous studies in which only the effects of one destination are analysed. In this one, where a wider panel of observations is evaluated, since a multitude of destinations and origins are analysed, which allows us to obtain much more relevant information.

The other innovation, also following the logic of the mentioned authors, is to apply a territorial variable, in this case belonging to the Mediterranean area. This application is logical in that the countries in this area are some of those that receive the most tourists, according to the UNWTO, and also some of those that have more seasonality, as indicated in the previous chapter.

In this case we find that GDP and the exchange rate are significant in terms of effects on seasonality in the estimated models. In this case, the signs presented by the GDP estimates are different from those in other previous studies, indicating that the higher the GDP, the greater the seasonality. The breadth of the sample leads to the obtaining of very interesting information for policy planners and company owners in the sector when forecasting and planning a tourist season following the evolution of macroeconomic data.

Finally, the new variables, unemployment and inequality, included in the final exercise permit us to continue with the analysis of the seasonality and to explore reasons and implications in a new research line. Inequality could be a new economic determinant to explore demand evolution as well seasonality.

ANNEX

Gini coefficient by origin–destination country pairs (number of observations, mean, standard deviation)

Origin	Austria	Belgium	Denmark	Finland	France	Germany	Greece	Italy	Luxemburg	Netherlands	Portugal	Spain	Sweden	United Kingdom
Australia	15	17	7	7	7	7	11	16	14	13	11	15	11	15
	0.27	0.173	0.314	0.335	0.278	0.22	0.449	0.277	0.218	0.185	0.268	0.237	0.267	0.297
	0.02	0.024	0.027	0.017	0.047	0.036	0.056	0.028	0.03	0.035	0.029	0.026	0.031	0.083
Austria		17	16	7	15	8	17	16	14	13	11	17	11	15
		0.113	0.262	0.365	0.261	0.117	0.548	0.329	0.147	0.144	0.289	0.202	0.251	0.266
		0.017	0.044	0.044	0.018	0.006	0.017	0.01	0.026	0.017	0.044	0.018	0.029	0.082
Belgium	15		14	7	15	8	17	16	14	13	11	17	11	15
	0.355		0.182	0.137	0.245	0.134	0.493	0.276	0.113	0.089	0.284	0.262	0.14	0.184
	0.047		0.04	0.016	0.021	0.009	0.023	0.03	0.024	0.013	0.015	0.019	0.022	0.043
Brazil	1	7	7	7	2	7	7	7	5	6	7	7	3	5
	0.24	0.17	0.339	0.301	0.263	0.207	0.409	0.207	0.186	0.156	0.179	0.162	0.315	0.267
		0.021	0.024	0.013	0.047	0.062	0.026	0.012	0.027	0.013	0.018	0.018	0.082	0.046
Bulgaria	6	5	5	5	5	4	5	5	3		5	5	3	1
	0.102	0.095	0.168	0.169	0.22	0.086	0.288	0.192	0.139		0.173	0.17	0.351	0.128
	0.017	0.021	0.05	0.036	0.053	0.024	0.034	0.012	0.071		0.039	0.029	0.055	
Canada	15	17	16	7	15	8	17	16	14	13	11	17	11	15
	0.28	0.189	0.281	0.233	0.281	0.179	0.37	0.315	0.203	0.197	0.222	0.202	0.192	0.265
	0.036	0.018	0.036	0.017	0.024	0.017	0.041	0.03	0.023	0.02	0.031	0.03	0.022	0.07
China	7	7	7	7	6	7	7	8	5	6	7	7	7	5
	0.206	0.153	0.243	0.26	0.147	0.121	0.257	0.153	0.175	0.119	0.123	0.14	0.282	0.296
	0.022	0.032	0.053	0.052	0.052	0.032	0.025	0.029	0.031	0.031	0.029	0.077	0.075	0.023
Cyprus	7	7	7	7	6	7	7	7	5	2	7	7	3	5
	0.27	0.137	0.363	0.258	0.43	0.13	0.228	0.269	0.247	0.132	0.395	0.244	0.311	0.307
	0.02	0.038	0.102	0.023	0.123	0.019	0.03	0.036	0.061	0.027	0.132	0.06	0.105	0.079
Czech Republic	15	17	7	7	13	8	17	15	14	13	10	15	11	11
	0.159	0.138	0.19	0.197	0.259	0.074	0.575	0.237	0.185	0.144	0.314	0.416	0.198	0.304
	0.041	0.032	0.038	0.021	0.042	0.009	0.037	0.03	0.027	0.058	0.053	0.067	0.055	0.118
Denmark	15	17		7	15	8	17	16	14	13	11	17	11	15
	0.416	0.133		0.189	0.322	0.217	0.513	0.288	0.206	0.178	0.157	0.173	0.21	0.168
	0.05	0.02		0.024	0.015	0.011	0.02	0.025	0.026	0.017	0.034	0.02	0.02	0.029
Estonia	7	7	7	7	6	7	7	7	5	2	7	7	7	2
	0.226	0.136	0.195	0.103	0.274	0.125	0.484	0.288	0.195	0.191	0.351	0.199	0.139	0.277
	0.071	0.02	0.039	0.021	0.061	0.027	0.018	0.053	0.06	0.062	0.032	0.071	0.033	0.007
Finland	15	17	16		13	8	17	16	14	13	11	17	11	15
	0.184	0.13	0.286		0.199	0.147	0.46	0.245	0.214	0.145	0.175	0.122	0.226	0.226
	0.052	0.015	0.029		0.025	0.012	0.033	0.015	0.029	0.027	0.015	0.02	0.023	0.072
France	15	17	11	7		8	17	16	14	13	11	17	11	15
	0.3	0.073	0.154	0.183		0.084	0.431	0.24	0.068	0.104	0.279	0.251	0.148	0.132
	0.053	0.014	0.037	0.036		0.007	0.029	0.017	0.011	0.024	0.015	0.014	0.019	0.027
Germany	15	17	16	7	15		17	16	14	13	11	17	11	15
	0.169	0.133	0.308	0.301	0.251		0.464	0.27	0.121	0.169	0.191	0.228	0.318	0.214
	0.079	0.019	0.06	0.026	0.016		0.019	0.012	0.013	0.013	0.012	0.01	0.036	0.053

Greece	15	17	12	7	13	8		16	14	12	11	17	11	15
	0.305	0.085	0.337	0.387	0.173	0.056		0.17	0.163	0.088	0.243	0.243	0.29	0.219
	0.05	0.02	0.042	0.054	0.048	0.015		0.037	0.031	0.022	0.112	0.079	0.069	0.072
Hungary	15	17	7	7	13	8	17	15	14	13	11	15	11	7
	0.178	0.137	0.172	0.165	0.25	0.112	0.538	0.218	0.19	0.144	0.305	0.327	0.215	0.271
	0.066	0.029	0.033	0.026	0.054	0.008	0.039	0.021	0.042	0.026	0.045	0.094	0.046	0.114
Iceland	15	17	7	7	13	8	7	15	14	8	11	15	11	6
	0.282	0.172	0.153	0.273	0.264	0.15	0.44	0.264	0.192	0.173	0.396	0.298	0.255	0.257
	0.077	0.036	0.031	0.041	0.061	0.026	0.031	0.052	0.04	0.069	0.069	0.094	0.079	0.125
Ireland	15	17	7	7	13	8	17	16	14	13	11	17	11	11
	0.292	0.08	0.232	0.303	0.222	0.074	0.486	0.237	0.144	0.082	0.376	0.241	0.17	0.155
	0.091	0.03	0.023	0.139	0.044	0.024	0.03	0.036	0.032	0.019	0.033	0.044	0.092	0.043
Italy	15	17	16	7	15	8	17		14	13	11	17	11	15
	0.291	0.092	0.327	0.342	0.266	0.136	0.5		0.098	0.153	0.322	0.268	0.264	0.197
	0.021	0.02	0.023	0.023	0.029	0.011	0.018		0.021	0.037	0.026	0.024	0.024	0.047
Japan	15	17	16	7	15	8	17	16	14	13	11	17	11	15
	0.219	0.217	0.303	0.191	0.094	0.143	0.161	0.088	0.351	0.165	0.101	0.093	0.276	0.181
	0.045	0.04	0.055	0.014	0.03	0.016	0.055	0.018	0.064	0.037	0.035	0.025	0.02	0.043
Korea	7	7	7	7		7	5	7	5	6	7	7	7	5
	0.258	0.252	0.295	0.339		0.142	0.358	0.226	0.246	0.149	0.198	0.15	0.312	0.348
	0.021	0.05	0.084	0.057		0.011	0.065	0.009	0.055	0.047	0.046	0.036	0.043	0.056
Latvia	7	7	7	7	6	7	7	7	5	2	7	7	7	1
	0.211	0.127	0.177	0.124	0.205	0.108	0.47	0.153	0.255	0.203	0.327	0.184	0.156	0.478
	0.079	0.016	0.018	0.02	0.056	0.017	0.035	0.042	0.074	0.043	0.054	0.065	0.064	
Lithuania	7	7	7	7	6	7	7	7	5	2	7	7	7	1
	0.221	0.119	0.163	0.124	0.224	0.094	0.475	0.204	0.248	0.164	0.288	0.19	0.164	0.414
	0.097	0.017	0.042	0.033	0.076	0.013	0.028	0.025	0.045	0.019	0.05	0.061	0.084	
Luxembourg	14	17	7	7	13	8	7	16		13	11	17	11	7
	0.358	0.154	0.204	0.205	0.214	0.112	0.511	0.322		0.21	0.305	0.257	0.238	0.298
	0.045	0.031	0.027	0.044	0.033	0.011	0.023	0.017		0.041	0.041	0.027	0.079	0.132
Malta	7	7	7	7	6	7	7	7	5	2	7	7	3	5
	0.298	0.132	0.495	0.367	0.483	0.135	0.376	0.226	0.249	0.273	0.286	0.237	0.305	0.376
	0.07	0.029	0.136	0.084	0.099	0.036	0.074	0.021	0.031	0.051	0.049	0.089	0.029	0.07
Netherlands	15	17	16	7	15	8	17	16	14		11	17	11	15
	0.408	0.091	0.24	0.222	0.265	0.157	0.474	0.285	0.249		0.263	0.259	0.178	0.175
	0.057	0.008	0.028	0.046	0.021	0.01	0.022	0.021	0.019		0.014	0.025	0.021	0.041
Norway	15	17	16	7	13	8	17	16	14	13	11	17	11	15
	0.283	0.128	0.37	0.213	0.3	0.24	0.541	0.319	0.248	0.146	0.242	0.13	0.347	0.168
	0.037	0.023	0.03	0.026	0.029	0.007	0.024	0.034	0.022	0.035	0.036	0.019	0.037	0.048
Poland	15	17	16	7	13	8	17	15	14	13	11	15	11	15
	0.186	0.102	0.206	0.177	0.255	0.063	0.529	0.219	0.158	0.106	0.345	0.366	0.175	0.285
	0.061	0.015	0.058	0.022	0.05	0.008	0.037	0.056	0.037	0.033	0.027	0.067	0.041	0.094
Portugal	15	17	7	7	13	8	17	16	14	13		17	11	15
	0.282	0.076	0.248	0.248	0.183	0.084	0.413	0.227	0.161	0.116		0.204	0.271	0.205
	0.067	0.022	0.034	0.043	0.033	0.026	0.044	0.033	0.054	0.026		0.027	0.043	0.054
Romania	6	5	5	5	5	4	5	5	3	4	5	5	3	3
	0.218	0.095	0.158	0.228	0.212	0.133	0.453	0.145	0.19	0.111	0.237	0.216	0.251	0.296
	0.012	0.014	0.049	0.037	0.046	0.025	0.02	0.019	0.023	0.032	0.024	0.035	0.043	0.03
Russia	7	7	7	7	7	7	7	7	5	6	7	7	7	5
	0.24	0.117	0.149	0.176	0.153	0.063	0.507	0.191	0.174	0.086	0.286	0.364	0.203	0.226
	0.173	0.027	0.014	0.011	0.01	0.008	0.033	0.013	0.048	0.011	0.015	0.022	0.013	0.056
	15	17	7	7	13	8	16	15	13	8	10	15	11	5

Slovak Republic	0.135	0.158	0.205	0.155	0.288	0.092	0.625	0.237	0.285	0.178	0.271	0.378	0.28	0.269
	0.05	0.032	0.025	0.023	0.073	0.021	0.028	0.053	0.055	0.053	0.038	0.116	0.065	0.144
Slovenia	7	7	7	7	6	7	7	7	5	2	7	7	3	1
	0.163	0.131	0.279	0.272	0.289	0.105	0.577	0.142	0.267	0.148	0.29	0.282	0.235	0.435
	0.044	0.022	0.079	0.068	0.042	0.02	0.01	0.009	0.045	0.009	0.038	0.031	0.058	
South Africa	7	7	7	7	2	6	7	7	5	6	7	7	3	5
	0.276	0.141	0.236	0.194	0.312	0.114	0.472	0.252	0.173	0.151	0.221	0.171	0.264	0.273
	0.12	0.023	0.068	0.025	0.082	0.016	0.029	0.017	0.063	0.024	0.041	0.04	0.078	0.029
Spain	15	17	16	7	15	8	17	16	14	13	11		11	15
	0.343	0.16	0.21	0.342	0.242	0.159	0.374	0.214	0.167	0.191	0.25		0.35	0.169
	0.048	0.015	0.107	0.066	0.017	0.011	0.051	0.02	0.039	0.037	0.018		0.038	0.048
Sweden	15	17	16	7	13	8	17	16	14	13	11	17		15
	0.256	0.12	0.277	0.191	0.257	0.235	0.503	0.264	0.173	0.163	0.15	0.105		0.167
	0.038	0.01	0.013	0.014	0.025	0.01	0.016	0.01	0.016	0.015	0.031	0.018		0.044
Switzerland	15	17	16	7	15	8	17	16	14	13	11	17	11	15
	0.175	0.135	0.289	0.36	0.215	0.15	0.47	0.308	0.128	0.155	0.248	0.256	0.305	0.189
	0.051	0.023	0.037	0.033	0.013	0.007	0.015	0.008	0.024	0.019	0.03	0.015	0.026	0.054
Turkey	15	17	7	7	13	8	17	16	14	13	11	15	11	15
	0.175	0.096	0.235	0.162	0.163	0.082	0.252	0.158	0.195	0.086	0.227	0.176	0.238	0.243
	0.071	0.019	0.036	0.056	0.039	0.007	0.105	0.039	0.052	0.027	0.05	0.045	0.09	0.08
Ukraine	7	7	7	7		7	7	7	5	3	7	7	3	2
	0.228	0.109	0.224	0.231		0.1	0.409	0.153	0.23	0.103	0.154	0.255	0.24	0.265
	0.117	0.018	0.039	0.047		0.04	0.067	0.016	0.07	0.033	0.044	0.054	0.077	0.093
United Kingdom	15	17	16	7	15	8	17	16	14	13	11	17	11	
	0.221	0.096	0.146	0.197	0.2	0.103	0.477	0.224	0.111	0.068	0.191	0.231	0.126	
	0.07	0.016	0.018	0.022	0.02	0.015	0.015	0.014	0.01	0.008	0.026	0.013	0.011	
United States	15	17	16	7	15	8	17	16	14	13	11	17	11	15
	0.281	0.141	0.335	0.272	0.232	0.159	0.336	0.276	0.171	0.12	0.212	0.207	0.3	0.213
	0.037	0.022	0.042	0.018	0.022	0.015	0.027	0.012	0.02	0.02	0.013	0.014	0.032	0.044

Compiled by author

CHAPTER 5. CATALAN TOURISM SUBSYSTEM: APPLYING THE METHODOLOGY OF SUBSYSTEMS IN THE TOURISM SECTOR.

5.1 Introduction

Over the past few decades, the tourism sector has emerged as one of the key drivers for economic growth across the world. Various organizations, including the World Travel & Tourism Council (WTTC), have calculated that tourism accounts for approximately 10,3% of global GDP, (WTTC, 2022). The tourism sector is of great importance to the Spanish economy, in particular for the region of Catalonia. With more than forty-seven million tourist trips and seventeen million international visitors, tourism generates 11,5% of the Catalonian GDP and more than a 11% of total jobs.

Catalonia is a region of north-eastern Spain, with a population of over 7.5 million people and which accounted for 20.1% of the Spanish GDP in 2018. In terms of tourism, Catalonia was the first area to receive international tourists in the late 1940s, and this region focused on developing tourism related activities during the 50s, 60s and 70s. In 2018, Catalonia received more than 19 million international tourists, accounting for 23.1% of international tourist arrivals in Spain. Furthermore, Catalonia is the most popular destination for tourists from within Spain; in 2018 Catalonia received more than four million Spanish tourists and Catalans themselves took 20.4 million trips around Catalonia. These figures translate into over 44 million touristic trips taken in Catalonia.

The increasing importance of the tourism and hospitality sector requires an important effort to obtain more knowledge about our sector. As stated in Lashley (2018), sometimes we focused our energy in "how to do", not in a deeper analysis of the reasons or to obtain a research knowledge of our sector. Tourism and Hospitality, in the present and in the next future, need to increase the critical thinking and the knowledge of their professionals and graduates.

The literature on the economic impacts of tourism is ever-present in the literature on tourism (see e.g., Song et al., 2012; Tyrrell & Johnston, 2006), since many countries recognize the importance of accurate information regarding the impact of tourism on their respective economies. The main reason is that tourism is considered to be one of the key sectors when looking to develop a country's economy. Various researchers confirm that tourism is able to generate important economic impacts leading to an increase in GDP and job creation (Duro & Rodriguez, 2011; Dwyer et al., 2006 and EUTDH, 2013).

In that sense, as stated in previous chapters, research into tourism growth has focused on analysing the real link between economic growth and tourism. Chatziantoniou et al. (2013) present the main hypothesis and references drawn from this substantial body of work: Tourism-led economic growth hypothesis (TLGH); Economic-driven tourism growth (EDTG); Bidirectional causality (BC); and No causality Hypothesis (NC). The study by Balaguer & Cantavella-Jordà (2002) was one of the first to present the TLGH theory, following by the Export-led economic growth hypothesis (ELGH) as presented in Brida et al. (2016). Both theories are linked in that they conceptualise tourism as a type of export. The same authors included a broad review of the tourism-growth literature based around the TLGH theory, which included more than one hundred research papers. A recurring theme throughout these papers is that tourism is one of the main determinants of economic growth. Regarding Spain, Perles-Ribes et al. (2017) presented an in-depth analysis of the relationship between tourism and economic growth where they found that tourism and economic growth are demonstrably linked. The authors state that the two phenomena, are correlated through a bidirectional causality which is significant for Spain given that the tourism sector is central to the national economy.

Over the next few paragraphs, we present a brief review of the literature on the methodologies employed in the analysis of the economic impacts of tourism. Various methodologies have been used to calculate the economic impacts of tourism. One widely used technique is the Keynesian multiplier methodology, developed by Archer (1977). With this methodology, we can calculate an exact number to quantify the economic impact of an increase in the demand in tourism. In recent years, researchers have used this technique to estimate or forecast the impacts of events on local areas, especially when there were severe data restrictions (Llop & Arauzo-Carod, 2012). However, using Keynesian multipliers to analyse impacts over larger regions can be problematic, due to the difficulty in discerning intersectoral effects, and the choice of these relationships between sectors is very subjective (Fletcher, 1989). Other authors, for example Fretching & Smeral (2010), apply alternative methodologies like econometrics models or structural equations models. But those methodologies do not easily offer consistent results with respect to the identification of the economic impacts of tourism (Assaker et *al*., 2010 and Van Leeuwen et *al*., 2009).

Another widely-used methodology is input–output (IO) analysis. Archer (1977), Archer and Fletcher (1990) and Fletcher (1989), developed some applications to the tourism sector. The literature on tourism provides many examples of the use of the IO methodology to analyse economic impacts for a country or region. These include the studies conducted by Archer and Shea (1977) on the impacts of tourism for Wales, those carried out by Archer (1995) for the Bermuda Islands and by Archer and Fletcher (1996) in their analysis of the impact of tourism on the Seychelles. For the Spanish regions, Polo and Valle (2008) provide an analysis of the economic impact of tourism on the Balearic Islands and three studies for the specific case of Catalonia, two by Baró (2010), Baró and Villafaña (2005) and another by Polo et al. (2008), specifically about the economic impact of hotels in the city of Barcelona.

Briassoulis (1991), Fletcher (1989) and Polo et al. (2008) describe the advantages of using the IO methodology as opposed to other methodologies. They justify that IO is a valuable methodology for the following reasons. First, it is capable of fully analysing the linkages between tourism and other sectors; second, it reveals the impacts of tourism activity on other economic sectors; third, it is a *neutral* methodology and does not imply previous considerations concerning the sector; and, finally, this methodology reveals all the effects, including direct, indirect and induced effects.

Miller and Blair (2009), in their seminal book explain the limitations of the IO methodology which are based around several assumptions. First, the model supposes that the technical coefficients are fixed such that there are no economies of scale or externalities. In addition, it also assumes that the trade relationships between sectors, the economy and the rest of the world are stable. Secondly, resources are assumed to be infinite and able to cover all output requirements. Finally, regarding the job market, the method assumes that there is unemployment and, that, when the economy needs a labour force it is easy to find it.

In recent years, this methodology has received various criticisms, and some authors prefer to apply Social Accounting matrix (SAM) models as an evolution of the IO model (Jones, 2010; Polo & Valle, 2008 and Polo et al., 2008), or the Computable General Equilibrium models (CGE) to analyse the economic impact of tourism. Authors, including Blake (2009), Dwyer et al. (2004) and Pratt (2011), assert that IO Methodology is not flexible enough to consider problems involving prices and the assumption of full factor availability, linearity in consumption and production functions and the difficulty with its application to long-term analysis, because the tables are prepared for a fixed point in time. However, CGE models also display serious limitations. These include the addition of a series of additional simplifying assumptions and the fact that they require significantly more information. This often leads to work with very low levels of sectoral disaggregation. Despite these flaws, according to Mules (2005), the application of Input – Output or CGE models leads to similar results.

Recently, the appearance of Tourism Satellite Accounts (Diakomihalis & Lagos, 2011; Fretchling, 2010 and Madsen & Zhang, 2010), following UN recommendations, has improved the level of information which can be extracted and applied through an IO methodology.

In this chapter, we apply a specific IO technique, the subsystem methodology, to study the sectoral interrelations of tourism activities. Subsystem analysis provides a highly detailed level of disaggregation on the linkages between branches within the subsystem, outward connections from the subsystem branches to the rest of the economy. Following Alcántara and Padilla (2009), we will apply a recent development in this methodology to the tourism sector, with the aim of estimating the empirical impacts of the tourism on other sectors within the economy, and within the tourism sector itself. Similar and recent studies applying subsystems methodology, related to tourism but centred around cultural issues, such as Llop and Arauzo-Carod (2012) and others, apply similar methodologies to different activities. For example, Saari et al. (2013) look at agriculture or Butnar and Llop (2010) consider healthcare institutions.

The application of this methodology allows us to decompose activity caused by an increase in the final demand of the tourism sector into the activity produced within the tourism sector, the so-called internal component, as well as the spill over component referring to the activity produced in external sectors.

Applying this methodology to tourism has the added benefit of providing more information about the structure of that sector, which as mentioned above, is critical for the Catalonian economy. Baró and Villafaña (2005) and Baró (2010), analyse the Catalonian tourism sector as a whole and does not consider the relationships between the different subsectors. Overall, the application of the subsystems methodology has various advantages, it can provide a better understanding of the structure of the tourism sector in Catalonia while also enabling us to observe the relationships between the various subsectors that make up the tourism system.

This methodology gives the chance to estimate the impact that the tourist system has on other sectors. A wealth of existing literature, which includes Balaguer and Cantavella-Jorda (2002); Dritsakis (2004); Durbarry (2004); Figini and Vici (2010), Pablo-Romero and Molina (2013); Sinclair (1998), among others, study how tourist activity helps economic development through the connections which exist between tourism and other key economic sectors. This literature has extended the literature on the TLEG, which was discussed previously.

As stated in Bastos and Rejowski (2015) more research in methodologies is needed in our research field and this is an attempt to increase our knowledge and to have more tools to research in tourism and hospitality.

One of the main problems which arises during research into tourism is how to precisely define the tourism sector and we discuss this question in following sections. Having established a definition, we ask what the optimal way is to use our categorization to adjust the information taken from the Input-Output tables to discover the underlying configuration of the tourism sector. We can then adjust the information obtained by the

Input-output tables and make accurate calculations of the rate activity related to tourism. One clear example of this is the activity generated by tourism within the transport sector. The required data is contained within the Input-Output tables, but it is very difficult to distinguish which activity is driven by changes in the tourism market, and not. This investigation is a first attempt to estimate the significance of the tourism subsector and its relevance within the overall of the national economy using this methodology.

The structure of the article is as follows. Section 2 presents the methodology employed by the analysis. Section 3 presents the results and finally, section 4 presents the conclusions.

5.2 Methodology

To start with we will discuss our work on a key topic when investigating tourism which is the definition of the activities which belong to the tourism sector. To form a coherent definition, we will discuss several previously conducted studies, which focus on defining tourism. Tyrrel and Johnston (2006) report that tourism and other related elements have been defined in different ways and that the criteria applied may affect the results and conclusions of research into the tourism sector. We will highlight a few proposals from the existing literature alongside our own regarding the industries which we consider as belonging to the tourism sector.

Fletcher (1989), who studies the impacts of tourism in Spain using the IO methodology, defines five sub-sectors as belonging to the tourism sector: Hotels, catering, entertainment[21], transport and other industrial sectors. In another study, Fletcher and Horváth (1999) identify key sectors as road, urban and suburban transports, the retail sector, with the exception of catering activities, car rental, accommodation and other entertainment services. These projects chose these sectors intuitively and none of them used clear logical or economic criteria to define the tourism sector.

Finally, in 2001 the UN Statistics Division, with the Eurostat, the OCDE and the WTO proposed the Tourism Satellite Account (TSA), giving rise to a list of the activities which can be considered to belong to the tourism sector and a guideline to define the tourism sector for researchers.

The TSA includes 18 subsectors[22]. From these, the sector labeled “Other services”, includes financial and insurance services, in addition to other rental services, and it is very difficult to identify which of these activities is strictly confined within the tourism sector. To do so, additional and more detailed statistics are required, which are not currently available. Finally, the TSA defines 12 tourism characteristic subsectors[23].

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[21] Cinema; Theaters; Museums and galleries; Sports; Bullfights; Radio and TV channels and others.

[22] We can find the complete list on: fehttp://www.ine.es/metodologia/t35/metosateln.pdf , p.18, March, 20th 2023.

23 Accommodation; Second home ownership (imputed); Food and beverage; Passenger transport services by rail; Passenger transport services by road; Maritime transport services of passengers; Air transport services of passengers; Additional services for the carriage of passengers; Vacation goods passenger; Travel agencies and similar; Cultural services; Services of sports and other recreational activities

In this chapter, we considered two options. The first is to follow the list outlined by the Spanish TSA, as defined by the Institute of Tourism Studies (INE, 2004), adapted to the input–output tables for Catalonia. These activities (Accommodation services, food and beverages services, passenger transport services, travel agencies and tourism guide services, cultural services, sports and other entertainment services, and other services) have also been proposed by the UNWTO. The second potential option is to consider only the core tourism sub-sectors (Accommodation, food and beverage, travel agencies, entertainment and leisure services). We opted for the second option as a tourism subsystem[24]. The main reason is that we have strong doubts about our ability to accurately estimate our model if we include transport activities as a subsector of the tourism system. Transport services include important activities not related to tourism such as freight transport or dairy passenger transport, and there is no precise way to separate these different activities, given the available data.

As we stated in the introduction, the aim of this paper is to discover the real impacts of the tourism sector through an IO analysis of the tourism subsystem. The first researcher to use the subsystem method was Sraffa (1960) and subsequently Harcourt and Massaro (1964), Pasinetti (1980, 1986, and 1988), Sinisalco (1982), Deprez (1990) and Heimler (1991). Alcántara (1995) adapted it to the analysis of different atmospheric emissions for Spain, and Alcántara and Padilla (2009) developed this methodology in order to analyse the CO_2 emissions of the services subsystem in Spain. To do so, the

[24] When we obtained the first results through the option 1, including transports, these results were very inconsistent, showing that the inclusion of the transports in the subsystem generates some inconsistent results. We have some data constraints and to try to differentiate the transports related to tourism to the transports related to other activities could give us some insurmountable methodological problems.

authors developed the IO methodology to find matrix equations which allowed them to decompose the CO_2 emissions generated to satisfy demand in the services sector into different components. In so determining the importance of each inter-sector connection and simultaneously the importance of links between each subsystem and external sectors. We will not analyse emissions but will use their development of the IO methodology to examine tourism activity and discern which sectors are more affected by fluctuations in tourism demand. Readers not familiar with the IO methodology can obtain a solid understanding from the book by Miller and Blair (2009). There exists a great amount of literature on how this methodology can be effectively applied to tourism, for example, Briassoulis (1991), explains the fundamentals of using the IO methodology within tourism.

As stated by Alcantara and Padilla (2009, p.906): "In the framework of input–output analysis, the study of a particular sector, or a group of sectors, without delinking it from the rest of the system, might be made by treating this sector or sectors as a subsystem generating a single final output, the output of the sector or sectors." A leading advantage of this methodology is the ability to extract information on linkages between subsectors and from each subsector to other areas of the national economy (Alcántara & Padilla, 2009; Alcántara et al., 2013; Navarro & Alcántara, 2010). This provides sufficient support for using this methodology and we think that it is a good method of estimating the importance tourism isolated from the wider economy. It is common to run into problems when defining the tourism sector and its importance in comparison with other economic sectors, this methodology allows us to analyse the importance of sub-sectors in isolation and across time.

This research tries to answer some questions about the tourism sector and to develop new research methodologies in order to increase the knowledge of tourism.

Our research questions are:

- We can use Input-Output subsystems as a methodology to study the tourism activity?
- Is the tourism sector correctly explained by the relation between the tourism subsectors?
- Is the economic importance of this sector coming from the relation between the subsectors?
- Has the tourism sector significant relations with the other economic sectors?

To answer these questions, we present the methodology and our results.

First, we define the variables, parameters and vectors used:

A= Matrix (n×n) of technical coefficients of the Leontief model. The economic system is composed of n sectors that belong to set N.

N= (1,2,…, m,…, n), where 1, 2,…, m are the m subsectors not belonging to the tourism sector and m+1,…, n are the t subsectors of the tourism sector (t=n−m).

I= Identity matrix

$\mathbf{B}=(\mathbf{I}-\mathbf{A})^{-1}$ Leontief inverse matrix.

$\mathbf{x^R}$= column vector (m×1) which denotes the production of the m subsectors which do not belong to the tourism sector.

$\mathbf{x^T}$= column vector (t×1) which denotes the production of the t subsectors which belong to the tourism sector.

$\mathbf{y^R}$= column vector (m×1) which denotes the final demand of the m subsectors which do not belong to the tourism sector.

$\mathbf{y^T}$= column vector (t×1) which denotes the final demand of the t subsectors that belong to the tourism sector.

Production and final demand can be then expressed as:

$\mathbf{x} = \begin{pmatrix} \mathbf{x^T} \\ \mathbf{x^R} \end{pmatrix}$ is the production vector(nxl)

$\mathbf{y} = \begin{pmatrix} \mathbf{y^T} \\ \mathbf{y^R} \end{pmatrix}$ is the demand vector (nxl)

We can present the tourism subsystem model in its different components. We adapt the Leontieff matrix:

$$\begin{pmatrix} \mathbf{A_{TT}} & \mathbf{A_{TR}} \\ \mathbf{A_{RT}} & \mathbf{A_{RR}} \end{pmatrix} \begin{pmatrix} \mathbf{x^T} \\ \mathbf{x^R} \end{pmatrix} + \begin{pmatrix} \mathbf{y^T} \\ \mathbf{y^R} \end{pmatrix} = \begin{pmatrix} \mathbf{x^T} \\ \mathbf{x^R} \end{pmatrix} \tag{1}$$

Where the first element is the matrix A; separated according to the relationship of its coefficients with the tourist and the other sectors.

We operate with this model until we obtain the next expression:

$$\left[\begin{pmatrix} \mathbf{A^D_{TT}} & \mathbf{0} \\ \mathbf{0} & \mathbf{A^D_{RR}} \end{pmatrix} + \begin{pmatrix} \mathbf{A^O_{TT}} & \mathbf{A^O_{TR}} \\ \mathbf{A^O_{RT}} & \mathbf{A^O_{RR}} \end{pmatrix}\right] \begin{pmatrix} \mathbf{B_{TT}} & \mathbf{B_{TR}} \\ \mathbf{B_{RT}} & \mathbf{B_{RR}} \end{pmatrix} \begin{pmatrix} \mathbf{y^T} \\ 0 \end{pmatrix} + \begin{pmatrix} \mathbf{y^T} \\ 0 \end{pmatrix} = \begin{pmatrix} \mathbf{x^T_T} \\ \mathbf{x^R_T} \end{pmatrix} \tag{2}$$

We then obtain:

$$\mathrm{A^D_{TT}} \mathrm{B_{TT}} \mathrm{y^T} + \mathrm{A^O_{TR}} \mathrm{B_{RT}} \mathrm{y^T} + \mathrm{A^O_{TT}} \mathrm{B_{TT}} \mathrm{y^T} + \mathbf{y^T} = \mathbf{x^T_T} \tag{3}$$

$$\mathrm{A^D_{RR}} \mathrm{B_{RT}} \mathrm{y^T} + \mathrm{A^O_{RR}} \mathrm{B_{RT}} \mathrm{y^T} + \mathrm{A^O_{RT}} \mathrm{B_{TT}} \mathrm{y^T} + 0 = \mathbf{x^R_T} \tag{4}$$

Expression (3) gives us the vector of tourism production for the tourism subsystem, that is, the tourism production needed to satisfy the final demand of tourism subsystem, and so gives us the internal effects of tourism. The second expression, (4), gives us the production necessary in all additional sectors to cover the tourism sector demand, and so indicates the external effects of an increase in demand in the tourism sector.

The impact of each of the tourism subsectors on other service branches, as regards to their structural relationships with non-tourism sectors, is determined by diagonalizing $\mathbf{y}^{\mathbf{T}}$

Where:

$\mathrm{A}^{\mathrm{D}}_{\mathrm{TT}}\mathrm{B}_{\mathrm{TT}}\hat{\mathbf{y}}^{\mathbf{T}}$ indicates the quantity of own inputs that each tourism sub-sector purchases in order to obtain its own final demand, aka the internal own component.

$\mathrm{A}^{\mathrm{O}}_{\mathrm{TR}}\mathrm{B}_{\mathrm{RT}}\hat{\mathbf{y}}^{\mathbf{T}}$ indicates the input production that tourism produces for the non-tourism sectors, so that these obtain the output that the tourism sector demands to them aka the feed-back component.

$\mathrm{A}^{\mathrm{O}}_{\mathrm{TT}}\mathrm{B}_{\mathrm{TT}}\hat{\mathbf{y}}^{\mathbf{T}}$ indicates the production required by tourism subsectors from other subsectors of the tourism subsystem aka the internal spill over component.

Some examples:

Internal-own component: A travel agency places an order for rooms at an accommodation company to create tourist packages. In that case the travel agency demands inputs (rooms) to create its outputs (trips).

Feed-back component: A travel agency sells trips to an architecture business, to draw the plans for a hotel.

Internal spill-over component: A hotel asks an events company to organize a special event. In that case, the hotel does not need inputs from the events business, the hotel wants an output created by an events company.

And $\mathbf{\hat{y}^T}$ is the demand volume component, which indicates the final demand of the sectors that belong to the tourism sector.

And the different parts of the component of the second equation (spill over component), which show the spill over on the rest of the economy, are:

$\mathrm{A}_{\mathrm{RR}}^{\mathrm{D}}\mathrm{B}_{\mathrm{RT}}\mathbf{\hat{y}^T}$ captures the demand of within sector inputs for a non-tourism sector, due to demand from the tourism sector.

$\mathrm{A}_{\mathrm{RR}}^{\mathrm{o}}\mathrm{B}_{\mathrm{RT}}\mathbf{\hat{y}^T}$ captures the input quantities of non-tourism sectors purchased by the other non-tourism sectors, to cover demand from the tourism sector.

$\mathrm{A}_{\mathrm{RT}}^{\mathrm{O}}\mathrm{B}_{\mathrm{TT}}\mathbf{\hat{y}^T}$ indicates the input production of the non-tourism sector allocated to the tourism sector.

Those vectors give us the strength of the connections between the tourism subsystem and the rest of the economy and for the connections between the economic branches which constitute the tourism subsystem. Thus, it allows for a better understanding of the subsystem itself, and the size of shocks to any given branch on the subsystem itself and on the rest of the economy.

The following are some specific examples:

Case 1. A hotel needs inputs from the textile industry, and the textile industry orders ink from the chemical industry.

Case 2. A restaurant needs food and asks a farmer to cover the inputs, the farmer in turn asks a transport service to deliver the product.

Case 3. An event business orders flowers from a florist industry to be used for decoration.

We decided to analyze the internal tourism subsystem, as specified in equation 3, because the interest of this paper is to demonstrate the existence of a tourism subsystem in itself. In the next section we will present our research on the Catalonia case study.

5.3 Results

This paper has one main objective: to estimate the size of the internal sector effects for tourism and external effects on other sectors of the economy derived from fluctuations in the demand and supply of products in the tourism sector. In Table 1 we present the different subsectors and the weight of their influence on other subsectors of the tourism sector and over the other non-tourism sectors (Feed-Back).

Table 5.1 Internal Own, Internal Spill over and Feed-back values

Component	Internal Own		Feed-Back		Internal Spill over	
Year / Subsector	2001	2011	2001	2011	2001	2011
ACCOMMODATION	6,60%	17,80%	6,30%	11,40%	87,10%	70,80%
FOOD AND BEVERAGE	27,30%	58,20%	12,10%	11,20%	60,60%	30,60%
TRAVEL AGENCIES	73,20%	77,20%	10,50%	0,70%	16,40%	22,10%
ENTERTAINMENT[1]	71,10%	85,50%	11,80%	7,10%	17,10%	7,40%

Source: Compiled by author

Table 5.2 Destinations. Basic. Million euros

	ACCOMODATION		FOOD AND BEVERAGE		TRAVEL AGENCIES		ENTERTAINMENT	
	2001	2011	2001	2011	2001	2011	2001	2011
ACCOMODATION	13,1	45,2	1,1	6,5	275,9	185,8	44,2	42
FOOD AND BEVERAGE	2,4	33,7	25,2	240,5	51,5	165,8	12,7	36
TRAVEL AGENCIES	12,5	34,5	-	0,9	180,7	122,8	8,7	10
ENTERTAINMENT	25,9	22	21	1	1.8	0	448,9	928

Source: Compiled by author

[1] Note that the Entertainment sub-sector has been divided in two different subsectors in the 2011 Input-Output table, being impossible to operate with the different subsectors, we preferred to continue with just the Entertainment sub-sector to maintain the comparison between the different input-output tables.

During the first calculation process we see that the main impacts come from the demand side ($\hat{\mathbf{y}}^{\mathbf{T}}$), with a minimum of a 90% of the origin of the activity. Those results show that demand within a sub-sector is mainly driven from within that subsector.

But the most significant results come from the analysis of other impact components, the internal own component; feed-back component; and internal spill over component.

The economic activities explained by those effects are of little importance, but the research into the tourism subsystem structure provides some interesting results.

1. The main effects over the accommodation subsector come from the internal spill over component in two of the Input-Output tables (2001 and 2011)[25]. The accommodation subsector uses other subsectors as a supplier for its activities, for example the entertainment or food and beverage industries. Accommodation has some restrictions in its capacity to meet demand and, sometimes, needs to trade with other subsectors in order to offer a complete product. For example, when a hotel hosts a large congress, the kitchen services need external helps from other companies.
2. Food and beverages, travel agencies and entertainment obtain the most significant results for the internal own component, except for one observation (Food

[25] The 2005 Input-Output Catalan table is an update from the 2001 input-output table, and it can give some results differing from the other years (2001-2011).

and Beverage year 2001). These results are intuitive since they simply confirm traditional working patterns for these sub-sectors. For example, retail travel agencies purchase inputs from wholesale travel agencies or entertainment service providers contract other entertainment companies.

3. The Feed-Back component shows little significance. The tourism subsectors are not often used as inputs by non-tourism subsectors, but we can provide some preliminary results. Over recent years the number of events such as congresses or business fairs organised by non-tourism subsectors has increased globally[26]. This leads to a considerable increase in input demand for the accommodation and food and beverage subsectors. In the case of Barcelona, the number of large meeting events increased from 373 in 1990 to 2134 in 2017 (Barcelona council, 2017), some of these events are organized by businesses not related to tourism, for instance the incentives or courses, much of them organized by the companies by its own or by the sector related to the event. The medical sector is one of the most active, to the point where the medical association of Barcelona has its own events manager[27] as part of one medical educational foundation. On the contrary, travel agencies have seen a reduction in demand as a result of the boom in e-commerce and the popularity of buying flights online. Over the last few years, the increasing presence of the internet in our lives has made the purchase of these types of products (accommodation, flights, rentals, tourist guides etc.) very

[26] In 2014 the UNWTO presented a document which reflected the growing importance of the Events subsector.

[27] Acadèmia de Ciències Mèdiques i de la Salut de Catalunya i les Balears.

accessible and simple (Xiang et al., 2015). This has ultimately led to a large reduction in the size of the travel agency market.

Another important issue to consider is the importance of the outsourcing. Research conducted by Espino-Rodriguez and Padron-Robaina (2004), Hjalager (2006) and Lamminmaki (2011) among others presented some general facts about the accommodation sector. Most accommodation companies had started a process of outsourcing some services within their hotel and accommodation business. The main reason was to reduce costs. For example, some services such as laundry or cleaning services have been outsourced to external companies. These however are not the only services to be outsourced as we also find evidence of similar practices in food and beverages and entertainment. This represents a change for these subsectors as activities which were traditionally performed in-house, are now performed by other subsectors within tourism. This may explain some of the changes during the period analysed.

It is true, according to Kirschner (2015), that accommodation and entertainment services are not sectors which report a high percentage of outsourcing in the EU-28, just 19% and 18% of their production respectively. This is significantly less than other sectors, such as construction (38%) (Kirschner, 2015). The Internal Own Component shows increasing values over the years studied, which means that the different subsectors increase the use of inputs from other subsectors to create their final output. This provides additional supporting evidence for the increasing importance of outsourcing in the tourism sector.

The other hypothesis of the paper is about the structure of the tourism subsystem itself. We are interested in showing that a set of different subsectors, all offering a service related to tourism, constitute a sub-system. Table 3 provides the values from the Input-Output tables and it is clear that the majority of links between different subsectors strengthened over the last ten years.

As highlighted previously, the largest fraction of activity comes from the demand side of the market however the use of other sub-sectors as input suppliers, is also worth mentioning. For example, under the internal own component results, three of the subsectors (food and beverages, travel agencies and entertainment) report the highest values when the different tourism subsectors sell inputs to the other tourism subsectors. In addition, when we consult the final column, the internal spill-over component, we see high levels of output generated by the tourism subsectors for the other tourism subsectors. The links between the subsectors are strong and demonstrate that the tourism subsectors are cooperating between themselves and beyond the travel agency subsector.

5.4 Implications and Future research

This chapter looks to provide new tools to improve research into the economic impacts of tourism. There is a well-established literature about the impact of tourism and how to apply the Input-Output methodology. Despite this, the use of this methodology to study the impacts of tourism specifically is relatively underdeveloped and this paper contributes by offering a valid methodology to estimate the real impact of the tourism activity, beyond simply providing descriptive evidence or estimating multipliers. Then IO subsectors is an interesting methodology to increase the knowledge in our field.

Second, we defined the tourism sector around four sub-sectors. Namely, accommodation, food and beverages, travel agencies and entertainment activities. Future research should include the transport sector in this subsystem. However, in order to do so, we need additional literature and tools, which give us an indication about how to separate tourism from non-tourism transport activity.

Third, we have shown that the tourism sector is made up of different subsectors which each have strong links between them. The subsystem methodology provides accurate and relevant information about the cooperation between these subsectors. Tourism subsectors are regular suppliers for other tourism subsectors. The results demonstrate that there does exist a sub-system within the tourism sector and that considerable economic activity flows across this subsystem. If the transport sector can be effectively included into this subsystem, then this work will be advanced even further due to the obvious relevance of transport for tourists. Then our research questions 2 and 3 are well explained by the use of the IO subsystem methodology, we obtained that tourism is defined by 4 sectors and the economic importance lays in the relation between them.

The last research question, is the relations with the other sectors significant? This question requires a deeper analysis, we saw that it has economic importance, but not so big than the relation between the economic subsectors. As we said, we focused in the intra relations and we will continue the research increasing the calculations to the rest of the economic sectors.

As we stated in previous sections, Alcantara and Padilla (2009), developed this research to know the CO2 emissions, maybe this methodology could be used to know the environment impact of tourism and hospitality sector and to obtain ways to reduce the environment impact of our sector.

CHAPTER 6. EMPIRICAL FINDINGS AND THEIR IMPLICATIONS.

6.1. Empirical Findings

Economics of tourism is still a research area with some gaps or with little knowledge in some specific questions. At the same time, it is difficult that some of the practical applications of the research carried out in this area become real policies.

For that reason, we should continue, as researchers in tourism, looking for new insights and applying new methodological techniques. These new findings could help policy makers and company managers to develop new and more effective strategies to reduce seasonality and mitigate the problems associated to it, and to take advantage of the findings about the interrelations between tourism subsectors and their effects on the rest of the economic sectors.

During last years, plenty of research in seasonality was carried out. In particular, Turrión-Prats and Duro have conducted some interesting works and applying new methodologies in studies about Catalonia, Spain or Worldwide, or Martin-Martin or Perles-Ribes are researchers with recent works in this area. But seasonality is still an important problem in tourist destinations, and the findings of this thesis showed that some of the strategies applied are not very successful to reduce seasonality.

In Chapter 3, some interesting results are presented about the evolution of seasonality in recent years focusing on some specific EU countries, basically the most important ones in the tourism industry. This research findings indicate that is possible to group certain countries, because they have a similar evolution of seasonality, and they share some similar tourist products. This could give some indications that policies should be different for different groups of countries.

Another interesting observation is that tourist arrivals had grown along the period analysed but, in recent years, from the years of the financial crisis, seasonality had a worst evolution in comparison to the previous years. Some policies, as Calypso, promote the tourist demand in periods different from summer, and some strategies boost new tourist products to attract demand in low-demand periods. Nevertheless, one ur conclusions is that, even developing new activities in different periods of the year, the institutional factors, such as family holidays, continue to have a heavy weight in the evolution of seasonality.

In addition, summer products, especially around the Mediterranean but not only in this area, as we have seen that some areas in the north of Europe suffer similar problems, attract a high number of tourist demand, and they are growing in the last years. The activities around Sun, Sand and Sea lead to a worst seasonality, and unfortunately growing demand from other areas of the world are highly concentrated on this type of product, for instance on cruises in the Mediterranean. This area is plenty of attractive products, and the development of them conducts to increasing tourist arrivals concentrated in the summer. As a result, launching new products have not led to reduce seasonality.

The chapter studying the problem at regional level in Europe (Chapter 3) give us the chance to analyse destinations by type of offer too. About the seasonality evolution, it is interesting to realized that some alternative products and areas, developed as alternative to matures destinations around the Mediterranean, suffer a worst evolution in seasonality.

Another observation to highlight is the importance of the Mediterranean area as explanation of the overall evolution of seasonality in Europe. The decomposition exercise showed that regions and activities around Mediterranean conducted to an increasing seasonality.

Policy makers should take into account the significant differences amongst every single region, the products developed and the effects over seasonality. The knowledge about these questions could lead to new and applied policies, with higher probability of success.

Unfortunately, it seems that EUROSTAT is no longer offering monthly data of arrivals per region, and it will be more difficult to continue with this type of analysis, although data can be taken from each national statistics organism.

In chapter 4, the focus is on economic determinants of tourism seasonality. We divide our research in two parts, the first one continuous with the methodology applied by Rosselló et al (2004) and Duro and Turrión-Prats (2019). Our findings suggest that at European Union level, some economic determinants are different than those suggested in previous research. The gross domestic product is highly significant to understand the evolution of seasonality, which consistent to previous research. But we found that the exchange rate is significant as well, indicating that an evolution of this variable could lead to changes in seasonality. This value has different sign to other findings, but the global effects over seasonality are little. Finally, a new variable is introduced, to be part of Mediterranean area or not. Findings suggest that to be part of this area has huge effects over seasonality, showing that areas with mature destinations and focused on summer products suffer increasing seasonality when the GDP and exchange rates has a positive evolution.

One interesting implication of these results is that it is possible to use them the evolution of the GDP and the exchange rates to estimate future seasonality, and managers could use this information to prepare the regions and companies to receive more or less tourists and to be capable to reduce the negative effects of seasonality.

In the second part of chapter 4, the aim is to study the effects of new economic determinants. First, to analyse whether unemployment and inequality influences the evolution of seasonality beyond their relationship with the GDP. We demonstrate that unemployment and inequality could explain at some extent the evolution of seasonality in the Mediterranean countries, the most tourism-dependent countries in EU.

Chapter 5 is related to the economic relations inside the tourism subsectors and between the other economic sectors. First, we want to highlight a new application on the Input-Output methodology to understand the impacts and evolution of tourism activity in a particular area. Only few previous studies are found applying this methodology, such as Llop and Arauzo-Carod (2012), but not for a whole economy.

The findings in this chapter suggest that there is a strong economic relation between the different tourism subsectors, showing the great importance of the tourism sector in the Catalan economic structure. In addition, we estimate a significant effect over other sectors not related to tourism, showing important indirect and induced effects of tourism in the Catalan economy.

6.2 Future research

As every doctoral dissertation, findings in the different chapters can be only the beginning of new research, applying the same or refined methodology or developing new methodologies to provide new information to business managers or policy makers.

In that sense, description chapters should be continued, applying the methodology proposed in a wider period. As suggested by Turrión-Prats (2018), it is necessary to get more detailed research, even in geographical area even in tourism product developed. The knowledge got from little areas level could give us some indications about the hidden reasons, or the type of products that can explain seasonality's evolution.

It is necessary to get deeper knowledge about tourism demand, and tourist attitudes in front of some institutional reasons, as family holidays, or the effect of new products over demand. We should increase the data to analyse this kind of qualitative questions.

A combination of quantitative and qualitative research could lead to reduce a problem, that basically have social reasons. For instance, research about the effects on seasonality of the different holiday's periods in France.

Another future action is to refine the methodologies applied to the study of economic determinants of seasonality. As we mentioned before, it is important to get new insights about the economic reasons behind that phenomenon to improve the forecast of the evolution of seasonality. If we can improve those methodologies, we can help tourism planners to prevent some negative effects of the seasonality. In that sense, the research of the effects of the level of unemployment or the economic inequality could lead to a new way of understanding its economic determinants.

But it is clear that policy planners should act over institutional factors, promote new policies to break holidays or to plan holidays in different periods, as Batchelor (2000), Flitzpatick (1993) or Turrión-Prats (2018), suggest in their works. To create new products or to increase demand in low-season have failed to solve seasonality problems until now. New research in that line is needed.

Finally, the subsystems methodology can be used to develop more fruitful investigations on the specificities and effects of seasonality. For instance, including other tourism activities defined by the Tourism Satellite Account as tourism subsectors, or looking for new methodologies to find the real tourism activity inside these subsectors. An alternative is to continue with the methodology used in the work by Alcantara and

Padilla (2009), and estimate the effects of tourism on the environment throughout the gas emissions from the tourism sector.

7. REFERENCES

Ahlert, G. (2008). Estimating the economic impact of an increase in inbound tourism on the German economy using TSA results. *Journal of Travel Research*, 47(2), 225-234. https://doi.org/10.1177/0047287508321197.

Alam, M. S., & Paramati, S. R. (2016). The impact of tourism on income inequality in developing economies: does Kuznets curve hypothesis exist? *Annals of tourism research*, 61, 111-126 https://doi.org/10.1016/j.annals.2016.09.008.

Alcántara, V. (1995). *Economía y contaminación atmosférica: hacia un nuevo enfoque desde el anàlisis input-output. Doctoral Thesis.* . Universitat de Barcelona.

Alcántara, V., & Padilla, E. (2009). Input-output subsystems and pollution: An application to the service sector and CO2 emissions in Spain. *Ecological Economics*, 68, 903-914. https://doi.org/10.1016/j.ecolecon.2008.07.010.

Alcántara, V., Padilla, E., & Piaggio, M. (n.d.). Nitrogen oxide emissions and productive structure in Spain: An input–output perspective. *Journal of cleaner production*, 141, 420-428. https://doi.org/10.1016/j.jclepro.2016.09.088.

Alegre, J., Mateo, S., & Pou, L. (2013). Tourism participation and expenditure by Spanish households: The effects of the economic crisis and unemployment. *Tourism Management,*, 39, 37-49 https://doi.org/10.1016/j.tourman.2013.04.002.

Alegre, J., Pou, L., & Sard, M. (2019). High unemployment and tourism participation. *Current Issues in Tourism*, 22(10), 1138-1149 https://doi.org/10.1080/13683500.2018.1464550.

Allcock. (1989). Seasonality. In L. Moutinho, & S. Witt, *Tourism Marketing and Management Handbook.* (pp. 387-392). Cambridge: Prentice Hall.

Allcock, J. (1994). Seasonality. In a. L. S. F. Witt, *Tourism Marketing* (pp. 86-92). New York: Prentice Hall.

Alvarado García, E. (2014). *Ciclos económicos del Perú 1980-2013: un análisis con modelos econométricos lineales y no lineales.* Doctoral Thesis.

Antonakakis, N., Dragouni, M., & Filis, G. (2015). How strong is the linkage between tourism and economic growth in Europe? *Economic Modelling*, 44, 142-155 https://doi.org/10.1016/j.econmod.2014.10.018.

Antonakakis, N., Dragouni, M., Eeckels, B., & Filis, G. (2019). The tourism and economic growth enigma: Examining an ambiguous relationship through multiple prisms. *Journal of Travel Research*, 58(1), 3-24 https://doi.org/10.1177/0047287517744671.

Apergis, N., & Payne, J. E. (2012). Tourism and growth in the Caribbean–evidence from a panel error correction model. *Tourism Economics*, 18(2), 449-456 https://doi.org/10.5367/te.2012.0119.

Archer, B. (1977). *Tourism Multipliers: The State of the Art.* Bangor: University of Wales Press.

Archer, B. (1995). Importance of tourism in the economy of Bermuda. *Annals of Tourism research* , Volume 22(4), 918-930. https://doi.org/10.1016/0160-7383(95)00018-1.

Archer, B.H., & Fletcher, J. (1990). Tourism: its economic importance. In M. Quest, *Horwath Book of Tourism* (pp. 10-25). London and Basingstoke: MacMillan.

Archer, B.H., & Fletcher, J. (1996). The Economic Impact of Tourism in the Seychelles. *Annals of Tourism Research*, 23(1), 32-47. https://doi.org/10.1016/0160-7383(95)00041-0.

Archer, B.H., & Shea, S. (1977). *Manpower in tourism: the situation of Wales.* Bangor: University College of North Wales. Institute of Economic Research, Wales Tourist Board.

Assaker, G., Vinzi, V. E., & O'Connor, P. (2010). Structural equation modeling in tourism demand forecasting: A critical review. *Journal of Travel and Tourism Research (Online), 1.*, https://site.adu.edu.tr/jttr/files/JTTR-2010_1_.pdf.

Aznar, J. P., Sayeras, J. M., & Vives, J. (2019). Seasonality, Infrastructures and Economic Growth in Touristic Islands. *European Accounting and Management Review*, 5(2), 1-11 https://ssrn.com/abstract=3481188.

Balaguer, J., & Cantavella-Jorda, M. (2002). Tourism as a long-run economic growth factor: the Spanish case. *Applied economics*, 34(7), 877-884. https://doi.org/10.1080/00036840110058923.

Barcelona Council. (2017). *Tourism activity report.* https://professional.barcelonaturisme.com/storage/medias/files/UFXcJf3qFeMsVf526b9PE0G80pxpF4KIBadit2Kt.pdf 7/11/2022: Turisme de Barcelona.

Baró, E. (2010). *Estimació de l'impacte total de la despesa turística corrent a Catalunya en el conjunt de l'economia i en els seus principals sectors d'activitat. Aplicació d'una metodologia input-output.* Observatori del turisme de Catalunya.

Baró, E., & Villafaña, C. (2005). *L'impacte econòmic del turisme receptor sobre l'economia catalana i sectorialització per branques d'activitat: aplicació d'una metodologia input-output.* Observatori del turisme de Catalunya.

BarOn, R. R. (1972). Seasonality in tourism – part I. *International Tourism Quarterly*, Vol 4, 40-64.

BarOn, R. R. (1973). Seasonality in tourism – part II. *International Tourism Quarterly*, Vol. 1, 51-67.

BarOn, R. R. (1975). Seasonality in tourism: A guide to the analysis of seasonality and trends for policy making. *Economist Intelligence Unit.*

Bastos, S. & Rejowski, M. (2015). Scientific research in hospitality studies in Brazil: challenges to finding a theoretical framework. *Research in Hospitality Management*, 5(1), 45-55. https://doi.org/10.1080/22243534.2015.11828327.

Batchelor, R. (2000). The School Year and Tourism-Lessons frrom Abroad. *Insights-Tourism Intelligence Papers*, 12, 173-181.

Baum, T. & Lundtorp, S. eds. (2001). *Seasonality in Tourism.* Oxford: Pergamon.

Baum, T. (1999). Seasonality in tourism: understanding the challenges. *Tourism Economics – The Business and Finance of Tourism and Recreation*, 5(1), 5–8. https://10.1177/135481669900500101.

Baum, T. (1999). Seasonality in tourism: Understanding the challenges: Introduction. *Tourism Economics*, 5.1 (5-8) https://doi.org/10.1177/135481669900500101.

Baum, T., & Hagen, L. (1999). Responses to seasonality: the experiences of peripheral destinations. *Journal of Tourism Research*, 1(4), 299–312 https://doi.org/10.1002/(SICI)1522-1970(199909/10)1:5%3C299::AID-JTR198%3E3.0.CO;2-L.

Bender, O., Schumacher, K. P., & Stein, D. (2005). Measuring Seasonality in Central Europe's Tourism–how and for what?. In 10th International Conference on Information & Communication Technologies (ICT). *Urban Planning and Spatial Development*.

Blake, A. (2009). The dynamics of tourism's economic impact. *Tourism economics*, 15(3), 615-628. https://doi.org/10.5367%2F000000009789036576.

Blake, A., & Sinclair, M. T. (2003). Tourism crisis management: US response to September 11. *Annals of tourism research*, 30(4), 813-832 https://doi.org/10.1016/S0160-7383(03)00056-2.

Blake, A., Arbache, J. S., Sinclair, M. T., & Teles, V. (2008). Tourism and poverty relief. *Annals of Tourism Research*, 35(1), 107-126 https://doi.org/10.1016/j.annals.2007.06.013.

Blundell, R & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics,*, 87: 115–43 https://doi.org/10.1016/S0304-4076(98)00009-8.

Blundell, R., & Etheridge, B. (2010). Consumption, income and earnings inequality in Britain. *Review of Economic Dynamics*, 13(1), 76-102 https://doi.org/10.1016/j.red.2009.10.004.

Bojanic, D. C., & Lo, M. (2016). A comparison of the moderating effect of tourism reliance on the economic development for islands and other countries. *Tourism Management*, 53, 207-214 https://doi.org/10.1016/j.tourman.2015.10.006.

Briassoulis, H. (1991). Methodological Issues: Tourism Input-Output Analysis. . *Annals of Tourism Research*, 18, 485-495. https://doi.org/10.1016/0160-7383(91)90054-F.

Brida, J. G., & Pulina, M. (2010). *A literature review on the tourism-led-growth hypothesis.* Retrieved from https://iris.uniss.it/: https://iris.uniss.it/retrieve/handle/11388/263911/195146/Brida_J_Literature_review_on_the.pdf 9th March 2023

Brida, J. G., Cortes-Jimenez, I., & Pulina, M. (2016). Has the tourism-led growth hypothesis been validated? A literature review. *Current Issues in Tourism*, 19(5), 394-430. https://doi.org/10.1080/13683500.2013.868414.

Brown, T. L., & Connelly, N. A. (1986). Tourism and employment in the Adirondack Park. *Annals of Tourism Research*, 13(3), 481-489 https://doi.org/10.1016/0160-7383(86)90032-0.

Budyko, M. I. (1974). *Climate and life.* Academic Press.

Bürki, R., Elsasser, H., & Abegg, B. (2003). Climate change-impacts on the tourism industry in mountain areas. *1st International Conference on Climate Change and Tourism* , (pp. 9-11). Djerba.

Butler, R. W. (1994). Seasonality in Tourism: issues and problems. In A. V. Seaton (Eds.), *Tourism: The State of the Art* (pp. 332-340). Chichester: Wiley.

Butler, R. W. (2001). Seasonality in Tourism: Issues and implications. In T. G. Baum, *Seasonality in Tourism* (pp. 5-21). Oxford: Pergamon.

Butler, R. W., & Mao, B. (1997). Seasonality in tourism: problems and measurement. In P. Murphy, *Quality management in urban tourism* (pp. 9-24). Chistercher: Wiley.

Butnar, I., & Llop, M. (2010). *Structural decomposition analysis and input-output subsystems: An application to Spanish CO2 emissions.. Working Paper.* https://www.recercat.cat/bitstream/handle/2072/151546/201011.pdf?sequence=3.

Cafiso, G., Cellini, R., & Cuccia, T. (2018). Do economic crises lead tourists to closer destinations? Italy at the time of the Great Recession. *Papers in Regional Science*, 97(2), 369-386 https://doi.org/10.1111/pirs.12242.

Campos-Soria, J. A., García-Pozo, A., & Marchante-Mera, A. J. (2018). Explaining tourists attitudes to environmental support: A multilevel approach. *Journal of Sustainable Tourism*, 26(6), 987-1006 https://doi.org/10.1080/09669582.2018.1435667.

Cannas, R. (2012). An overview of tourism seasonality: Key concepts and policies. *Almatourism-Journal of Tourism, Culture and Territorial Development,*, 3(5), 40-58. https://doi.org/10.6092/issn.2036-5195/3120.

Cellini, R., & Cuccia, T. (2016). UNESCO sites as public goods: comparative experiences in Italy. *Revista de Economia Contemporânea*, 20, 553-569 https://doi.org/10.1590/198055272037.

Chatziantoniou, I., Filis, G., Eeckels, B., & Apostolakis, A. (2013). Oil prices, tourism income and economic growth: A structural VAR approach for European Mediterranean countries. *Tourism Management*, 36, 331-341. https://doi.org/10.1016/j.tourman.2012.1.

Chingarande, A., & Saayman, A. (2018). Critical success factors for tourism-led growth. *International Journal of Tourism Research*, 20(6), 800-818 https://doi.org/10.1002/jtr.2233.

Chingarande, A., & Saayman, A. (2018). Critical success factors for tourism-led growth. *International Journal of Tourism Research*, 20(6), 800-818 https://doi.org/10.1002/jtr.2233.

Chung, J. Y. (2009). Seasonality in tourism: A review. *E-review of Tourism Research*, 7(5).

Commons, J., Page, S. (2001). Managing Seasonality in Peripheral Tourism Regions: The Case of Northland, New Zealand. In S. Lundtrop, & T. Baum, *Seasonality in tourism* (pp. 153-172). Amsterdam, str.: Pergamon doi: http://dx.doi.org/10.1016/B978-0-08-043674-6.500.

Connell, J., Page, S. J., & Meyer, D. (2015). Visitor attractions and events: Responding to seasonality. *Tourism management*, 46, 283-298 https://doi.org/10.1016/j.tourman.2014.06.013.

Cooper, C., Fletcher, J., Fyall, A., Gilbert, D., & Wanhill, S. (2005). *Tourism Principles and Practice (3rd ed.).* Pearson Education.

Copeland, B. R. (1991). Tourism, welfare and de-industrialization in a small open economy. *Economica*, 515-529 https://doi.org/10.2307/2554696.

Corluka, G. (2019). Tourism seasonality–an overview. *Journal of Business Paradigms*, 4(1), 21-43.

Council, W. T. (2022). *Economic Impact of Travel & Tourism 2022 Annual Update: Summary.* Retrieved from https://wttc.org/Portals/0/Documents/Reports/2022/EIR2022-Global%20Trends.pdf

Cowell, F. A. (1999). Estimation of Inequality indices. In *Handbook of Income Inequality Measurement* (pp. 269-289). Dordreccht: Springer.

Croes, R. (2014). The role of tourism in poverty reduction: an empirical assessment. *Tourism Economics*, 20(2), 207-226 https://doi.org/10.5367/te.2013.0275.

Croes, R., & Vanegas Sr, M. (2008). Cointegration and causality between tourism and poverty reduction. *Journal of travel research*, 47(1), 94-103 https://doi.org/10.1177/0047287507312429.

Crouch, G. I. (1996). Demand elasticities in international marketing: A meta-analytical application to tourism. *Journal of Business Research*, 36(2), 117-136 https://doi.org/10.1016/0148-2963(95)00086-0.

Cuccia, T., & Rizzo, I. (2011). Tourism seasonality in cultural destinations: Empirical evidence from Sicily. *Tourism management*, 32(3), 589-595 https://doi.org/10.1016/j.tourman.2010.05.008.

Cuñado, J., Gil-Alana, L. A., & Perez de Gracia, F. (2004). Is the US fiscal deficit sustainable?: A fractionally integrated approach. *Journal of Economics and Business*, 56(6), 501-526. https://doi.org/10.1016/j.jeconbus.2004.05.001.

Dagum, C. (1997). Decomposition and interpretation of Gini and the generalized entropy inequality measures. *Statistica, 57(3)*, 295-308. https://doi.org/10.6092/issn.1973-2201/1060.

De Vita, G., & Kyaw, K. S. (2017). Tourism specialization, absorptive capacity, and economic growth. *Journal of Travel Research*, 56 (4) 423-435 https://doi.org/10.1177/0047287516650042.

Deprez, J. (1990). Vertical integration and the problem of fixed capital. *Journal of Postkeynesian Economics* , 13, 47–64. https://www.jstor.org/stable/4538222.

Diakomihalis, M. N., & Lagos, D. G. (2011). An empirical approach to coastal leisure shipping in Greece and an assessment of its economic contribution. *Tourism Economics*, 17(2), 437-456. https://doi.org/10.5367%2Fte.2011.0038.

Donatos, G., & Zairis, P. (1991). Seasonality of foreign tourism in the Greek island of Crete. *Annals of Tourism Research, 18(3)*, 515-519 https://doi.org/10.1016/0160-7383(91)90060-O.

Drakatos, C. (1987). Seasonal concentration of tourism in Greece. *Annals of Tourism Research*, 14(4): 582–586. https://doi.org/10.1016/0160-7383(87)90075-2.

Dritsakis, N. (2004). Tourism as a long-run economic growth factor: an empirical investigation for Greece using causality analysis. *Tourism economics*, 10(3), 305-316. https://doi.org/10.5367%2F0000000041895094.

Dritsakis, N. (2004). Tourism as a long-run economic growth factor: an empirical investigation for Greece using causality analysis. *Tourism economics*, 10(3), 305-316. https://doi.org/10.5367%2F0000000041895094.

Durbarry, R. (2004). Tourism and economic growth: the case of Mauritius. *Tourism Economics*, 10(4), 389-401. https://doi.org/10.5367%2F0000000042430962.

Duro, J. A. (2016). Seasonality of hotel demand in the main Spanish provinces: measurements and decomposition exercises. *Tourism Management,*, 52, 52-63. https://doi.org/10.1016/j.tourman.2015.06.013.

Duro, J. A. (2018). Seasonality of tourism: A new decomposition. *Tourism economics,*, 24(5), 615-621. https://doi.org/10.1177%2F1354816618768319.

Duro, J. A., & Farré, F. X. (2015). Estacionalidad turística en las provincias españolas: medición y análisis. *Cuadernos de Turismo*, (36), 157-174. https://doi.org/10.6018/turismo.36.230921.

Duro, J. A., & Rodríguez, D. (2011). *Estimació del PIB turístic per Catalunya, marques i comarques 2005–2010.* Report GRIT Universitat Rovira i Virgili, Tarragona.

Duro, J. A., & Turrion-Prats, J. (2019). Tourism seasonality worldwide. *Tourism Management Perspectives*, 31, 38-53 https://doi.org/10.1016/j.tmp.2019.03.010.

Duro, J. A., & Turrión-Prats, J. (2021). Territorial versus individual hotel seasonality in a high seasonal destination. *Current Issues in Tourism, 24(10)*, 1402-1417 https://doi.org/10.1080/13683500.2020.1792856.

Duro, J. A., & Turrión-Prats, J. (2022). Seasonality and the contribution of markets: Comparing methods. *Tourism Management Perspectives,*, 43, 100987 https://doi.org/10.1016/j.tmp.2022.100987.

Duro, J. A., & Turrión-Prats, J. (2022). Seasonality and the contribution of markets: Comparing methods. *Tourism Management Perspectives*, 43, 100987 https://doi.org/10.1016/j.tmp.2022.100987.

Dwyer, L.M., Forsyth, P., & Spurr, R. (2004). Evaluating tourism's economic effects: new and old approaches. *Tourism Management*, 25(3), 307-317. https://doi.org/10.1016/S0261-5177(03)00131-6.

Ekanayake, E. M., Halkides, M., & Ledgerwood, J. R. (2012). Inbound international tourism to the United States: A panel data analysis. *International Journal of Management and Marketing Research*, 5(3), 15-27 https://ssrn.com/abstract=2162573.

Elkan, W. (1975). The relation between tourism and employment in Kenya and Tanzania. *The Journal of Development Studies*, 11(2), 123-130 https://doi.org/10.1080/00220387508421529.

Espino-Rodríguez, T. F., & Padrón-Robaina, V. (n.d.). Outsourcing and its impact on operational objectives and performance: a study of hotels in the Canary Islands. *International Journal of Hospitality Management*, 23(3), 287-306. https://doi.org/10.1016/.

Eugenio-Martin, J. L., & Campos-Soria, J. A. (2014). Economic crisis and tourism expenditure cutback decision. *Annals of tourism Research*, 44, 53-73 https://doi.org/10.1016/j.annals.2013.08.013.

Eugenio-Martin, J. L., Martín Morales, N., & Scarpa, R. (2004). Tourism and economic growth in Latin American countries: A panel data approach. *Fondazione Eni Enrico Mattei*, Working Paper 2004-26 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=504482.

European Comission (2019). *Territorial Patterns of Tourism intensity and seasonality in EU*. Luxemburg. https://www.centralsweden.se/wp-content/uploads/serms-tourism_online.pdf 20th March 2023

EUTDH. (2013). *Índex UAB d'Activitat Turística. Previsions estiu 2013.* Electronic Document https://issuu.com/eutdh/docs/indexuab2013.

Farver, J. A. (1984). Tourism and employment in the Gambia. *Annals of Tourism Research*, 11(2), 249-265 https://doi.org/10.1016/0160-7383(84)90073-2.

Fayissa, B., Nsiah, C., & Tadesse, B. (2011). Research note: Tourism and economic growth in Latin American countries–further empirical evidence. *Tourism Economics*, 17(6), 1365-1373 https://doi.org/10.5367/te.2011.0095.

Fernandez-Morales, A. (2003). Decomposing seasonal concentration. *Annals of tourism research, 30(4)*, 942-956 https://doi.org/10.1016/S0160-7383(03)00090-2.

Fernández-Morales, A., & Cisneros-Martínez, J. D. (2019). Seasonal concentration decomposition of cruise tourism demand in southern Europe. *Journal of Travel Research*, 58(8), 1389-1407. https://doi.org/10.1177%2F0047287518802094.

Fernández-Morales, A., & Mayorga-Toledano, MC. (2008). Seasonal concentration of the hotel demand in Costa del Sol: A decomposition by nationalities. *Tourism Management*, 29(5), 940-949. https://doi.org/10.1016/j.tourman.2007.11.003.

Fernández-Morales, A., Cisneros-Martínez, J.D., & McCabe, S. (2016). Seasonal concentration of tourism demand: Decomposition analysis and marketing implications. *Tourism Management*, 56, 172-190. https://doi.org/10.1016/j.tourman.2016.04.004.

Ferrante, M., Magno, G. L. L., & De Cantis, S. (2018). Measuring tourism seasonality across European countries. *Tourism Management*, 68, 220-235. https://doi.org/10.1016/j.tourman.2018.03.015.

Figini, P., & Vici, L. (2010). Tourism and growth in a cross section of countries. *Tourism Economics*, 16(4), 789-805. https://doi.org/10.5367%2Fte.2010.0009.

Fletcher, J. E. (1989). Input-Output Analysis and Tourism Impact Studies. *Annals of Tourism Research*, 16(3), 513-529. https://doi.org/10.1016/0160-7383(89)90006-6.

Flitzpatrick, A. (1993). *All-season Tourism: Analysis of Experience, Suitable Products and Clientele.* Luxemburg: Ditectorate-General XXIII - Tourism Unit, Commission of the European Communities.

Frechtling, D. C. & Smeral, E. (2010). Measuring and interpreting the economic impact of tourism: 20/20 hindsight and foresight. In D. Pearce, & R. Butler, *Tourism research: A, 20:20 vision* (pp. 67-79). Oxford: Goodfellow Publishing.

Frechtling, D. C. (1982). Tourism trends and the business cycle: Tourism in recession. *Tourism Management*, 3(4), 285-290 https://doi.org/10.1016/0261-5177(82)90051-6.

Frechtling, D. C. (1996). *Practical tourism forecasting.* Oxford: Butterworth-Heinemann.

Frechtling, D. C. (2001). *Forecasting Tourism Demand: Methods and Strategies.* Oxford: Butterworth-Heinemann.

Frechtling, D. C. (2010). The tourism satellite account: A primer. *Annals of Tourism Research*, 37(1), 136-153. https://doi.org/10.1016/j.annals.2009.08.003.

Frechtling, D. C., & Horváth, E. . (1999). Estimating the multiplier effects of tourism expenditures on a local economy through a regional input-output model. *Journal of travel research*, 37(4), 324-332 https://doi.org/10.1177/004728759903700402.

Garín-Muñoz, T., & Montero-Martín, L. (2007). German Demand for Tourism in Spain. *Tourism Management*, Vol 28, No 1, pp 12-22 https://doi.org/10.1016/j.tourman.2006.09.024.

Garin-Muñoz, T., & Montero-Martín, L. F. (2007). Tourism in the Balearic Islands: A dynamic model for international demand using panel data. Tourism management. *Tourism Management*, 28(5), 1224-1235 https://doi.org/10.1016/j.tourman.2006.09.024.

Getz, D. (2008). Event tourism: Definition, evolution, and research. *Tourism Management*, 29(3), 403-428 https://doi.org/10.1016/j.tourman.2007.07.017.

Getz, D., & Nilsson, P. A. (2004). Responses of family businesses to extreme seasonality in demand: the case of Bornholm, Denmark. *Tourism management*, 25(1), 17-30 https://doi.org/10.1016/S0261-5177(03)00067-0.

Gil-Alana, L. A., & Huijbens, E. H. (2018). Tourism in Iceland: Persistence and seasonality. *Annals of Tourism Research*, 68, 20-29 https://doi.org/10.1016/j.annals.2017.11.002.

Gil-Alana, L. A., De Gracia, F. P., & Cuñado, J. (2004). Seasonal fractional integration in the Spanish tourism quarterly time series. *Journal of Travel Research,*, 42(4), 408-414. https://doi.org/10.1177/0047287503258843.

Gil-Alana, L. A., Mudida, R., & Perez de Gracia, F. (2014). Persistence, long memory and seasonality in Kenyan tourism series. *Annals of Tourism Research*, 46, 89-101. https://doi.org/10.1016/j.annals.2014.02.008.

Goeldner, C. R., Ritchie, J. R. B., & McIntosh, R. W. (2000). Tourism components and supply. In C. R. Goeldner, *Tourism: Principles, practices, philosophies* (pp. 362-393). New York: John Wiley & Sons.

Goerlich, F. J. (1998). *Desigualdad, diversidad y convergencia:(algunos) instrumentos de medida. .* Valencia: Instituto Valenciano de Investigaciones Económicas.

Gonzalez, P. & Moral, P. (1995). An analysis of the international tourism demand in Spain. *International Journal of forecasting*, 11(2), 233-251. https://doi.org/10.1016/0169-2070(94)00570-3.

Gonzalez, P., & Moral, P. (1996). Analysis of tourism trends in Spain. *Annals of Tourism Research*, 23(4), 739-754 https://doi.org/10.1016/0160-7383(96)00019-9.

Goulding, P. J. (2006). Conceptualising supply-side seasonality in tourism: a study of the temporal trading behaviours for small tourism businesses in Scotland (Doctoral dissertation, University of Strathclyde). http://doi.org/10.48730/8ngr-zx83.

Gouveia, P. M. & Rodrigues, P. M. (2005). Dating and synchronizing tourism growth cycles. *Tourism Economics*, 11(4), 501-515 https://doi.org/10.5367/000000005775108746.

Grainger, J., & Judge, G. (1996). *Changing patterns of seasonality in hotel and tourism demand: an analysis of Portsmouth monthly arrivals data.* University of Portsmouth.

Grant, M., Human,B. & Le Pelley, E. (1997). *Seasonality, Insights,.* London: BTA/ETB.

Guizzardi, A, & Mazzocchi, M. (2010). Tourism demand for Italy and the business cycle. *Tourism Management*, 31(3), 367-377 https://doi.org/10.1016/j.tourman.2009.03.017.

Guizzardi, A., & Mazzocchi, M. (2010). Tourism demand for Italy and the business cycle. *Tourism Management*, 31(3), 367-377 https://doi.org/10.1016/j.tourman.2009.03.017.

Gutiérrez-Pérez, F. J., Medina-Muñoz, D. R., & Medina-Muñoz, R. D. . (2014). Tourism and poverty alleviation: an academic literature review. *Tourism & Management Studies*, 10(2), 104-115 http://www.redalyc.org/articulo.oa?id=388743882013.

Hall, C. M. (2010). Crisis events in tourism: Subjects of crisis in tourism. *Current issues in Tourism*, 13(5), 401-417 https://doi.org/10.1080/13683500.2010.491900.

Harcourt, G.C., & Massaro, V.G. (1964). A note on Mr. Sraffa's subsystems. *The Economic Journal*, 74, 715–722. https://doi.org/10.2307/2228337.

Hartmann, R. (1986). Tourism, seasonality and socialchange. *Leisure Studies*, 5(1): 25–33 https://doi.org/10.1080/02614368600390021.

Hazari, B. R., & Sgro, P. (1995). Tourism and growth in a dynamic model of trade. *Journal of international trade and economic development*, 4 (2) 243-252 https://doi.org/10.1080/09638199500000019.

Heathcote, J., Perri, F., & Violante, G. L. (2010). Unequal we stand: An empirical analysis of economic inequality in the United States, 1967–2006. *Review of Economic dynamics*, 13(1), 15-51 https://doi.org/10.1016/j.red.2009.10.010.

Heimler, A. (1991). Linkages and vertical integration in the Chinese economy. *Review of Economics and Statistics* , 73, 261–267. https://doi.org/10.2307/2109516.

Helpman, E., Itskhoki, O., & Redding, S. (2010). Inequality and unemployment in a global economy. *Econometrica*, 78(4), 1239-1283 https://doi.org/10.3982/ECTA8640.

Helpman, E., Itskhoki, O., & Redding, S. (2010). Inequality and unemployment in a global economy. *Econometrica*, 78(4), 1239-1283 https://doi.org/10.3982/ECTA8640.

Henderson, J. C. (1999). Tourism management and the Southeast Asian economic and environmental crisis: a Singapore perspective. *Managing Leisure*, 4(2), 107-120 https://doi.org/10.1080/136067199375887.

Higham, J. & Hinch, T. (2002). Tourism, sport and seasons: the challenges and potential of overcoming seasonality in the sport and tourism sectors. *Tourism Management*, 23(2), 175-185 https://doi.org/10.1016/S0261-5177(01)00046-2.

Hinch, T. D., Hickey, G. P. (1996). Tourism attractions and seasonality: spatial relationships in Alberta. In K. Mackay, & K. R. Boyd, *Tourism for All Seasons: Using Research to Meet the Challenge of Seasonality* (pp. 69-76). Winnipeg, Manitoba: University of Manitoba.

Hjalager, A. M. (2006). The marriage between welfare services and tourism—a driving force for innovation? *Journal of Quality Assurance in Hospitality & Tourism*, 6(3-4), 7-29. https://doi.org/10.1300/J162v06n03_02.

Hsiao, C. & Pesaran, M.H. (2004). *Random Coefficient Panel Data Models.* https://dx.doi.org/10.2139/ssrn.572783.

Hylleberg, S. (1992). General introduction. In S. Hylleberg, *Modeling Seasonality* (pp. 3-14). Oxford: Oxford University Press.

Incera, A. C., & Fernández, M. F. (2015). Tourism and income distribution: Evidence from a developed regional economy. *Tourism Management*, 48, 11-20 https://doi.org/10.1016/j.tourman.2014.10.016.

INE. (2004). *Cuenta satélite del Turismo.* Retrieved from Instituto Nacional de Estadística: https://www.ine.es/docutrab/cuen_sat_turismo/cuenta_satelite_turismo.pdf

Jang, S. S. (2004). Mitigating tourism seasonality: A quantitative approach. *Annals of Tourism Research*, 31(4), 819-836.

Jappelli, T., & Pistaferri, L. (2010). Review of Economic Dynamics. *Does consumption inequality track income inequality in Italy?*, 13(1), 133-153 https://doi.org/10.1016/j.red.2009.11.001.

Jenkins, S. (2006, September). Variance estimation for quantile group shares, cumulative shares, and Gini coefficient. *United Kingdom Stata Users' Group Meetings 2006 (No. 07). Stata Users Group.*

Jones, A. L., & Phillips, M. (Eds.). (2017). *Global Climate Change and Coastal Tourism: Recognizing problems, managing solutions and future expectations.* CABI.

Jones, S. (2010). The economic contribution of tourism in Mozambique: Insights from a Social Accounting Matrix. *Development Southern Africa*, 27(5), 679-696 https://doi.org/10.1080/0376835X.2010.522831.

Južnik Rotar, L., Gričar, S., & Bojnec, Š. (2022). The relationship between tourism and employment: evidence from the Alps-Adriatic country. *Economic Research-Ekonomska Istraživanja*, 1-19. https://doi.org/10.1080/1331677X.2022.2080737.

Karamustafa, K., & Ulama, S. (2010). Measuring the seasonality in tourism with the comparison of different methods. *EuroMed Journal of Business*, 191-214 https://doi.org/10.1108/14502191011065509.

Katircioglu, S. (2009). Testing the tourism-led growth hypothesis: The case of Malta. *Acta Oeconomica*, 59(3), 331-343 https://doi.org/10.1556/aoecon.59.2009.3.4.

Kessler, M. (1990). Der Fremden-und Freizeitverkehr in der Bundesrepublik Deutschland. . In B. Deutschland., *Geographie Deutschlands.* (pp. 616-639). Stuttgart: Staat–Natur–Wirtschaft.

Kirschner, S. (2015). Who performs outsourcing? A cross national comparison of companies in the EU-28. In J. Drahokoupil, *The outsourcing challenge Organizing workers across fragmented production networks* (pp. 25-45). Brussels: ETUI.

Koc, E., & Altinay, G. (2007). An analysis of seasonality in monthly per person tourist spending in Turkish inbound tourism from a market segmentation perspective. *Tourism Management*, 28(1), 227-237. https://doi.org/10.1016/j.tourman.2006.01.003.

Koenig-Lewis, N., & Bischoff, E. E. (2005). Seasonality research: The state of the art. *International Journal of Tourism Research*, 7(4-5), 201-219. https://doi.org/10.1002/jtr.531.

Koenig-Lewis, N., & Bischoff, E. E. (2010). Developing effective strategies for tackling seasonality in the tourism industry. *Tourism and Hospitality Planning & Development*, 7(4), 395-413 https://doi.org/10.1080/1479053X.2010.520466.

Kolomiets, A. (2010). *Seasonality in Tourism Employment Case: Grecotel Kos Imperial.* Kos: Saima University of Applied Sciences Tourism and Hospitality.

Koske, I., Fournier, J. M., & Wanner, I. (2012, January 10). *Less income inequality and more growth–Are they compatible? Part 2. The distribution of labour income.* Retrieved from OECDiLibrary: https://doi.org/10.1787/18151973

Kotler, P. (1984). *Marketing Management: Analysis, Planning and Control .* (5th Eds.), New Jersey: Prentice-Hall.

Krakover, S. (2000). Partitioning seasonal employment in the hospitality industry. *Tourism Management*, 21(5), 461-471 https://doi.org/10.1016/S0261-5177(99)00101-6.

Kuznets, S. (1933). Appendices to" Seasonal Variations in Industry and Trade". *Seasonal Variations in Industry and Trade*, 369-448. NBER http://www.nber.org/books/kuzn33-1.

Lamminmaki, D. (2011). An examination of factors motivating hotel outsourcing. International. *Journal of Hospitality Management*, 30(4), 963-973. https://doi.org/10.1016/j.ijhm.2010.10.010.

Lanza A., & Pigliaru F. (1999). *Why are Tourism Countries Small and Fast-Growing, Working Paper No 99–06.* Retrieved from CRENoS Centro Ricerche Economiche Nord Sud, Cagliari: https://crenos.unica.it/crenos/sites/default/files/wp/99-6.pdf 9th March 2023

Larrinaga, C., & Vallejo, R. (2013). El turismo en el desarrollo español contemporáneo. *Transportes, Servicios y Telecomunicaciones*, 24, 12-27 https://www.tstrevista.com/tstpdf/tst_24/articulo24_01.pdf.

Lashley, C. (2018). What do about how to do: Reflections on the future direction of hospitality education and research. *Research in Hospitality Management* , 8(2), 79-84. https://doi.org/10.1080/22243534.2018.1553368.

Lau, P. L., Koo, T. T., & Dwyer, L. (2017). Metrics to measure the geographic characteristics of tourism markets: An integrated approach based on Gini index decomposition. *Tourism Management*, 59, 171-181. https://doi.org/10.1016/j.tourman.2016.07.019.

Law, R. (2001). The impact of the Asian financial crisis on Japanese demand for travel to Hong Kong: A study of various forecasting techniques. *Journal of Travel & Tourism Marketing*, 10(2-3), 47-65 https://doi.org/10.1080/10548400109511558.

Ledesma-Rodríguez, F. J., Navarro-Ibáñez, M., & Pérez-Rodríguez, J. V. (2001). Panel data and tourism: a case study of Tenerife. *Tourism Economics*, 7(1), 75-88. https://doi.org/10.5367/000000001101297748.

Lee, C. C., & Chang, C. P. (2008). Tourism development and economic growth: A closer look at panels. *Tourism management*, 29(1), 180-192 https://doi.org/10.1016/j.tourman.2007.02.013.

Lee, C. K., Song, H. J., & Mjelde, J. W. (2008). The forecasting of International Expo tourism using quantitative and qualitative techniques. *Tourism management*, 29(6), 1084-1098 https://doi.org/10.1016/j.tourman.2008.02.007.

Lee, S. (2009). Income inequality in tourism services-dependent counties. *Current Issues in Tourism*, 12(1), 33-45 https://doi.org/10.1080/13683500802248001.

Lee, S., & O'Leary, J. T. (2008). Determinants of income inequality in US nonmetropolitan tourism-and recreation-dependent communities. *Journal of Travel Research*, 46(4), 456-468. https://doi.org/10.1177/0047287507312425.

Lerman, R. I. & Yitzhaki, S. (1985). Income inequality effects by income source: A new approach and applications to the United States. *The review of economics and statistics,*, 151-156.

Lerman, R. I., & Yitzaki, S. (1985). Income inequality effects by income: A new approach and applications to the United States. *The Review of Economic and Statistics, 67(1)*, 151-156 https://do.org/10.1016/S0160-7383(03)00090-2.

Lim, C. (1997). Review of international tourism demand models. *Annals of tourism research,*, 24(4), 835-849 https://doi.org/10.1016/S0160-7383(97)00049-2.

Llop , M. & Arauzo-Carod, J.M. (2012). Economic Impact of a New Museum on the Local Economy: "The Gaudi Centre". *Letters in Spatial and Resource Sciences* , 5(1), 17-23. https://doi.org/10.1007/s12076-011-0061-0.

Llorca-Rodríguez, C. M., Casas-Jurado, A. C., & García-Fernández, R. M. (2017). Tourism and poverty alleviation: An empirical analysis using panel data on Peru's departments. *International Journal of Tourism Research*, 19(6), 746-756.

Llorca-Rodríguez, C. M., García-Fernández, R. M., & Casas-Jurado, A. C. (2020). Domestic versus inbound tourism in poverty reduction: Evidence from panel data. *Current Issues in Tourism*, 23(2), 197-216. https://doi.org/10.1080/13683500.2018.1494701.

Lo Magno, G. L., Ferrante, M., & De Cantis, S. (2017). A new index for measuring seasonality: A transportation cost approach. *Mathematical Social Sciences,*, 88, 55–65. http://dx.doi.org/10.1016/j.mathsocsci.2017.05.002.

López Bonilla, J. M., López Bonilla, L. M., & Sanz Altamira, B. (2006). Patterns of tourist seasonality in Spanish Regions. *Tourism and Hospitality Planning & Development, 3(3)*, 241-256. https://doi.org/10.1080/14790530601132468.

López-Bonilla, J. M., & López-Bonilla, L. M. (2006). La concentración estacional en las regiones españolas desde una perspectiva de la oferta turística. *Revista de estudios regionales*, 77, 77-104. http://hdl.handle.net/11441/54070.

Lopez-Feldman, A. (2006). Decomposing inequality and obtaining marginal effects. *The Stata Journal, 6(1)*, 106-111 https://doi.org/10.1177%2F1536867X0600600107.

Lundtorp, S. (2001). Measuring tourism seasonality. In T. a. Baun, *In Seasonality in tourism* (pp. 23-50). London: Routledge.

Lundtorp, S., Rassing, C. R., & Wanhill, S. (1999). The off-season is 'no season': the case of the Danish island of Bornholm. *Tourism Economics*, 5(1), 49-68. https://doi.org/10.1177/135481669900500104.

Lv, Z. (2019). Deepening or lessening? The effects of tourism on regional inequality. *Tourism Management*, 72, 23-26 https://doi.org/10.1016/j.tourman.2018.11.009.

Madsen, B. & Zhang, J. (2010). Towards a New Framework for Accounting and Modelling the Regional Impacts of Tourism and Culture. *Economic Systems Research*, 22(4), 313–340 https://doi.org/10.1080/09535314.2010.529067.

Maestri, V., & Roventini, A. (2012, November 27). *Inequality and macroeconomic factors: A time-series analysis for a set of OECD countries.* Retrieved from https://dx.doi.org/10.2139/ssrn.2181399

Mahadevan, R., & Suardi, S. (2019). Panel evidence on the impact of tourism growth on poverty, poverty gap and income inequality. *Current Issues in Tourism,*, 22(3), 253-264 https://doi.org/10.1080/13683500.2017.1375901.

Maloney, W. F., & Montes Rojas, G. V. (2005). How elastic are sea, sand and sun? Dynamic panel estimates of the demand for tourism. *Applied Economics Letters*, 12(5), 277-280.

Manning, R.E., & Powers, L.A. (1984). Peak and off-peak use: redistributing the outdoor recreation/tourism load. *Journal of Travel Research*, 23(2), 25-31. https://doi.org/10.1177/004728758402300204.

Manyara, G., & Jones, E. (2007). Community-based tourism enterprises development in Kenya: An exploration of their potential as avenues of poverty reduction. *Journal of sustainable tourism*, 15(6), 628-644. https://doi.org/10.2167/jost723.0.

Martín Martín, J. M., Jiménez Aguilera, J. D., & Molina Moreno, V. (2014). Impacts of seasonality on environmental sustainability in the tourism sector based on destination type: an application to Spain's Andalusia region. *Tourism Economics,*, 20(1), 123-142. https://doi.org/10.3390/su11030739.

Martínez, J. M. G., Martín, J. M. M., Fernández, J. A. S., & Mogorrón-Guerrero, H. (2019). An analysis of the stability of rural tourism as a desired condition for sustainable tourism. *Journal of Business Research,*, 100, 165-174. https://doi.org/10.1016/j.jbusres.2019.03.033.

Martínez, R., Ayala, L., & Ruiz-Huerta, J. (2001). The impact of unemployment on inequality and poverty in OECD countries. *Economics of Transition*, 9(2), 417-447 https://doi.org/10.1111/1468-0351.00082.

Mathieson, A., & Wall, G. (1982). *Tourism: Economic, Physical and Social Impacts,.* Harlow: Longman.

Matsaganis, M., & Leventi, C. (2014). Poverty and inequality during the Great Recession in Greece. *Political Studies Review*, 12(2), 209-223 https://doi.org/10.1111/1478-9302.12050.

Mauricio, J. A. (2008). Computing and using residuals in time series models. *Computational statistics & data analysis,*, 52(3), 1746-1763 https://doi.org/10.1016/j.csda.2007.05.034.

Mauss, M. & Beuchat, H. (1979). *Seasonal variations of Eskimo: a study in social morphology.* London: Routledge & Kegan Paul.

Medina, R. M. P., Martín, J. M. M., Martínez, J. M. G., & Azevedo, P. S. (2022). Analysis of the role of innovation and efficiency in coastal destinations affected by tourism seasonalit. *Journal of Innovation & Knowledge*, 7(1), 100163. https://doi.org/10.1016/j.jik.2022.100163.

Mello M., Pack A., & Sinclair M.T. (2002). A system of equations model of UK tourism demand in neighbouring countries. *Applied Economics*, 34(4): 509–521 https://doi.org/10.1080/00036840110049310.

Middleton, V. (1992). *Marketing in Travel and Tourism.* Second Edition. London: Heinemann.

Miller, R.E. & Blair, P.D. (2009). *Input–Output Analysis: Foundations and Extension. 2nd edition.* Cambridge: Cambridge University Press.

Mitchell, L. S. (1991). Geography and tourism. *Annals of tourism research*, 18(1), 57-70. https://doi.org/10.1016/0160-7383(91)90039-E.

Moore, T. W. (1989). *Handbook of Business Forecasting.* London: Gower.

Moreira, C. O. (2018). Portugal as a tourism destination. Paths and trends. *Mediterranée. Revue géographique des pays méditerranéens/Journal of Mediterranean geography*, 130 https://doi.org/10.4000/mediterranee.10402.

Moutinho, L., & Witt, S. F. (1995). Forecasting the tourism environment using a consensus approach. *Journal of Travel Research*, 33(4), 46-50 https://doi.org/10.1177/004728759503300407.

Mules, T. (2005). Economic impacts of national park tourism on gateway communities: the case of Kosciuszko National Park. *Tourism Economics*, 11(2), 247-259. https://doi.org/10.5367%2F0000000054183513.

Murphy, E. C. (1985). Bergmann's rule, seasonality, and geographic variation in body size of house sparrows. *Evolution*, 39(6), 1327-1334 https://doi.org/10.1111/j.1558-5646.1985.tb05698.x.

Narayan, P. K. (2004). Economic impact of tourism on Fiji's economy: empirical evidence from the computable general equilibrium model. *Tourism Economics,*, 10(4), 419-433 https://doi.org/10.5367/0000000042430971.

Navarro, F., & Alcántara, V. (2010). Emissions of methane (CH4) in the Catalan agro-food subsystem: An alternative input-output analysis. *Economía Agraria y Recursos Naturales-Agricultural and Resource Economics*, 10(2), 25-39. https://doi.org/10.7201/earn.

Niavis, S. (2020). Evaluating the spatiotemporal performance of tourist destinations: the case of Mediterranean coastal regions. *Journal of Sustainable Tourism*, 28(9), 1310-1331. https://doi.org/10.1080/09669582.2020.1736087.

Nicolau, J. L., & Mas, F. J. (2005). Stochastic modeling: a three-stage tourist choice process. *Annals of Tourism Research*, 32(1), 49-69. https://doi.org/10.1016/j.annals.2004.04.007.

O'Driscoll, T. (1985). Seasonality in the Trans-Atlantic Vacation Market. *Annals of Tourism Research*, 12(1) 109–110. https://doi-org.sabidi.urv.cat/10.1016/0160-7383(85)90045-3.

Oh, C. O. (2005). The contribution of tourism development to economic growth in the Korean economy. *Tourism management*, 26(1), 39-44 https://doi.org/10.1016/j.tourman.2003.09.014.

Pablo-Romero, M. D. P., & Molina, J. A. (2013). Tourism and economic growth: A review of empirical literature. *Tourism Management Perspectives*, 8, 28-41. https://doi.org/10.1016/j.tmp.2013.05.006.

Page, S., Song, H., & Wu, D. C. (2012). Assessing the impacts of the global economic crisis and swine flu on inbound tourism demand in the United Kingdom. *Journal of travel research*, 51(2), 142-153 https://doi.org/10.1177/0047287511400754.

Pan, S.Y., Gao, M., Kim, H., Shah,K.J., Pei, S.L. & Chiang, P.C. (2018). Advances and challenges in sustainable tourism toward a green economy. *The Science of the Total Environment*, 635, 452-469 https://doi.org/10.1016/j.scitotenv.2018.04.134.

Papatheodorou, A., Rosselló, J., & Xiao, H. (2010). Global economic crisis and tourism: Consequences and perspectives. *Journal of Travel Research*, 49(1), 39-45 https://doi.org/10.1177/0047287509355327.

Paramati, S. R., Shahbaz, M., & Alam, M. S. (2017). Does tourism degrade environmental quality? A comparative study of Eastern and Western European Union. *Transportation Research Part D: Transport and Environment*, 50, 1-13 https://doi.org/10.1016/j.trd.2016.10.034.

Parlamient, E. (2018). *Facsheets on European Union - Tourism*. Retrieved from https://www.europarl.europa.eu/: https://www.europarl.europa.eu/factsheets/en/sheet/126/tourism)

Pasinetti, L. (1980). The Notion of Vertical Integration in Economic Analysis. In L. Pasinetti, *Essays on the Theory of Joint Production* (pp. 16-43). London: Palgrave Macmillan https://doi.org/10.1007/978-1-349-05201-1_2.

Pasinetti, L. (1986). Sraffa's circular process and the concept of vertical integration. *Political Economy*, 2, 3–16. http://www.centrosraffa.org/pe/2,1/2,1.1.%20Pasinetti.pdf.

Pasinetti, L. (1988). Growing subsystems, vertically hyper-integrated sectors and the labour theory of value. *Cambridge Journal of Economics*, 12, 125–134. https://www.jstor.org/stable/23599528.

Payne, J. E., & Mervar, A. (2010). Research note: The tourism–growth nexus in Croatia. *Tourism Economics*, 16(4), 1089-1094 https://doi.org/10.5367/te.2010.0014.

Payne, J. E., Gil-Alana, L. A., & Mervar, A. (2022). Persistence in Croatian tourism: The impact of COVID-19. *Tourism economics,*, 28(6), 1676-1682 https://doi.org/10.1177/1354816621999969.

Perles-Ribes, J. F., Ramón-Rodríguez, A. B., Rubia, A., & Moreno-Izquierdo, L. (2017). Is the tourism-led growth hypothesis valid after the global economic and financial crisis? The case of Spain 1957–2014. *Tourism Management*, 61, 96-109 https://doi.org/10.1016/j.tourman.2017.01.003.

Perles-Ribes, J. F., Ramón-Rodríguez, A. B., Sevilla-Jiménez, M., & Moreno-Izquierdo, L. (2016). Unemployment effects of economic crises on hotel and residential tourism destinations: The case of Spain. *Tourism management*, 54, 356-368 https://doi.org/10.1016/j.tourman.2015.12.002.

Pijoan-Mas, J., & Sánchez-Marcos, V. (2010). Spain is different: Falling trends of inequality. *Review of Economic Dynamics,*, 13(1), 154-178 https://doi.org/10.1016/j.red.2009.10.002.

Po, W. C., & Huang, B. N. (2008). Tourism development and economic growth–a nonlinear approach. *Physica A: Statistical mechanics and its applications*, 387(22), 5535-5542 https://doi.org/10.1016/j.physa.2008.05.037.

Polo, C. and Valle, E. (2008). An assessment of the impact of tourism in the Balearic Islands. *Tourism economics*, 14(3), 615-630. https://doi.org/10.5367%2F000000008785633604.

Polo, C., Ramos, V., Rey-Maquieira, J., Tugores, M. & Valle, E. (2008). The potential effects of a change in the distribution of tourism expenditure on employment. *Tourism Economics*, 14(4), 709-725. https://doi.org/10.5367%2F000000008786440210.

Pratt, S. (2011). Economic linkages and impacts across the TALC. *Annals of Tourism Research*, 38(2), 630-650. https://doi.org/10.1016/j.annals.2010.11.014.

Prideaux, B. (1999). Tourism perspectives of the Asian financial crisis: Lessons for the future. *Current issues in Tourism*, 2(4), 279-293 https://doi.org/10.1080/13683509908667856.

Pulido-Fernández, J. I., & Cárdenas-García, P. J. (2021). Analyzing the bidirectional relationship between tourism growth and economic development. *Journal of Travel Research*, 60(3), 583-602 https://doi.org/10.1177/0047287520922316.

Radić, M. M. (2017). "What Is the Real Seasonality of the European Union Tourism?.". *The 11th Multidisciplinary Academic Conference.*, (pp. 104-111).

Raza, S. A. & Shah, N. (2017). Tourism growth and income inequality: does Kuznets Curve hypothesis exist in top tourist arrival countries. *Asia Pacific Journal of Tourism Research*, 22(8), 874-884. https://doi.org/10.1080/10941665.2017.1343742.

Rico, P., Cabrer-Borrás, B., & Morillas-Jurado, F. (2021). Seasonality in Tourism: Do Senior Programs Mitigate It? *Mathematics*, 9(16), 2003 https://doi.org/10.3390/math9162003.

Rico, P., Cabrer-Borrás, B., & Morillas-Jurado, F. (2021). Seasonality in Tourism: Do Senior Programs Mitigate It? *Mathematics*, 9(16), 2003. https://doi.org/10.3390/math9162003.

Ridderstaat, J., Croes, R., & Nijkamp, P. (2013). Tourism development, quality of life and exogenous shocks: A systemic framework. *International Journal of Society Systems Science*, 5(4), 321-336 https://doi.org/10.1504/IJSSS.2013.058465.

Rosselló, J., Riera, A. & Sansó, A. (2004). The economic determinants of seasonal patterns. *Annals of Tourism Research*, 31(3), 697-711. https://doi.org/10.1016/j.annals.2004.02.001.

Rosselló. J. & Sansó. A. (2017). Yearly, monthly and weekly seasonality of tourism demand: a decomposition analysis. *Tourism Management,*, 60, 379-389. https://doi.org/10.1016/j.tourman.2016.12.019.

Saari, M. Y., Shuja, N., & Rahman, I. A. . (2013). Evaluation of impacts of the rise in energy prices on costs of production and living expenses in Malaysia. *Malaysian Journal of Economic Studies*, 50(1), 1-20.

Sala, M., Torres, T., & Farré, M. (2014). La demanda turística de la economía española: caracterización cíclica y sincronización. *Cuadernos de turismo*, (33), 335-356.

Salifou, C. K., & Haq, I. U. . (2017). Tourism, globalization and economic growth: A panel cointegration analysis for selected West African States. *Current Issues in Tourism*, 20(6), 664-667 https://doi.org/10.1080/13683500.2016.1175421.

Sanchez Carrera, E. J., Brida, J. G., & Risso, W. A. (2008). Tourism's impact on long-run Mexican economic growth. *Economics Bulletin*, 23(21), 1-8 https://dx.doi.org/10.2139/ssrn.1076225.

Sasser, W. E. (1976). Match supply and demand in service industries. *Harvard Business Review*, 54(6), 133-140 [Web of Science ®].

Schubert, S.F., & Brida, J.G. (2011). Dinamic Model of Economic Growth in a Small Tourism Driven Economy. In Á. Matias, P. Nijkamp, M. Sarmento, & (eds), *Tourism Economics* (pp. 149-168). Physica-Verlag HD https://doi.org/10.1007/978-3-7908-2725-5_10.

Scott, D., Gössling, S., & Hall, C. M. (2012). International tourism and climate change. *Wiley Interdisciplinary Reviews: Climate Change*, 3(3), 213-232 https://wires.onlinelibrary.wiley.com/doi/abs/10.1002/wcc.165.

Seetaram, N. and Petit, S. (2012). Panel Data Analysis. In L. Dwyer, A. Gill, & N. Seetaram, *Handbook of Research Methods in Tourism* (pp. 127-144). Cheltenham, UK - Nothampton, USA: Edward Elgar Publishing https://doi.org/10.4337/9781781001295.00013.

Šegota, T., & Mihalič, T. (2018). Elicitation of tourist accommodation demand for counter-seasonal responses: Evidence from the Slovenian Coast. *Journal of Destination Marketing & Management*, 9, 258-266 https://doi.org/10.1016/j.jdmm.2018.02.002.

Senbeto, D. L., & Hon, A. H. (2019). A dualistic model of tourism seasonality: Approach–avoidance and regulatory focus theories. *Journal of Hospitality & Tourism Research*, 43(5), 734-753. https://doi.org/10.1177/1096348019828446.

Senbeto, D. L., & Hon, A. H. (2021). Shaping organizational culture in response to tourism seasonality: A qualitative approach. *Journal of Vacation Marketing*, 27(4), 466-478 https://doi-org.sabidi.urv.cat/10.1177/13567667211006759.

Shahzad, S. J. H., Shahbaz, M., Ferrer, R., & Kumar, R. R. (2017). Tourism-led growth hypothesis in the top ten tourist destinations: New evidence using the quantile-on-quantile approach. *Tourism Management*, 60, 223-232 https://doi.org/10.1016/j.tourman.2016.12.006.

Shahzad, S. J. H., Shahbaz, M., Ferrer, R., & Kumar, R. R. (2017). Tourism-led growth hypothesis in the top ten tourist destinations: New evidence using the quantile-on-quantile approach. *Tourism Management*, 60, 223-232 https://doi.org/10.1016/j.tourman.2016.12.006.

Shapley, L. S. (1953). Stochastic games. *Proceedings of the national academy of sciences*, 39(10), 1095-1100.

Sheldon, P., & Dwyer, L. (2010). The global financial crisis and tourism: Perspectives of the academy. *Journal of travel research*, 49(1), 3-4 https://doi.org10.1177/0047287509353191.

Shorrocks, A. F. (1982). Inequality decomposition by factor components. *Econometrica: Journal of the Econometric Society*, 193-211 https://doi.org/10.2307/1912537.

Shorrocks, A. F. (1984). Inequality decomposition by population subgroups. *Econometrica: Journal of the Econometric Society,*, 1369-1385 https://doi.org/10.2307/1912537.

Sinclair, M. T. (1998). Tourism and economic development: A survey. *The journal of development studies*, 34(5), 1-51. https://doi.org/10.1080/00220389808422535.

Sinisalco, D. (1982). Il sistema produttivo: anàlisi per industria e susbsistemi. *Ricerche Economiche*, 4, 475–488.

Smeral, E. (2009). The impact of the financial and economic crisis on European tourism. *Journal of Travel Research*, 48(1), 3-13 https://doi-org.sabidi.urv.cat/10.1177/0047287509336332.

Smeral, E. (2010). Impacts of the world recession and economic crisis on tourism: Forecasts and potential risks. *Journal of Travel Research*, 49(1), 31-38 https://doi-org.sabidi.urv.cat/10.1177/0047287509353192.

Smeral, E. (2012). International tourism demand and the business cycle. *Annals of Tourism Research*, 39(1), 379-400. https://doi.org/10.1016/j.annals.2011.07.015.

Smith, P. E. (1973). The effects of some air pollutants and meteorological conditions on airborne algae and protozoa. *Air Pollution Control*, 23, 876–880 https://doi.org/10.1080/00022470.1973.10469858.

Song, H. & Witt, S. (2000). *Tourism Demand Modelling and Forecasting: Modern Econometric.* Amsterdam: Pergamon.

Song, H., & Wu, D. C. (2022). A critique of tourism-led economic growth studies. *Journal of Travel Research*, 61(4), 719-729 https://doi.org/10.1177/00472875211018514.

Song, H., Dwyer, L., Li, G., & Cao, Z. (2012). Tourism economics research: A review and assessment. *Annals of tourism research*, 39(3), 1653-1682. https://doi.org/10.1016/j.annals.2012.05.023.

Soukiazis, E., & Proença, S. (2008). Tourism as an alternative source of regional growth in Portugal: a panel data analysis at NUTS II and III levels. *Portuguese Economic Journal*, 7, 43-61 https://link.springer.com/article/10.1007/s10258-007-0022-0.

Spotts, D. M., & Mahoney, E. M. (1993). Understanding the fall tourism market. *Journal of Travel Research*, 32(2), 3-15 https://doi.org/10.1177/004728759303200202.

Sraffa, P. (1960). *Production of Commodities by Means of Commodities.* Cambridge: Cambridge University Press.

Stabler, M. J., Papatheodorou, A., & Sinclair, M. T. (2009). *The economics of tourism.* london: Routledge https://doi.org/10.4324/9780203864272.

Stark, O., Taylor, J. E., & Yitzhaki, S. (1986). Remittances and inequality. *The economic journal, 96(383)*, 722-740. https://doi.org/10.2307/2232987.

Suštar, N., & Ažić, M. L. (2020). Measuring Tourism Seasonality Across Selected Mediterranean Countries. *KnE Social Sciences*, 216-229 https://doi.org/10.18502/kss.v4i1.5990.

Suštar, N., and Ažić, M. L.,. (2020). Measuring Tourism Seasonality Across Selected Mediterranean Countries. *KnE Social Sciences,*, 216-229.

Sutcliffe, C.M. & Sinclair, M.T. (1980). The measurementof seasonality within the tourist industry: anapplication to tourist arrivals in Spain. *Applied Economics*, 12(4): 429–441 https://doi.org/10.1080/00036848000000004.

Tang, C. F. (2013). Temporal Granger causality and the dynamics relationship between real tourism receipts, real income and real exchange rates in Malaysia. *International Journal of Tourism Research*, 15(3), 272-284 https://doi.org/10.1002/jtr.1869.

Tang, C. F., & Tan, E. C. (2015). Does tourism effectively stimulate Malaysia's economic growth? *Tourism management*, 46, 158-163 https://doi.org/10.1016/j.tourman.2014.06.020.

Tang, C. F., & Tan, E. C. (2018). Tourism-led growth hypothesis: A new global evidence. *Cornell Hospitality Quarterly*, 59(3), 304-311 https://doi.org/10.1177/1938965517735743.

Tosun, C., Timothy, D. J., & Ozturk, Y. (2003). Tourism growth, national development and regional inequality in Turkey. *Journal of sustainable tourism*, 11(2-3), 133-161.

Townsend, A. (1992). New directions in the growth of tourism employment?: propositions of the 1980s. *Environment and Planning A*, 24(6), 821-832 https://doi.org/10.1068/a240821.

Tse, R. Y. (2001). Estimating the impact of economic factors on tourism: evidence from Hong Kong. *Tourism Economics*, 7(3), 277-293 https://doi.org/10.5367/000000001101297874.

Turner, L.W., and Witt, S.F. (2001). Factors influencing demand for international tourism: Tourism demand analysis using structural equation modelling, revisited. *Tourism Economics*, 7(1), 21–38. https://doi.org/10.5367%2F000000001101297711.

Turrión Prats, J. (2018). Empirical essays on seasonality in tourism (Doctoral dissertation, Universitat Rovira i Virgili).

Turrion-Prats, J., & Duro, J. A. (2017). Tourist seasonality in Catalonia: The relevance of demand factors. *Tourism Economics*, 23(4), 846-853 https://doi.org/10.5367/te.2016.0543.

Turrion-Prats, J., & Duro, J. A. (2017). Tourist seasonality in Catalonia: The relevance of demand factors. *Tourism Economics*, 23(4), 846-853 https://doi.org/10.5367/te.2016.0543.

Turrión-Prats, J., & Duro, J. A. (2019). Seasonality determinants for the main markets in Spain. *International Journal of Tourism Research, 21(4)*, 462-477. https://doi.org/10.1002/jtr.2275.

Tyrrell, T.J. & Johnston, R.J. (2006). The economic impact of tourism: A special issue. *Journal of Travel Research*, 45, 3-7. https://doi.org/10.1177%2F0047287506288876.

UNWTO. (2012). *Tourism Highlights. 2012 Edition.* Retrieved from http://dtxtq4w60xqpw.cloudfront.net/sites/all/files/docpdf/unwtohighlights12enlr_1.pdf Visit on June 28th 2013

UNWTO. (2020). *International Tourism Higlights 2020*. Retrieved from https://www.e-unwto.org/doi/epdf/10.18111/9789284422456

van Leeuwen, E. S., Nijkamp, P., & Rietveld, P. (2009). A meta-analytic comparison of regional output multipliers at different spatial levels: economic impacts of tourism. *Advances in tourism economics: New developments*, 13-33 https://doi.org/10.1007/978-3-7908-2124-6_2.

van Leeuwen, E. S., Nijkamp, P., & Rietveld, P. (2009). A meta-analytic comparison of regional output multipliers at different spatial levels: economic impacts of tourism. In M. Á, P. Nijkamp, & M. Sarmento, *Advances in tourism economics* (pp. 13-33). Physica-Verlag HD https://doi.org/10.1007/978-3-7908-2124-6_2.

Vanegas, M., & R. Croes . (2003). Growth, Development and Tourism in a Small Economy: Evidence from Aruba. *International Journal of Tourism Research*, 5: 315-330 https://doi.org/10.1002/jtr.441.

Vergori, A. S., & Arima, S. (2022). Transport modes and tourism seasonality in Italy: By air or by road? *Tourism Economics*, 28(3), 583-598 https://doi.org/10.1177/1354816620974563.

Wang, Y. (2011). Destination marketing and management: Scope, definition and structure. In Y. Wang, & A. Pizam, *Destination marketing and management: Theories and applications* (pp. 1-20). Cambridge: CAB International.

Wanhill, S. R. (1980). Tackling seasonality: a technical note. *International Journal of Tourism Management, 1(4)*, 243-245.

Wanhill, S. R. (1980). Tackling seasonality: a technical note. . *International Journal of Tourism Management, 1(4),* , 243-245.

Wen, J., & Tisdell, C. (1997). Regional inequality and tourism distribution in China. *Pacific Tourism Review*, 1(2), 119.

Williams, A. M., & Shaw, G. (1988). Tourism: candyfloss industry or job generator? *The Town Planning Review*, 81-103 https://www.jstor.org/stable/40111677.

Williams, A.M. & Shaw, G. (1991). Tourism policies in a changing economic environment. *Tourism & economic development: Western European experiences*. University of Exeter, Exeter, UK Ed. 2 pp.263-272.

Witt, S. F., & Witt, C. A. (1995). Forecasting tourism demand: A review of empirical research. *International Journal of forecasting*, 11(3), 447-475 https://doi.org/10.1016/0169-2070(95)00591-7.

Wooldridge, J. (2002). *Econometric Analysis of Cross Section and Pannel Data.* Cambridge, MA: MIT Press.

WTTC. (2022). *World Travel and Tourism Council. Economic Impact Report*. Retrieved from https://wttc.org/research/economic-impact 12th March 2023

Xiang, Z., Magnini, V. P., & Fesenmaier, D. R. (2015). Information technology and consumer behavior in travel and tourism: Insights from travel planning using the internet. *Journal of retailing and consumer services*, 22, 244-249. https://doi.org/10.1016/j.jretconser.2014.08.005.

Xie, J. (2020). The economic determinants of tourism seasonality: A case study of the Norwegian tourism industry. *Cogent Business & Management*, 7(1), 1732111 https://doi.org/10.1080/23311975.2020.1732111.

Yacoumis, J. (1980). Tackling seasonality: the case of Sri Lanka. *International Journal of Tourism Management, 1(2)*, 84-98.

Yan, M., & Wall, G. (2003). Disaggregating visitor flows: The example of China. *Tourism Analysis, 7(3-4),*, 191-205. https://doi.org/10.3727/108354203108750049.

Yoon, Y., Gursoy, D., & Chen, J. S. (2001). Validating a tourism development theory with structural equation modelling. *Tourism Management*, 22, 363-372. https://doi.org/10.1016/S0261-5177(00)00062-5.

Zaharia, M., Balacescu, A., & Gogonea, R. (2014). Global Crisis'Impact Upon the Employed Number in Hospitality Industry. *Studia Universitatis Babes-Bolyai, Negotia,* , 59(4) https://www.ceeol.com/search/article-detail?id=150037.

Zhang, J., & Cheng, L. (2019). Threshold effect of tourism development on economic growth following a disaster shock: Evidence from the Wenchuan earthquake, PR China. *Sustainability*, 11(2), 371 https://doi.org/10.3390/su11020371.

Zortuk, M. (2009). Economic impact of tourism on Turkey’s economy: evidence from cointegration tests. *International Research Journal of Finance and Economics*, 25(3), 231-239.