Tourism demand and **tourism growth** cycles in Portugal and Spain

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Abstract | This paper investigates the patterns of tourism growth cycles in domestic and international tourism demand for Portugal and Spain with monthly data on visitor's arrivals in tourist accommodation establishments from January 1990 to September 2013. The de-trending method proposed by Hodrick-Prescott filter is used to extract the tourism growth cycles for both resident and non-resident tourists. The Bry-Boschan algorithm finds that the duration of contractions tend to be on average twice longer for resident tourists than for non--resident tourists, and the length of expansions is almost three times higher for non-resident tourists than for resident ones in Portugal. The duration of the tourism growth cycles is much higher in Portugal than in Spain in both groups of tourists by ten to twelve months. Large expansion phases in Portugal tend to coexist with large contraction phases in Spain along the cycles from non-resident tourists. Spectral analysis confirms the existence of one dominant cyclic frequency within tourism demand from both tourist groups. The paper is concluded with a brief discussion of findings.

Keywords | Tourism demand, Expansion, Contraction, Spectral analysis, Iberian Peninsula.

Resumo | Este artigo investiga os padrões de ciclos de crescimento da procura turística nacional e internacional para Portugal e Espanha, através de dados mensais das chegadas de visitantes em estabelecimentos de alojamento turístico, no período de janeiro de 1990 a setembro de 2013. A metodologia aplicada consistiu num filtro de Hodrick-Prescott usado para extrair a tendência da série cronológica relativa à procura turística por turistas residentes e não residentes. O algoritmo de Bry-Boschan considera que a duração das contrações tendem a ser, em média, duas vezes maior para os turistas residentes do que para os turistas não residentes, bem como a duração das expansões é quase três vezes maior para os turistas não residentes do que para os

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residentes em Portugal. A duração dos ciclos de crescimento do turismo é muito mais elevada em Portugal do que em Espanha, em ambos os grupos de turistas por dez a doze meses. As grandes fases de expansão em Portugal tendem a coexistir com grandes fases de contração em Espanha ao longo dos ciclos de turistas não residentes. A análise espectral confirma a existência de uma frequência cíclica dominante na procura turística de ambos os grupos de turistas. O artigo é concluído com uma breve discussão dos resultados.

Palavras-chave | Procura turística, Expansão, Contração, Análise espectral, Península Ibérica.

1. Introduction

Recent research has highlighted the influence of business cycles and economic crises on tourism destinations competitiveness in both emerging and mature destinations (Perles-Ribes, Ramón-Rodríguez, Rubia-Serrano & Moreno-Izquierdo, 2013). Business cycles affect tourism development, and tourism is highly vulnerable to economic fluctuations (Andraz, Gouveia & Rodrigues, 2009). Tourism demand does not response immediately to the business cycles fluctuations, as it happens in the demand of market goods and services, because of substitution effects between different types of destinations and existing lags between the tourist decision and the time of the holiday (Guizzardi & Mazzocchi, 2010). Moreover, the tourism industry is very susceptible to reflect the consequences of various types of disturbances, such as wars, disease outbreaks, terrorist attacks, economic fluctuations, currency instability and energy prices (Gouveia, Guerreiro & Rodrigues, 2013).

Contrary to the literature that connects cyclical fluctuations of the economic activity and tourism demand, this study does not focus directly on the importance of tourism for the transmission of business cycles. It rather employs statistical methods found in business cycle research to assess the patterns of domestic and international tourism demand in Portugal and Spain. These countries rank among the world's most visited tourist destinations where tourism has become an important source of income. The aim of this study is to make an important contribution to tourism policy, planning and business practices in these two neighbouring countries. It contributes to the literature and knowledge advance in the field of tourism demand modelling and forecasting. Monthly observations on visitor's arrivals in tourist accommodation establishments are gathered from January 1990 until September 2013, in order to investigate the pattern of tourism growth cycles for the countries made up by Portugal and Spain. However, unlike previous research, it employs spectral analysis techniques for assessing the cyclic behaviour of tourism demand in the frequency domain.

This paper is structured as follows. Section two presents the key concepts of the business cycle theory, and looks at how these can be applied in tourism demand studies. Section three presents the data and methods, and discusses the empirical results of the tourism growth cycles analysis. Section four presents the conclusions of the study.

2. Business cycle theory and tourism demand analysis

The concept of business cycles refers to fluctuations of economic activity in the long term. The cycle involves alternating periods of expansion, peak, contraction and trough, and of relative rapid growth of output, with periods of relative stagnation or decline, often called contraction or recession. Although the business cycles recur and present a sequence of phases, usually between one and

twelve years, they are not necessarily a periodic phenomenon, tending to be irregular and largely unpredictable. Business cycles are characterized by a movement of a large number of economic activities and not only by the movement of a single variable such as real gross domestic product, although these fluctuations are often measured in terms of variation of output. The business cycle is related with the occurrence of expansion, contraction and recovery in the economy and the economic activity is measured in terms of output. The recessions are a downturn in economic activity, and are usually defined by the existence of two consecutive quarters of declining real gross domestic product.

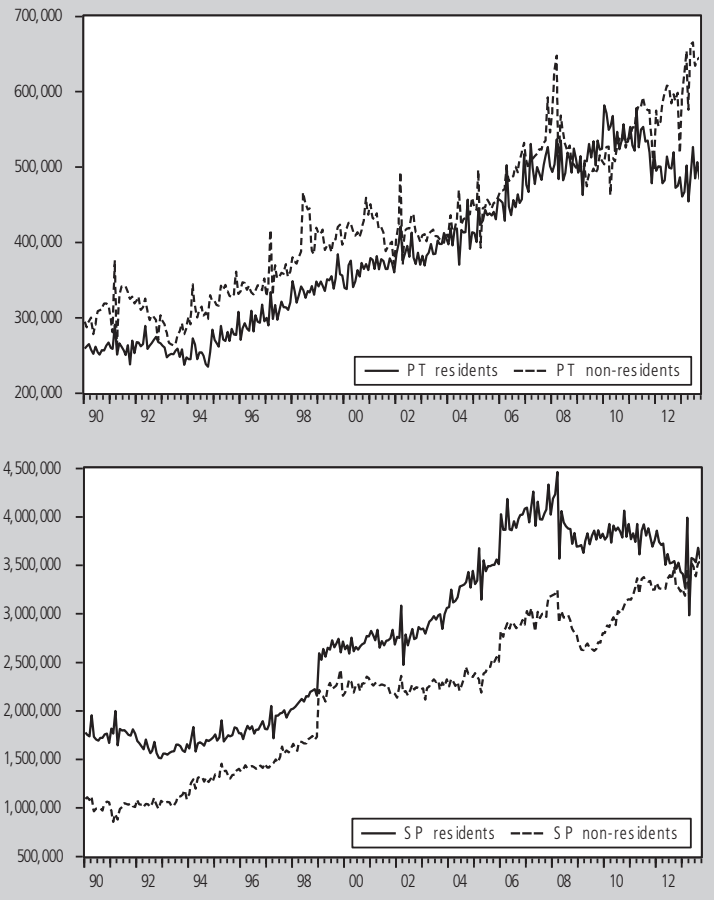
The four parts of a business cycle are contraction, expansion, peak, and trough. A contraction refers to a period of decline in which economic activity measured by the real gross domestic product decreases for at least two quarters. A trough occurs in the end of a contraction and a transition to an expansion. An expansion is characterized by a period of growth in which economic activity tends to increase monthly or yearly. A peak occurs in the end of an expansion and the transition to a contraction. The business cycles fluctuate around a long run trend, represented by a straight line usually with a positive slope. The systematization of cyclic behaviors within the business cycles theory led to the classification of business cycles according to duration. Different types of cycles can be distinguished according to their authors' names: (i) the Kitchin cycle with a short duration, between two and five years; (ii) the Juglar cycle with duration between seven and eleven years; (iii) the Kuznets cycle with duration between fifteen and 25 years; and (iv) the Kondratieff cycle with duration between forty and sixty years.

Research on business cycles developed quickly early in the twentieth century due to an empirical study of fluctuations across periods of prosperity and decline. These were considered alternated states of expansions and contractions trying to capture the process of output determination (Cooley & Prescott, 1995; Shiskin, 1971). Contemporary economists usually agree that business cycles are less systematic and regular that in the ninetieth century when they were proposed.

The business cycle is a relatively simple concept in economics, but two major theoretical schools of economics, namely Keynesians and Monetarists, debate the impacts of length and magnitude of the components of the business cycle. Contrary to Keynesians, some monetarists look at changes in the economy as non-cyclical fluctuations, where the fluctuations in business activity are a consequence of monetary policies. Real business cycle theory advocates that are external shocks, such as innovation and technological progress, drives economic cycles as opposed to the Austrian business cycle theory that suggests business cycles are caused by the excess of speculation or the creation of excess levels of bank capital. However, the question of what causes economic fluctuations remains controversial.

Business cycle behaviour has been implicitly taken into account in tourism demand models (Gouveia et al., 2013). Many empirical studies stress the influence of cyclical movements on tourism demand related with the cyclical fluctuations in the economic cycle (Bleile, 1983; Guizzardi & Mazzocchi, 2010; Hernandez & Léon, 2002; Kožic, 2013; Semeral, 2012). Tourism is an activity stronglý interrelated with economic fluctuations, because output shocks generate important fluctuations in international tourism flows, which are stronger in contractions than in expansions, and tourism is an important channel of international transmission of output shocks (Canova & Dallari, 2013).

Several studies have investigated the tourism demand from the perspective of the economic cycles to explain or predict the changes in the pattern of overall economic activity and their impacts on tourism, despite the fact that, only a few present an accurate business cycle interpretation (Guizzardi & Mazzocchi, 2010). They have investigated the relationship between tourism demand and economic cycles in specific regions or countries, such as, for example, the Mediterranean region (Canova & Ciccarelli, 2012), Portugal (Daniel &



Source: Own construction.

Figure 1 | Resident and non-resident tourist arrivals in Portugal and Spain.

Rodrigues, 2010, 2012), Spain (Hernandez & Léon, 2002; Perles-Ribes et al., 2013), Italy (Guizzardi & Mazzocchi, 2010), and the United Kingdom (Song, Romilly & Liu, 2000).

The published literature also differs in terms of samples, data and methodology employed to study the relation between business cycles and tourism demand. Several authors use a non-parametric approach (Harding & Pagan, 2003) and base their findings on the Hodrick-Prescott filter and a Granger causality (Gouveia et al., 2013; Gouveia & Rodrigues, 2005). Other scholars combine seasonal unit root tests together with methods for seasonal adjustment or decomposition techniques (Koc & Altinay, 2007). Spectral analysis has also been applied relating cyclical movements to exchange rates and passenger flows (Coshall, 2000). A Bayesian panel vector autoregressive model approach is used by Canova and Dallari (2013), unit root testing by Perles-Ribes et al. (2013), and structural time series methods by Guizzardi and Mazzocchi (2010).

3. Data and methods

Domestic and international tourism demand is modelled through the number of nights spent at tourist accommodation establishments by residents and non-residents. The tourist establishments correspond to the

Nomenclature of Economic Activities (NACE) revision two classifications I551 to I553. These include hotels, holiday and other short-stay accommodation, camping grounds, recreational vehicle parks and trailer parks. All data is collected from Eurostat monthly data on tourism industries available on the Internet. The set of time series data include monthly data from January 1990 to September 2013. The data is seasonally adjusted with the X13 Auto Regressive Integrated Moving Average (ARIMA) Seasonal Adjustment Software (SEATS) distributed by the United States Department of Commerce Census Bureau. Figure 1 plots the seasonally adjusted data series. As it can be seen, all-time series show a trend. More specifically, both the data series for resident arrivals in Portugal and Spain indicate an upward trend. The data for non-residents in these countries continued both an upward trend around the years 2008 or 2010 and a downward subsequently.

Since there are monthly observations and a trend in the data, it is necessary to apply a de-trending method that is used as a pre-processing step to prepare time series for the spectral analysis. De-trending methods decompose the series into a trend and a cycle component over time. The cycle components correspond to growth cycles. In this way it is possible to obtain the tourism growth cycles in terms of the growth cycle definition, which represents the fluctuations around the long-term trend of aggregate tourism activity, namely trend-adjusted tourism growth cycles.

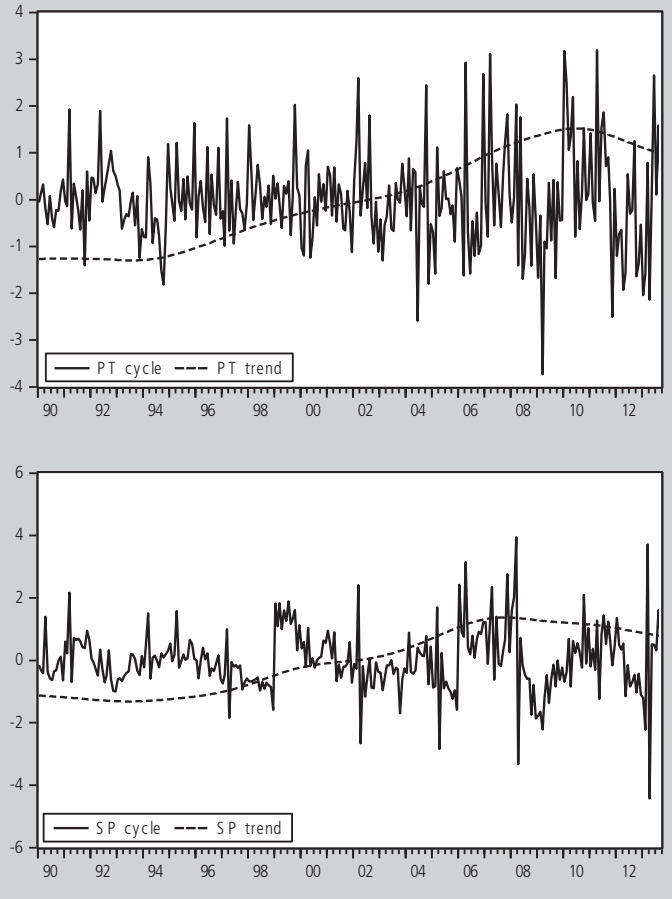


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Figure 2 | Trends and tourism growth cycles components for residents in Portugal and Spain.

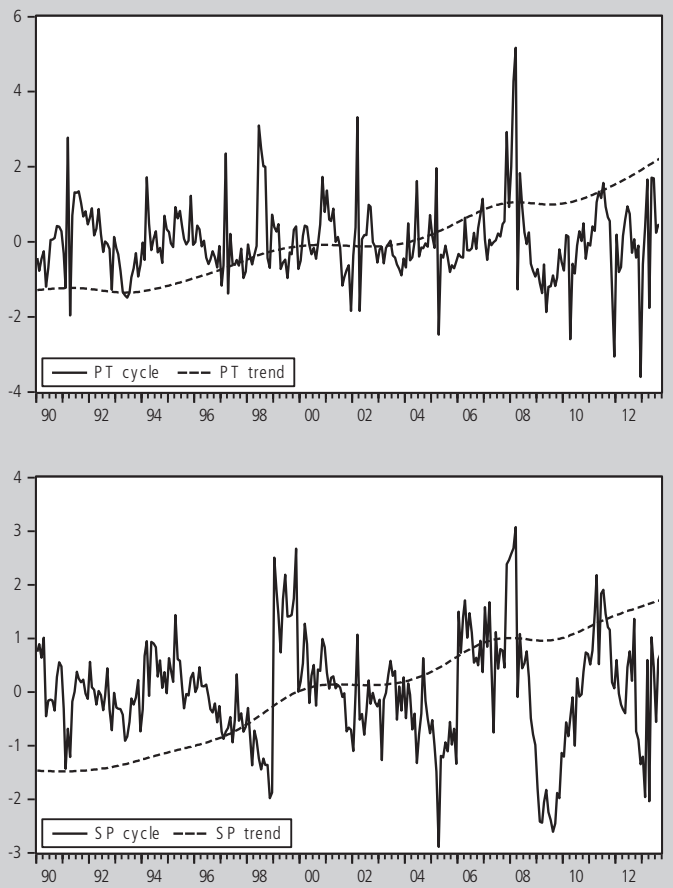

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Figure 3 | Trends and tourism growth cycles components for non-residents in Portugal and Spain.

The Hodrick-Prescott filter algorithm is applied to the data series (Hodrick & Prescott, 1997). Also known as the Hodrick-Prescott filter, this de-trending method is widely used in empirical macroeconomics research. Let's suppose that $x_t = g_t + c_t$ where a series x_t is composed by a trend component g_t and a cyclical component c_t. The method implies isolating the cycle component by solving the following minimization problem:

$$\sum_{t=1}^{T}(x_t - g_t)^2 + \lambda \sum_{t=2}^{T-1}[(g_{t+1} - g_t) - (g_t - g_{t-1})]^2$$

The first term is a measure of the fitness of the time series while the second term is a measure of the smoothness. A 'trade-off' parameter λ keeps track of a possible conflict between 'goodness of fit' and 'smoothness'. If λ is 0, the trend component becomes equivalent to the original series while λ diverges to infinity, the trend component approaches a linear trend. The Hodrick-Prescott filter acts to remove a trend from the data by solving a least square problem. The value of parameter λ depends on the frequency of the data. Since the data set consists of monthly data, we set λ=14400 which is the value suggested in the literature for monthly data.

The de-trending method has been able to separate tourism-cycle elements from slowly evolving secular trends and rapidly varying and irregular components. Figures 2 and 3 report for each country the trends and tourism growth cycles components,

Table 1 | Tourism growth cycles of resident and non-resident tourists in Portugal.

Trough	Peak	Previous contraction (number of months from previous peak to trough)	Expansion phase (number of months from trough to peak)	Length of the cycle (number of months from peak to peak)
Residents				
-	1991:03	-	-	-
1994:10	1995:04	43	6	49
1997:06	1998:01	26	7	33
2004:11	2007:03	82	28	110
2009:03	2010:01	24	10	34
2010:06	2011:04	5	10	15
2013:04	-	24	-	-
Average		36	12.2	48.2
Trough	**Peak**	**Previous contraction (number of months from previous peak to trough)**	**Expansion phase (number of months from trough to peak)**	**Length of the cycle (number of months from peak to peak)**
Non-residents				
-	1991:03	-	-	-
1993:06	1995:11	27	29	56
1997:11	1998:06	24	7	31
1999:07	2000:11	13	16	29
2001:12	2008:03	13	75	88
2009:05	2011:07	14	26	40
2011:12	-	5	-	-
Average		18.2	30.6	48.8

Source: Own construction.

respectively, for residents and non-residents. The vertical axis indicates that the data is normalized for both countries. Clearly, there is an upward secular trend for non-resident tourists. The plots involving resident tourists show that trend components move up and then down in both countries.

The approach to dating reference tourism growth cycles is conceptually related to the implementation of the Bry-Boschan business cycle dating algorithm (Bry & Boschan, 1971). This method is used for the calculation of the duration in months of the expansions and contractions, in addition to the identification of turning points in the tourism growth cycles. Troughs and peaks are defined as the ending points of contractions and expansions, respectively, that is as points of minimal or maximal growth. The expansion (contraction) is defined as a time span between a cyclical trough (peak) and peak (trough). Table 1 presents the troughs, peaks, expansions and contractions, along with the length of tourism growth cycles for resident and non-resident tourist's arrivals in Portugal. The first column reports the year and month of tourism growth cycles troughs (the end of contraction). The second column displays the year and the month of tourism growth cycles peaks (the end of expansion). The next two columns are the lengths of contractions and expansions in months. The last column indicates the total duration of tourism growth cycles, in months, measured from peak to peak.

Table 2 shows that expansions and contractions of the tourism growth cycles occur at irregular intervals and last for varying lengths of time. The longest expansion of resident tourists, which lasted for 28 months, began with a trough in November 2004. This trough ended an 82 months contraction that begins in January 1998. Prior to that there was a 26 months contraction from April 1995 to June 1997. The numbers for resident tourists indicate that expansions have ranged from a low of six months

to a high of 28 months, whereas for non-resident tourists these vary from a low of seven months to a high of 75 months. The longest expansion for non-resident tourists begins in December 2001 and ends in March 2008. It is followed by a 26 months period of expansion that starts in May 2009.

The numbers reveal five cycles for both resident and non-resident arrivals in Portugal's tourism activity since 1990. The tourism growth cycles for residents average 48.2 months in length corresponding to 12.2 months of expansion and 36 months of contraction. The tourism growth cycles for non-residents average 48.8 months in length equal to 18.2 months of contraction and 30.6 months of expansion. On average the length of resident and non-resident tourism growth cycles is quite similar measured by the number of months from peak to peak. However, the duration of contractions tend to be twice longer for resident tourists than for non-resident tourists, and the duration of expansions is almost three times higher for non-resident tourists than for resident tourists.

The results further indicate that there are seven cycles for resident arrivals and six cycles for non-resident arrivals in Spain's tourism activity since 1990. The tourism growth cycles for residents average 34.9 months in length equivalent to 18.7 months of contraction and 16.2 months of expansion. The tourism growth cycles for non-residents average 39.5 months in length that corresponds to 13.5 months of expansion and 26 months of contraction. On average, the duration of contractions is much higher for non-resident tourists than for resident ones, whereas the opposite holds in the case of expansions. Thus, most of the differences in cycle duration are found in the duration of contractions that are much longer

Table 2 | Tourism growth cycles of resident and non-resident tourists in Spain.

Trough	Peak	Previous contraction (number of months from previous peak to trough)	Expansion phase (number of months from trough to peak)	Length of the cycle (number of months from peak to peak)
Residents				
-	1991:03	-	-	-
1992:12	1995:04	21	28	49
1998:12	1999:07	44	7	51
2000:07	2001:01	12	6	18
2002:04	2004:02	15	22	37
2005:04	2006:04	14	12	26
2007:05	2008:03	13	10	23
2009:03	2011:07	12	28	40
2013:04	-	21	-	-
Average		18.7	16.2	34.9
Trough	**Peak**	**Previous contraction (number of months from previous peak to trough)**	**Expansion phase (number of months from trough to peak)**	**Length of the cycle (number of months from peak to peak)**
Non-residents				
1991:02	1991:07	-	5	-
1993:05	1994:03	22	10	32
1998:11	1999:11	56	12	68
2002:01	2003:06	26	17	43
2005:04	2006:04	22	12	34
2007:05	2008:03	13	10	23
2009:08	2011:04	17	20	37
2013:04	-	24	-	-
Average		26	13.5	39.5

Source: Own construction.

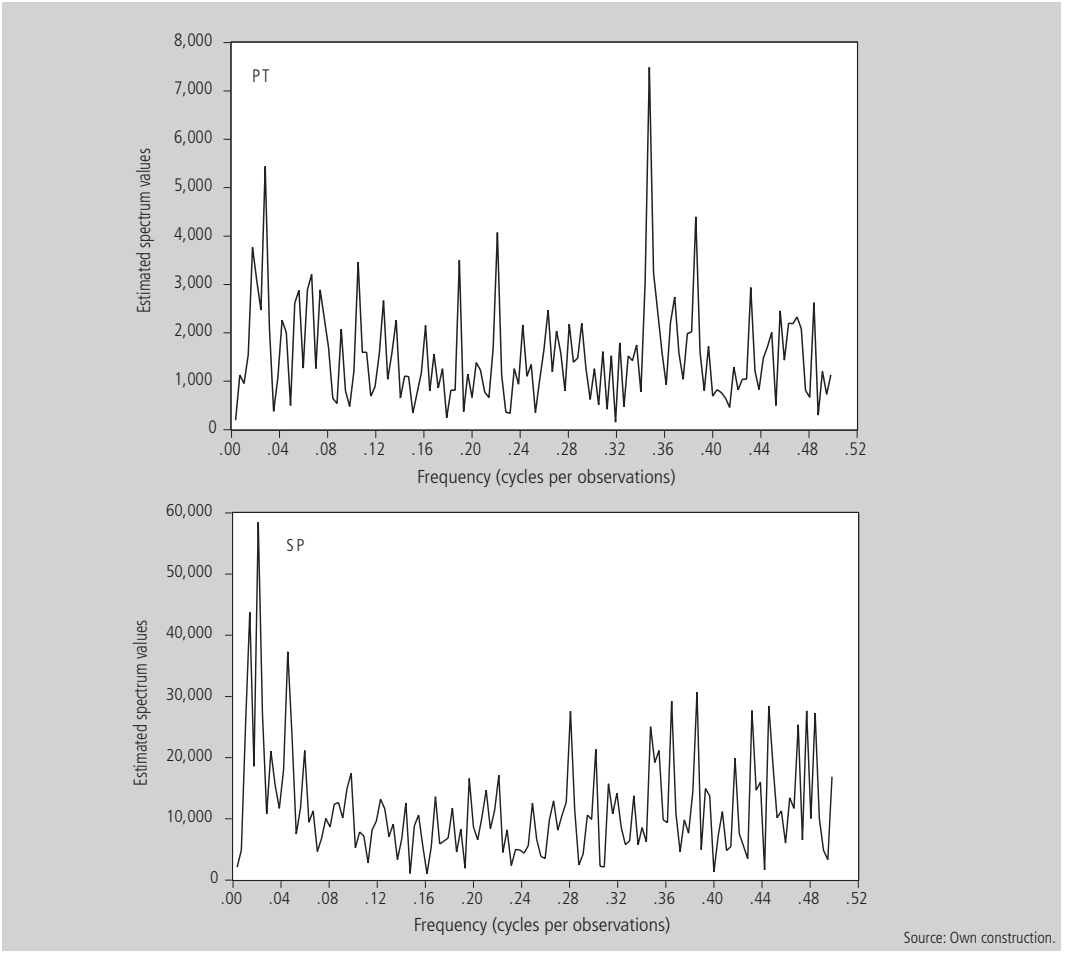

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Figure 4 | Spectral analysis of tourism growth cycles for residents in Portugal and Spain.

as compared to the average length of expansions between the two groups of tourists.

There is little to no gap on average between the length of the tourism growth cycles of resident tourists and non-resident tourists in Portugal and Spain. However, the duration of the tourism growth cycles is much higher in Portugal than in Spain in both groups of tourists by ten to twelve months. Higher contraction periods for resident tourists and non-resident tourists dominate in Portugal and Spain, respectively. Large expansion phases in Portugal tend to coexist with large contraction phases in Spain along the tourism growth cycles from non-resident tourists.

We now proceed to spectral analysis to investigate the cyclical proprieties of tourism demand in the frequency domain (Bloomfield, 2000). This method is usually referred as frequency domain analysis which generates a frequency spectrum via a Fourier transform resulting in values presented as amplitude and phase, both plotted against frequency. Fourier transforms maps a time-series from its time domain into the series of frequencies (their amplitude and phases). The spectral plot is employed as a graphical technique for examining cyclic structure in the frequency domain. The spectral plot is used to answer the question if there is a dominant cyclic frequency. The frequency is

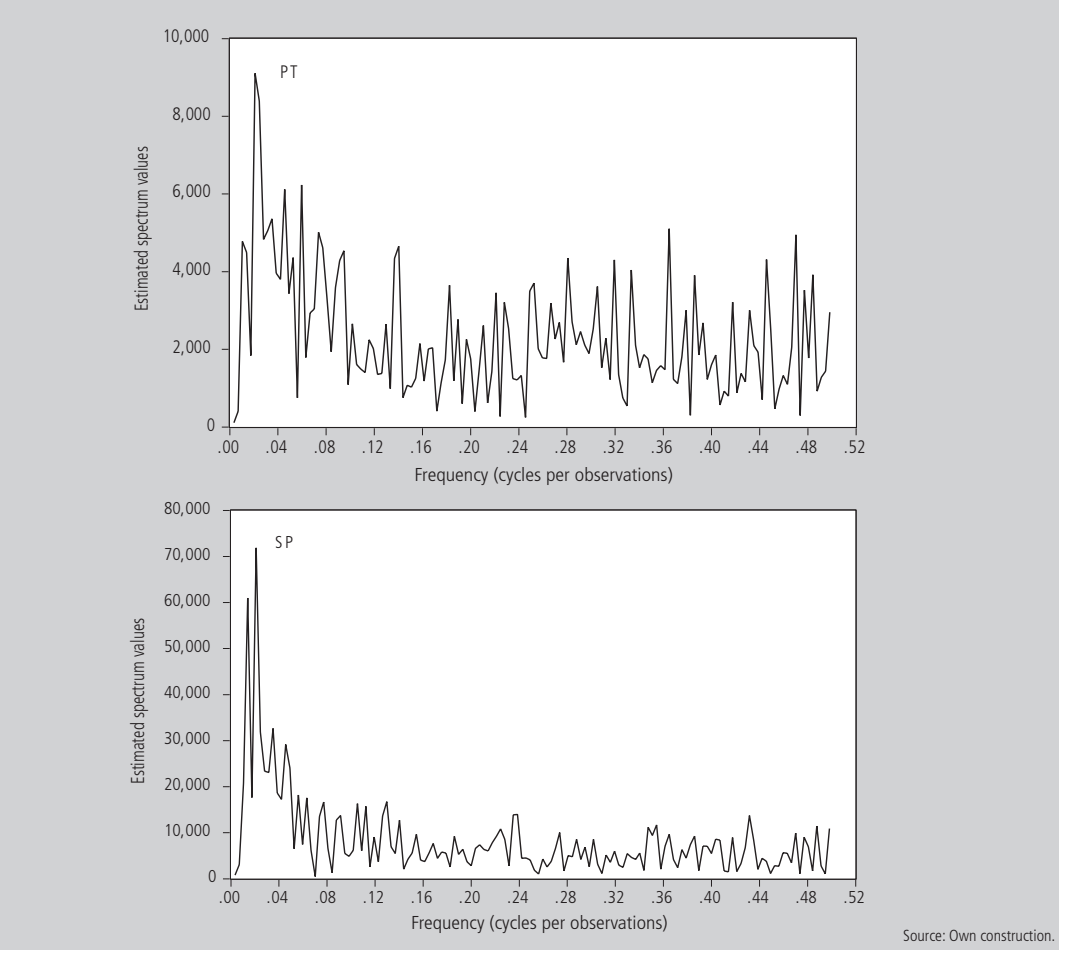

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Figure 5 | Spectral analysis of tourism growth cycles for non-residents in Portugal and Spain.

measured in cycles per unit time. Figure 4 indicates one dominant frequency of approximately 0.34821 cycles per observation (the plot on the left hand side) and another dominant frequency in the beginning of the right hand side plot of roughly 0.02597 cycles per observation. Figure 5 also identifies a dominant frequency around 0.02113 and 0.02069 cycles per observation in both left and right plots.

In the case of Portugal, the highest peak frequencies are 0.34821 and 0.02597 for residents and non-residents tourists, respectively. The former corresponds to approximately 2.9 months and the latter is equal to 38.5 months peak periods. The figures are larger for Spain. Indeed, the results indicate that the highest peak frequencies are 0.02113 (47.3 months) and 0.02069 (48.3 months). All the detected dominant highest peak frequencies are statistically significant at conventional levels of significance. Hence, the spectral analysis confirms the existence of one dominant cyclic frequency within tourism demand from residents and non-residents in both countries.

4. Conclusions

This paper investigates the pattern of tourism growth cycles in Portugal and Spain with monthly

data on domestic and international tourist arrivals during the period from January 1990 to September 2013. The empirical investigation applies different methods to tourism demand analysis which are commonly employed in leading theories of the business cycle in economics.

Results indicate that in Portugal the duration of contractions tend to be on average twice longer for resident tourists than for non-resident tourists, and the length of expansions is almost three times higher for non-resident tourists. The duration of the tourism growth cycles is also much higher in Portugal than in Spain in both groups of tourists by approximately ten to twelve months on average corresponding to a Juglar cycle in length. Higher contraction periods for resident tourists and non-resident tourists dominate in Portugal and Spain, respectively. Large expansion phases in Portugal tend to coexist with large contraction phases in Spain in the tourism growth cycles of non-residents. The existence of one dominant cyclic frequency within tourism demand of residents and non-residents is confirmed by spectral analysis.

One limitation of this empirical study is its application only to Portugal and Spain although the comparision of the two Iberian countries on growth cycle profiles is of importance to understand the dynamics of tourism demand. The main findings cannot be generalized to other countries albeit Portugal and Spain are main tourist destinations in Europe. The present study is of interest since there is a lack of studies on tourism demand and the business cycle. The main contribution of this study is to look into ways of analyzing tourism cycles patterns of traditional south European tourist destinations with modern tools for business cycles analysis. The strenght of this empirical investigation is on its statistical metholological application, but it missed to explore the linkages between tourism cycles and the business cycles. Therefore, it would be particularly fruitful for future research to shift attention to tourism demand across business cycles and to incorporatate macroeconomic effetcs, such as asymmetric income effects, inflation and unemployment effects, but also economic policy of governments effects.

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