5. Measuring pattern, amplitude and timing differences between monetary and non-monetary seasonal factors of tourism - The case of Aruba

Abstract

Seasonality is a frequent and important occurrence in the tourism industry, with concurrent effects on both the financial and volume flows of tourism. The purpose of this study is to measure pattern, amplitude, and timing differences between the seasonal factors of monetary and non-monetary indicators of tourism development in Aruba. The study contributes to filling the gap in the literature on the dynamics in the co-movement of these two types of seasonal factors, with the simultaneous incorporation of three measurement dimensions of this relation. The methodology involves decomposing time series on both stay-over tourism and tourism expenditures using the Census X-12 technique, with the subsequent calculation of Pearson’s correlation coefficients, ratios of amplitudes, and timing differentials of peaks and troughs. The results show important differences in the pattern, amplitude, and timing of the seasonal factors.

Keywords: seasonality, Aruba, monetary and non-monetary tourism indicators, seasonal patterns, seasonal amplitude, seasonal timing

1. This chapter is based on:
Ridderstaat, J., & Nijkamp, P. (XXXX). Measuring pattern, amplitude and timing differences between monetary and non-monetary seasonal factors of tourism - The case of Aruba. *Tourism Economics (accepted for publication).*
5.1 Introduction

Seasonality is a concept frequently encountered in the tourism industry. It is one of the most problematic issues facing tourism, yet it is one of the least understood aspects of this business (Jang, 2004). Its importance crosses over from the academic literature to the domains of policy making and practical tourism management (Koenig-Lewis & Bischoff, 2005; De Cantis et al., 2011). Butler (2001) defines (tourism) seasonality as ‘…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 in highways and other forms of transportation, employment and admissions to attractions.’ (p. 5).

According to Hylleberg (1992), the causes of seasonality fall into three groups, i.e. weather (e.g. variations in temperature, rainfall, snowfall, sunlight, daylight, etc.), calendar effects (e.g. timing of religious events such as Christmas, Easter, etc.), and timing decisions (e.g. school vacations). From the perspective of tourism, Butler (2001) distinguishes between institutional seasonality (resulting from the religious, cultural, ethnic, and social behavior of humans) and natural seasonality (which has to do with regular temporal and recurring variations in natural phenomena, for example, the climate). The typologies of both authors have common linkages with each other (e.g. weather seasonality with natural seasonality), which boils down to the seasonal phenomenon being a combination of both man-made and natural events.

There are numerous effects ascribed to seasonality, and understanding these impacts is critical for the tourism industry, because seasonal variations can affect destination image, destination choice, and tourists’ decisions on spending (Goh, 2012). Periodical swings in the flow of tourists, for example, produce situations of overcapacity, non-utilization of infrastructure, decrease in the workforce, and a lack of investments during low seasons (Pegg et al., 2012), causing reduced profitability and productivity (Karamustafa & Ulama, 2010). On the other hand, peak seasons of tourist flows can be characterized by overuse of public utilities (e.g. water supply, waste management, and road use), causing dissatisfaction for residents and tourists alike, while the environment can suffer from irreversible damage because of tourism pressures (Cuccia & Rizzo, 2011). These effects may explain why there have been considerable efforts from both the public and private sectors to attempt to reduce seasonality in destination areas (Cannas, 2012). But, the literature also shows that seasonality does not always have a negative influence. For example, the environment needs a period of time to recover from heavy usage during peak seasons (Pegg et al., 2012), while maintenance work on buildings and attractions can be better done during
off-peak periods (Cannas, 2012). It is, however, generally recognized that seasonality has more negative effects, particularly from a socio-economic perspective (Karamustafa & Ulama, 2010). In any case, identifying the seasonal model which affects a destination’s tourism is necessary in order to better understand and cope with the recurring developments in tourism.

Three important weaknesses have been identified in the literature on tourism seasonality. Firstly, the literature has mostly compared seasonality between non-monetary indicators of tourism development (e.g. comparing the seasonality of visitors from different countries of origin), with much less emphasis on seasonal relationships between monetary and non-monetary indicators. Seasonality is not an isolated event, but occurs in both the physical and the financial facets of tourism development. Each type of indicator has its own importance for the tourism industry. For example, monetary indicators could be important for the profitability of businesses and the generation of foreign exchange for destinations, while non-monetary indicators, such as the number of visitors may be important for job stability (e.g. the more visitors there are during each time of the year, the more people are needed on an ongoing basis to serve them properly). The comparison between monetary and non-monetary tourism seasonal factors could be important for when considering anti-seasonal policies. The literature on this type of policy (see, e.g., Yacoumis, 1980; Croes & Hooimeijer, 2007; Koenig-Lewis & Bischoff, 2010; Cannas, 2012) has been particularly geared towards finding solutions for the physical side of tourism seasonality (e.g. attracting more visitors or reducing their numbers during certain periods) with much less consideration for the role of financial traits in seasonality. Secondly, differences in seasonality between monetary and non-monetary tourism indicators can occur because of dissimilarities in patterns, levels of seasonal intensities as well as timing inconsistencies (e.g. seasonal peaks occurring earlier in one variable compared with the others). The literature has considered combinations of two of these measurement approaches (e.g. Drakatos, 1987; Koenig-Lewis & Bischoff, 2005; Croce & Wöber, 2010), but as far as is known, no study has considered all three lines of measurement together. Thirdly, when analyzing tourism seasonality using time series, the recurring periodic variations are best recognized and evaluated when eliminating other factors, such as trend and incidental elements. A number of authors have emphasized the available tools to quantify seasonality (e.g. Bender et al., 2005; Koenig-Lewis & Bischoff, 2005; De Cantis & Ferrante, 2011; De Cantis et al., 2011), where popular

---

11 Anti-seasonal policies are policies designed to counter the effect of seasonality on tourism, for example, by encouraging tourists to visit the destination in the off-season.
methods such as the Gini coefficient, the coefficient of variation, and the seasonal index have been analyzed. However, the literature has given little attention to the diagnostics of the calculated seasonal factors, which determines their adequacy. Ignoring the traits of the seasonal factors could possibly bias the conclusions of seasonality studies.

The purpose of this paper is to compare the discrepancies in the seasonal factors of monetary and non-monetary indicators of tourism development in Aruba, in terms of patterns, amplitude, and timing differences. Understanding the differences in seasonality between both monetary and non-monetary tourism indicators could provide policy-makers and practitioners of tourism (revenue) management with crucial information on how to design the appropriate mix of measures to simultaneously cope with the seasonal phenomenon in both these types of indicators of tourism development. The methodology involves decomposing time series on both monetary and non-monetary variables using the Census X-12 technique, with the subsequent calculation of Pearson’s correlation coefficients, amplitude and timing differentials.

This study makes a triad of contributions to the literature. Firstly, the study compares the seasonality of both monetary and non-monetary factors, which has received little attention in the literature. The proposed research contributes to filling this gap in the literature by improving the understanding of the dynamics of the co-movement of monetary and non-monetary seasonal indicators of tourism. Secondly, the study simultaneously explores three dimensions of seasonality, which is most likely a novel approach to the tourism seasonality literature. Thirdly, the study also contributes to the literature on seasonality in small open island economies like that of Aruba.

The rest of this paper is organized as follows. Section 5.2 presents an overview of the literature covering the empirical relationship between seasonal factors and tourism. Section 5.3 briefly discusses tourism development and seasonality in Aruba. Section 5.4 reviews the data and the applied methodology, while Section 5.5 presents the empirical results. Finally, Section 5.6 concludes, then explains the policy implications and suggests possible directions for future research.

5.2 Literature Review

The tourism literature has considered the seasonality phenomenon from several angles of approach. For example, Ashworth & Thomas (1999), Dritsakis (2008) and Karamustafa & Ulama (2010) studied seasonality, using one or more methods to measure this phenomenon. A second group of
studies (Goh & Law, 2002; Kulendran & Wong, 2005; Lim et al., 2009; Vergori, 2012) adopted a forecasting perspective, examining several models for forecasting tourism demand, with a relevant role given to seasonality. Another cluster in the tourism literature has investigated seasonality as an impacted or impacting factor (e.g. Lim & McAleer, 2000; Yu et al., 2009, 2010; Hadwen et al., 2011; Boffa & Succurro, 2012; Goh, 2012; Pegg et al., 2012). For example, Yu et al. (2010) found that the seasonal factor of weather conditions impacted the seasonality of demand for two parks in the United States. Alternatively, authors such as Yacoumis (1980), Baum & Hagen (1999), Sharpley (2003), Jang (2004), Koenig-Lewis & Bischoff (2005), Croes & Hooimeijer (2007) and Cannas (2012) looked at the formulation and implementation of anti-seasonal policies to contain seasonal effects. An extensive part of the seasonality literature has considered this repetitive fluctuation by comparing seasonal differences of tourism demand data in particular (Drakatos, 1987; Donatos & Zairis, 1991; Fernández-Morales, 2003; Bender et al., 2005; Koenig & Bischoff, 2002; Ahas et al., 2007; Koc & Altinay, 2007; Croce & Wöber, 2010; De Cantis & Ferrante, 2011; De Cantis et al., 2011). For example, Drakatos (1987) compared the monthly seasonal patterns of arrivals in Greece from several destinations (including Austria, Italy, France, the United Kingdom, Yugoslavia, and the US) for the period 1980-1985, and found considerable differences between the seasonal patterns of the nationalities arriving in Greece. Lim & McAleer (2000) compared the seasonal patterns of tourist arrivals from Hong Kong, Malaysia, and Singapore in Australia, and noted substantial differences between the seasonal patterns of these three tourism-generating countries.

There is no general agreement as to which data should be used to measure and analyze seasonality (Koenig-Lewis & Bischoff, 2005). Tourism demand in the studies which compare seasonality has been represented by variables such as tourist arrivals (Drakatos, 1987; Lim & McAleer, 2000; Bender et al., 2005); average spending per person (Koc & Altinay, 2007); hotel nights (Fernández-Morales, 2003); bednights (Croce & Wöber, 2010); and hotel bed occupancy rates (De Cantis & Ferrante, 2011; De Cantis et al., 2011). These variables are often linked to international demand for the destination studied, although in some instances (e.g. De Cantis & Ferrante, 2011; De Cantis et al., 2011) domestic demand has also been included in the analysis. With the exception of Koc & Altinay (2007) and Croes et al. (2011), these studies have been almost exclusively based on comparing the seasonality of non-monetary indicators. The study by Koc & Altinay (2007) comes close to analyzing the differences in seasonal patterns of both the monetary and non-monetary indicators of tourism development by investigating seasonal variations in monthly spending per tourist in Turkey. Their findings, based on monthly data on tourism arrivals and
tourism receipts between 1992-2004, suggest that the seasonal pattern in per
person tourist spending is considerably different from the seasonal pattern of
tourist arrivals and tourism receipts. Croes et al. (2011) analyzed the
difference in monthly shares between the number of stay-over visitors to
Aruba and their spending, and found differences in peaks between the
monetary and the non-monetary indicators of tourism. Since only monthly
shares have been compared, the findings may contain traces of other
elements in the series, like incidentals and changes in cyclical patterns that
may affect the outcome. Thus, a more rigorous investigation than that of
monthly shares is necessary.

Analyzing seasonality requires the ability to satisfactorily quantify this
phenomenon. Yet, there are no general guidelines on how to measure
seasonality (Koenig-Lewis & Bischoff, 2005). The methodologies applied in
calculating and analyzing the seasonal patterns vary from study to study. For
example, Bender et al. (2005) applied several measures of seasonality,
including the seasonality ratio and the Gini coefficient, combined with bi-
variate Pearson’s correlation to gauge and evaluate seasonality. Koenig &
Bischoff (2002) used a multiplicative model of seasonal decomposition
(whereby the seasonal factor was determined as the difference between the
actual and the average value), and different measurement techniques,
including concentration indices, Gini coefficients, amplitude ratios, and
indices of similarity to analyze the seasonality. Croce & Wöber (2010)
calculated the average number of bednights of 20 European city destinations
as a proxy for the seasonal patterns, and subsequently applied Gini
coefficients and Pearson’s bi-variate correlation coefficients to make
seasonal comparisons. The methodological differences also determined
whether variations in seasonality were fixed for the whole period of analysis
(e.g. Drakatos, 1987; Bender et al., 2005), or varied over the course of time
(e.g. Koenig & Bischoff, 2002; Koc & Altinay, 2007; De Cantis & Ferrante,
2011; De Cantis et al., 2011).

Most of the studies were geared towards exploring differences in
seasonal patterns, and, in some instances (Koenig-Lewis & Bischoff, 2005;
Croce & Wöber, 2010), both patterns and amplitude differences were
analyzed. None of the studies considered examining differences in timing
between the seasonal factors, which is regarded as an omission in these
studies.

While all investigations found important differences in seasonality,
there are two key methodological drawbacks found in the analyzed
literature. Firstly, apart from some exceptions like the rigorous work by Koc
& Altinay (2007), Dritsakis (2008), and Vergori (2012), little attention has
been given to the issue of whether the seasonal factors were deterministic or
stochastic in nature. This distinction is important because stochastic
seasonal series have a long memory, whereby shocks will last forever and may actually permanently change the seasonal pattern (Hylleberg et al., 1990). According to Beaulieu & Miron (1993), the investigation of seasonal unit roots logically precedes the examination of other kinds of seasonality, because the latter can produce spurious results if seasonal unit roots are present but unaccounted for. Secondly, many of the studies do not provide any diagnostics on either the presence of seasonality, or the calculated seasonal patterns themselves. For example, one cannot determine the quality of the calculated seasonal data in these investigations. Lack of qualitatively adequate seasonal factors can produce biased results in the analysis of seasonality. Bearing in mind these methodological requirements can improve the reliability of the final results.

5.3 Tourism and Seasonality in Aruba

Aruba is a small island located about 32 km from the Northern coast of Venezuela. It has an area of 180 km² (or about 1½ times the surface area of Walt Disney World in Orlando, Florida), and a population of about 100,000 people. Tourism is the mainstay of the Aruban economy. According to the World Travel and Tourism Council (2012), tourism accounted for about 2/3 of Aruba’s total GDP and employment in 2011. The United States (US) is by far the largest market for Aruba, accounting, on average, for 65.4% of all stay-over visitors between 1996-2011. The Venezuelan market is the second largest market for Aruba (averaging 12.2% between 1996-2011). Together, these two countries accounted, on average, for about 77.6% of all stay-over visitors to Aruba between 1996-2011. Other smaller markets include, among others, Colombia, the Netherlands, Canada, Argentina, and Brazil.

Studies on the seasonality of tourism in Aruba are limited and sketchy. For example, Vanegas & Croes (2003), in a study based on quarterly shares of markets of origin of tourism demand in 2000, concluded that visitors from the US were less inclined to visit Aruba during the third quarter, while Venezuelans preferred to visit the island during this quarter. The latter period coincides with the national holidays and the long school vacations in Venezuela. The study further concluded that 24.9% of all stay-over visitors came to Aruba in the first quarter; 24.4% in the second quarter; 27.3% in the third quarter; and 23.4% in the fourth quarter. The conclusions were based only on a single year (2000), which makes it difficult to make a satisfactory inference about seasonality traits in Aruba. Alternatively, a study by Croes & Hooimeijer (2007), applying a simple shares calculation as a proxy for seasonal factors, concluded that Aruba has few problems with seasonality, which is in line with the inference of Croes et al. (2011) who found that
seasonality has been pretty stable over time, with no lasting effects of incidental developments such as the September 11 events, the Natalee Holloway case\textsuperscript{12}, etc. Characteristically for these studies is that they were based on simple techniques to analyze the seasonality phenomenon in Aruba, and the resulting conclusions could still contain traces of irregular developments that could put a veil on the seasonal factors.

\textbf{5.4 Data and Methods}

This study employs the variables tourism expenditures and stay-over tourism as proxies for, respectively, the monetary and non-monetary indicators of tourism. Both variables are included in aggregate form, with further segmentation into the US, Venezuelan, and other tourism markets. The US and Venezuelan markets are included separately, given their relative importance in Aruba’s stay-over tourism (the latter is defined here as tourists remaining for 1 night or longer on the island). The other markets’ segment includes all other tourism markets (Colombia, the Netherlands, Canada, Argentina, Brazil, etc.). Data on the monetary indicators were derived from the periodical survey of the Central Bureau of Statistics of Aruba, and covered the period of the first quarter of 1996 up to and including the fourth quarter of 2011. Data on stay-over tourism were from the Central Bank of Aruba.

Table 5.1 presents an overview of the variables involved in the study, which were transformed into log functions to stabilize their variance (Farooque, 2003). The table also includes a number of descriptive statistics of the applied variables, i.e. the mean, median, maximum, minimum, standard deviation, and coefficient of variation. The mean and median values of all variables were fairly close to each other. This implies the absence of significant outliers, as can be seen by the small differences between the minimum and the maximum values, and the relatively low coefficients of variation.

\footnotesize
\textsuperscript{12} Natalee Holloway was an American student who disappeared while on vacation on the island of Aruba on May 30, 2005. This case caused a media sensation, particularly in the US.
Table 5.1: Variables used in the study

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Mean</th>
<th>Median</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Standard deviation</th>
<th>Coefficient of variation (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSTAYVIS_TOT</td>
<td>Total number of stay-over visitors</td>
<td>12.1</td>
<td>12.1</td>
<td>12.3</td>
<td>11.9</td>
<td>0.1</td>
<td>0.9</td>
</tr>
<tr>
<td>LSTAYVIS_USA</td>
<td>Number of stay-over visitors from the US market</td>
<td>11.7</td>
<td>11.7</td>
<td>12.0</td>
<td>11.2</td>
<td>0.2</td>
<td>1.4</td>
</tr>
<tr>
<td>LSTAYVIS_VEN</td>
<td>Number of stay-over visitors from the Venezuelan market</td>
<td>9.9</td>
<td>9.9</td>
<td>10.8</td>
<td>9.0</td>
<td>0.4</td>
<td>4.5</td>
</tr>
<tr>
<td>LSTAYVIS_OTH</td>
<td>Number of stay-over visitors from the other markets</td>
<td>10.6</td>
<td>10.6</td>
<td>11.0</td>
<td>10.2</td>
<td>0.2</td>
<td>1.9</td>
</tr>
<tr>
<td>LTOUREXP_TOT</td>
<td>Total expenditures made in Aruba by all stay-over visitors</td>
<td>11.9</td>
<td>11.9</td>
<td>12.3</td>
<td>11.6</td>
<td>0.1</td>
<td>1.1</td>
</tr>
<tr>
<td>LTOUREXP_USA</td>
<td>Total expenditures made in Aruba by stay-over visitors from the USA</td>
<td>11.4</td>
<td>11.5</td>
<td>12.0</td>
<td>10.9</td>
<td>0.2</td>
<td>2.0</td>
</tr>
<tr>
<td>LTOUREXP_VEN</td>
<td>Total expenditures made in Aruba by stay-over visitors from Venezuela</td>
<td>9.9</td>
<td>9.9</td>
<td>10.7</td>
<td>9.1</td>
<td>0.4</td>
<td>4.3</td>
</tr>
<tr>
<td>LTOUREXP_OTH</td>
<td>Total expenditures made in Aruba by stay-over visitors from the other markets</td>
<td>10.5</td>
<td>10.4</td>
<td>11.0</td>
<td>10.1</td>
<td>0.2</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Note: All data are in logarithms. The coefficient of variation is equal to the ratio between the standard deviation and the mean.
To obtain a preliminary impression of the seasonal differences between the monetary and non-monetary tourism indicators, the authors first calculated the quarterly ratios of each indicator in their annual total. Then, they subtracted 25% from the results. The 25% was a proxy for the case when there was no seasonal factor influencing the quarterly results, where under normal conditions the ratio would be 25% for each quarter. The remaining values after subtraction provided a preliminary indication of the seasonal factors. Combinations of both monetary and non-monetary seasonal factors are presented in Figure 5.1. The first chart (Chart 1a), which represents the total of all markets, shows little co-movements in the early years, but the linear interrelationship becomes stronger in the later years, particularly as of 2007. The upper and lower boundaries of tourism expenditures generally seem to be larger than those of stay-over tourism, indicating stronger effects of seasonal factors on tourism revenues than visitor numbers. The results for the US market show much more instances of closely aligned movements between the two variables, although the width of tourism expenditures generally seems larger than that of stay-over tourism (Chart 1b). The case of Venezuela also shows close co-movements, where the width of the upper and lower limits are fairly similar, particularly since 2009 (Chart 1c). The results for the other markets show incongruous movements between the ratios of stay-over tourism and tourism expenditures (Chart 1d), probably attributed to the heterogeneity of the markets involved in this segment. These preliminary findings suggest that there are visible differences in the patterns and amplitude of seasonality per market, implicating that deeper and more sophisticated tests are necessary to analyze the seasonal features of both monetary and non-monetary indicators.
Figure 5.1: Quarterly ratios between tourism expenditures and stay-over tourism
A first step involves the testing of the variables for the presence of seasonal unit roots. Seasonally integrated series of orders higher than zero, like the case of ordinary integrated processes, have a ‘long memory’, so that shocks could last forever and may permanently change the seasonal patterns (Hylleberg et al., 1990). Seasonal unit root tests are much more complicated than the simple unit root tests, because they tend to have different unit roots, for example, a quarterly, semi-annual, and annual basis (Song et al., 2009). Hylleberg et al. (1990) (HEGY) developed a test to determine whether time series contain unit roots at other frequencies than the conventional long-term position. Following Dritsakis (2008), the authors applied the ensuing HEGY test:

\[ Y_{4t} = \pi_1 Y_{1t-1} + \pi_2 Y_{2t-1} + \pi_3 Y_{3t-1} + \pi_4 Y_{4t-1} + u_t, \]  

(1)

where:

\[ Y_{4t} = (1 – L^4)Y_t = Y_t – Y_{t-4}; \]  

(2)

\[ Y_{1t-1} = (1 + L + L^2 + L^3)Y_{t-1} = Y_{t-1} + Y_{t-2} + Y_{t-3} + Y_{t-4}; \]  

(3)

\[ Y_{2t-1} = -(1 – L + L^2 – L^2)Y_{t-1} = -(1 – L)(1 + L^2)Y_{t-1} \]
\[ = -Y_{t-1} + Y_{t-2} – Y_{t-3} + Y_{t-4}; \]  

(4)

\[ Y_{3t-1} = -(1 – L^2)Y_{t-2} = -(1 – L)(1 + L)Y_{t-2} = Y_{t-2} – Y_{t-4}; \]  

(5)

\[ Y_{4t-1} = -(1 – L^2)Y_{t-1} = -Y_{t-1} + Y_{t-3}; \]  

(6)

\[ u \] = normally and independently distributed error term with zero mean and constant variance;

\[ L \] = backward shift operator.

The above equation was estimated here using the Ordinary Least Squares method involving an intercept, a time trend, and three seasonal dummies. Three hypotheses were tested:

1. \( H_0: \pi_1 = 0, H_1: \pi_1 < 0 \) \( \rightarrow \) t-test;
2. \( H_0: \pi_2 = 0, H_1: \pi_2 < 0 \) \( \rightarrow \) t-test;
3. \( H_0: \pi_3 = 0, H_1: \pi_3 \neq 0 \ and \ \pi_4 \neq 0 \) \( \rightarrow \) F-test.
If the first hypothesis was not rejected ($\pi_1 = 0$), then there was a unit root at the zero frequency (or a non-seasonal unit root in the time series). If the second hypothesis was not rejected, then there was a seasonal unit root at the semi-annual frequency. In the case of non-rejection of the third hypothesis, there was a unit root at the annual frequency.

Time series usually consist of four components (trend, cycle, seasonal factor, and irregular factor), and can be either multiplicative (trend x cycle x seasonal factor x irregular factor) or additive (trend + cycle + seasonal factor + irregular factor) (Bails & Peppers, 1993). The main difference between these two types of model is that in the case of the multiplicative model the factors that affect the trend, cycle, seasonal and irregular components are interdependent (for example, the factors affecting the trend depend on those affecting the cycle component), whereas in the case of the additive model the four elements are independent (http://pages.intnet.mu/cueboy/education/notes/statistics/timeseries.pdf).

The Census X-12 decomposition method was applied here to each of the series. In economic applications, it is one of the most widely used procedures to decompose a time series (De Cantis & Ferrante, 2011). The decomposed elements include a trend-cycle, a seasonal component, and an irregular component. Prior to applying the Census X-12 decomposition technique, the data were analyzed for the type of model (additive or multiplicative) to which they belonged. The authors applied here the following regression, borrowed from den Butter & Fase (1991), to assess the model type:

$$|Y_t - Y_T| = \alpha + \beta Y_T + \varepsilon_t, \quad (7)$$

where:
- $Y$ = the original value of the time series;
- $Y_T$ = the centralized moving average of $Y$ over a period of a year;
- $\alpha, \beta$ = coefficients;
- $\varepsilon$ = error term.

If $Y$ and $Y_T$ are uncorrelated, meaning that the coefficient $\beta$ is not significantly different from zero, the model type is then additive. If $\beta$ is significantly different from zero, the model is then multiplicative. The

---

13 Bloem et al. (2001) describes the trend-cycle as a combination of long-term trend and the (business) cycle movements in the data. Furthermore, the irregular component captures effects that are unpredictable, including outliers and other irregular effects such as unseasonable weather, natural disasters, strikes, etc.
question here basically boils down to whether movements away from the moving trend (the absolute difference between $Y_t$ and $YT_t$, or $|Y_t - YT_t|$), be it the cycle, seasonal factor or irregular component, are related to $YT$ or not. If they are (i.e. $\beta$ is significantly different from zero), then the trend, cycle, seasonal and irregular elements are related to each other in a multiplicative way. Otherwise (i.e. $\beta$ is not significantly different from zero), they have an additive relationship with each other.

Simultaneously, when applying the Census X-12 methodology, the study considered a test of the ratio between moving seasonality and stable seasonality. This test is normally suggested by the U.S. Bureau of Census (2010) to assess for the presence of significant seasonality in cases where the number of data points are low (i.e. less than 15 in the case of quarterly data). Considering the length of the series in this study (16 years of quarterly data), the authors still opted to apply this ratio test on the outcomes of the Census X-12 calculations of the seasonal factors. According to this test, the presence of significant seasonality is recognized if the outcome of this ratio is less than 1.0. Additionally, the authors applied a second test by individually regressing the first difference of the seasonal factors from the Census X-12 decomposition on the overall series:

$$\Delta \text{Series}_t = \alpha \Delta S_t + \epsilon_t,$$

where:
- $\Delta$ = first difference;
- $S$ = Seasonal factor;
- $t$ = time;
- $\epsilon$ = residual.

The aim here was to assess the contribution of the seasonal factor to the variability of the overall series through the coefficients of determination (adj. $R^2$) calculated in the regression. The higher the adj. $R^2$, the higher the explanatory power of the element in the overall short-term variability of the series. Together with the ratio test, this coefficient of determination assessment was used to decide whether seasonality had an important role in the analysis of the monetary and non-monetary variables.

Having determined the suitability of the seasonal factors, the next step was to standardize these factors of both monetary and non-monetary indicators so that they could be compared with each other. Comparison in this study involved an assessment of the linear similarity, as well as a comparison of the amplitude and timing difference between both monetary
and non-monetary indicators. The aim of the linear comparison was to assess how much the monetary indicators moved in line with the non-monetary ones. This analysis applied the Pearson’s correlation, which measures the strength of the linear association between the monetary and the non-monetary indicators.

The second analysis compared the amplitudes of the seasonal patterns of both types of indicators (whereby amplitude was defined here as the difference between the maximum and minimum points on the seasonal patterns during one year). The amplitude differences were determined by calculating the absolute amplitude ratio between the standardized seasonal patterns of stay-over tourism and tourism expenditure, using the following formula:

\[ ADR_y = \frac{\text{Max}(SSF_{SOT,1,y}, SSF_{SOT,2,y}, SSF_{SOT,3,y}, SSF_{SOT,4,y}) - \text{Min}(SSF_{SOT,1,y}, SSF_{SOT,2,y}, SSF_{SOT,3,y}, SSF_{SOT,4,y})}{\text{Max}(SSF_{TE1,y}, SSF_{TE2,y}, SSF_{TE3,y}, SSF_{TE4,y}) - \text{Min}(SSF_{TE1,y}, SSF_{TE2,y}, SSF_{TE3,y}, SSF_{TE4,y})} \]

(9)

where:
- \( ADR \) = amplitude difference ratio;
- \( \text{Max} \) = maximum;
- \( \text{Min} \) = minimum;
- \( SSF \) = standardized seasonal factor;
- \( SOT \) = stay-over tourism;
- \( TE \) = tourism expenditures;
- \( |...| \) = absolute value;
- \( 1..4 \) = quarters of the year;
- \( y \) = year (1996..2011).

For instance, if the numerator value is 0.05 and denominator equals 0.07, the \( ADR \) is about 0.71, meaning that the amplitude difference of the standardized seasonal factor of stay-over tourism is about 0.71 times the amplitude difference of the standardized seasonal factor of tourism expenditures. Some possible \( ADR \) outcome scenarios included:

- If numerator → denominator: \( ADR_y \rightarrow 1 \);
- If numerator → 0: \( ADR_y \rightarrow 0 \);
- If numerator → \( \infty \) and denominator → 0: \( ADR_y \rightarrow \infty \);
- If numerator → 0 and denominator → 0: \( ADR_y \rightarrow 1 \);
- If numerator → \( \infty \) and denominator → \( \infty \): \( ADR_y \rightarrow 1 \).
So, theoretically, the ADR outcomes could vary between zero and infinity, whereby the value of one would indicate that the seasonal factors have the same amplitude differences.

The third analysis involved determining the timing difference of the occurrence of the seasonal patterns of stay-over tourism versus tourism expenditures. The aim here was to measure whether the seasonal peaks and troughs of stay-over tourism had a lag, lead or coincident relationship with those of tourism expenditures. To determine the timing difference, the maximum (peaks) and minimum (troughs) seasonal factors for the variables were first calculated for each year:

\[
P_{\text{SOT}, q, y} = \max (SSF_{\text{SOT}, 1, y}; SSF_{\text{SOT}, 2, y}; SSF_{\text{SOT}, 3, y}; SSF_{\text{SOT}, 4, y});
\]
\[
T_{\text{SOT}, q, y} = \min (SSF_{\text{SOT}, 1, y}; SSF_{\text{SOT}, 2, y}; SSF_{\text{SOT}, 3, y}; SSF_{\text{SOT}, 4, y});
\]
\[
P_{\text{TE}, q, y} = \max (SSF_{\text{TE}, 1, y}; SSF_{\text{TE}, 2, y}; SSF_{\text{TE}, 3, y}; SSF_{\text{TE}, 4, y});
\]
\[
T_{\text{TE}, q, y} = \min (SSF_{\text{TE}, 1, y}; SSF_{\text{TE}, 2, y}; SSF_{\text{TE}, 3, y}; SSF_{\text{TE}, 4, y});
\]

where
\[P = \text{peak};\]
\[T = \text{trough};\]
\[q = \text{quarter (}q = 1..4).\]

The next step was to compare the peaks and troughs of stay-over tourism with those of tourism expenditures to determine the timing effects. The following combinations were possible (\(L = \text{lead or lag}\)):

<table>
<thead>
<tr>
<th>Peaks</th>
<th>Troughs</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L_p = 0) if (P_{\text{SOT}, q, y} = P_{\text{TE}, q, y})</td>
<td>(L_T = 0) if (T_{\text{SOT}, q, y} = T_{\text{TE}, q, y})</td>
</tr>
<tr>
<td>(L_p = 1) if (P_{\text{SOT}, q, y} = P_{\text{TE}, q+1, y})</td>
<td>(L_T = 1) if (T_{\text{SOT}, q, y} = T_{\text{TE}, q+1, y}) where (q &lt; 4)</td>
</tr>
<tr>
<td>(L_p = 2) if (P_{\text{SOT}, q, y} = P_{\text{TE}, q+2, y})</td>
<td>(L_T = 2) if (T_{\text{SOT}, q, y} = T_{\text{TE}, q+2, y}) where (q &lt; 3)</td>
</tr>
<tr>
<td>(L_p = 3) if (P_{\text{SOT}, q, y} = P_{\text{TE}, q+3, y})</td>
<td>(L_T = 3) if (T_{\text{SOT}, q, y} = T_{\text{TE}, q+3, y}) where (q = 1)</td>
</tr>
<tr>
<td>(L_p = -1) if (P_{\text{SOT}, q, y} = P_{\text{TE}, q-1, y})</td>
<td>(L_T = -1) if (T_{\text{SOT}, q, y} = T_{\text{TE}, q-1, y}) where (q &gt; 2)</td>
</tr>
<tr>
<td>(L_p = -2) if (P_{\text{SOT}, q, y} = P_{\text{TE}, q-2, y})</td>
<td>(L_T = -2) if (T_{\text{SOT}, q, y} = T_{\text{TE}, q-2, y}) where (q &gt; 3)</td>
</tr>
<tr>
<td>(L_p = -3) if (P_{\text{SOT}, q, y} = P_{\text{TE}, q-3, y})</td>
<td>(L_T = -3) if (T_{\text{SOT}, q, y} = T_{\text{TE}, q-3, y}) where (q = 4)</td>
</tr>
</tbody>
</table>

A positive \(L\) indicates that the peak (or trough) of the standardized seasonal factor of stay-over tourism is leading that of tourism expenditures. Similarly, a negative \(L\) denotes that the peak (or trough) of the standardized seasonal factor of stay-over tourism is lagging that of tourism expenditures.
5.5 Empirical Results

All estimates were obtained from Eviews 7.0 and Microsoft Excel 2010. Seasonal unit root test results show the rejection of the first hypothesis for the variables LSTAYVIS_TOT and LSTAYVIS_OTH, implying that these variables are stationary at the zero frequency (Table 5.2). The other variables had a non-seasonal unit root at this frequency, meaning that they were not stationary in their non-seasonal elements. The second and third hypotheses were rejected in all cases, meaning that there was no seasonal unit root at the semi-annual and annual frequencies. Following Hylleberg et al. (1990), this implies that the seasonal factors in the series have no long memory, and that shocks do not last forever, so they do not permanently change the seasonal patterns. This is consistent with the findings of Croes et al. (2011). The results of the second and third hypotheses are of particular relevance to the study, given that the seasonal factors are at the basis of the analysis by the authors. Therefore, in the absence of seasonal unit roots, the data required no further transformation.

<table>
<thead>
<tr>
<th>Variables</th>
<th>( \pi_1 = 0 )</th>
<th>( \pi_2 = 0 )</th>
<th>( \pi_3 = 0, \pi_4 = 0 )</th>
<th>Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSTAYVIS_TOT</td>
<td>7.1383 *</td>
<td>-6.91E+13 *</td>
<td>8.67E+27 *</td>
<td>I(0,0,0)</td>
</tr>
<tr>
<td>LSTAYVIS_USA</td>
<td>-0.5482</td>
<td>-3.6318 *</td>
<td>134.3726 *</td>
<td>I(1,0,0)</td>
</tr>
<tr>
<td>LSTAYVIS_VEN</td>
<td>1.0052</td>
<td>-4.3378 *</td>
<td>79.43426 *</td>
<td>I(1,0,0)</td>
</tr>
<tr>
<td>LSTAYVIS_OTH</td>
<td>-7.0430 *</td>
<td>-1.26E+15 *</td>
<td>1.07E+30 *</td>
<td>I(0,0,0)</td>
</tr>
<tr>
<td>LTOUREXP_TOT</td>
<td>-0.0381</td>
<td>-10.1942 *</td>
<td>71.4643 *</td>
<td>I(1,0,0)</td>
</tr>
<tr>
<td>LTOUREXP_USA</td>
<td>-0.7091</td>
<td>-8.0463 *</td>
<td>40.0476 *</td>
<td>I(1,0,0)</td>
</tr>
<tr>
<td>LTOUREXP_VEN</td>
<td>-0.4839</td>
<td>-8.3012 *</td>
<td>29.4543 *</td>
<td>I(1,0,0)</td>
</tr>
<tr>
<td>LTOUREXP_OTH</td>
<td>-0.7692</td>
<td>-11.0288 *</td>
<td>36.4765 *</td>
<td>I(1,0,0)</td>
</tr>
</tbody>
</table>

Note: The regression includes an intercept, three seasonal dummies, and a time trend. The number of observations is 64. The critical values are taken from Hylleberg et al., (1990) for 100 observations at the 5% level of significance: \( t(\pi_1) = -3.53, t(\pi_2) = -2.94, t(\pi_3, \pi_4) = 6.60 \). * indicates that the t-value is larger than the critical value, meaning that there is stationarity.

Prior to applying the seasonal decomposition procedure, the authors tested the data for the type of model (additive or multiplicative) to which they belong. According to the results shown in Table 5.3, with the exception of the variable LSTAYVIS_USA, all variables were of the additive form,
implying that the cycle, seasonal and irregular elements were not related to the trend of the series.

Table 5.3: Model type determination

<table>
<thead>
<tr>
<th>Variable type</th>
<th>Regression result of $\beta$</th>
<th>Model type</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSTAYVIS_TOT</td>
<td>-0.0290</td>
<td>additive</td>
</tr>
<tr>
<td>LSTAYVIS_USA</td>
<td>-0.1001 **</td>
<td>multiplicative</td>
</tr>
<tr>
<td>LSTAYVIS_VEN</td>
<td>0.0095</td>
<td>additive</td>
</tr>
<tr>
<td>LSTAYVIS_OTH</td>
<td>0.0507</td>
<td>additive</td>
</tr>
<tr>
<td>LTOUREXP_TOT</td>
<td>0.0258</td>
<td>additive</td>
</tr>
<tr>
<td>LTOUREXP_USA</td>
<td>-0.0840</td>
<td>additive</td>
</tr>
<tr>
<td>LTOUREXP_VEN</td>
<td>-0.0014</td>
<td>additive</td>
</tr>
<tr>
<td>LTOUREXP_OTH</td>
<td>0.0735</td>
<td>additive</td>
</tr>
</tbody>
</table>

Note: The symbol ** indicates the 5% significance level.

With these results, the authors proceeded to apply the Census X-12 technique, with the seasonality test results shown in Table 5.4. The ratio between moving seasonality and stable seasonality was in all cases smaller than 1.0, indicating the presence of significant seasonality. These findings were also confirmed by the results of the coefficient of determination of the seasonal factors, which, except for the variable LTOUREXP_OTH, were in all cases higher than 50%, implying a significant influence of the seasonal factor on the short-term development of the variables.
Table 5.4: Diagnostic and explanatory power of seasonal factor

<table>
<thead>
<tr>
<th></th>
<th>Ratio of moving seasonality to stable seasonality</th>
<th>% of changes from quarter to quarter explained by seasonal factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSTAYVIS_TOT</td>
<td>0.3970</td>
<td>62.1</td>
</tr>
<tr>
<td>LSTAYVIS_USA</td>
<td>0.2430</td>
<td>66.4</td>
</tr>
<tr>
<td>LSTAYVIS_VEN</td>
<td>0.1660</td>
<td>81.6</td>
</tr>
<tr>
<td>LSTAYVIS_OTH</td>
<td>0.2420</td>
<td>76.7</td>
</tr>
<tr>
<td>LTOUREXP_TOT</td>
<td>0.3640</td>
<td>55.1</td>
</tr>
<tr>
<td>LTOUREXP_USA</td>
<td>0.2640</td>
<td>68.8</td>
</tr>
<tr>
<td>LTOUREXP_VEN</td>
<td>0.4200</td>
<td>58.4</td>
</tr>
<tr>
<td>LTOUREXP_OTH</td>
<td>0.6790</td>
<td>40.3</td>
</tr>
</tbody>
</table>

Note: The ratio of moving seasonality to stable seasonality is derived from the Census X-12 decomposition technique. The calculation of the explanatory % of the seasonal factors is derived from the regression \( \Delta(\text{variable}) = \Delta(\text{seasonal factor of variable}) + \epsilon \), whereby the adjusted R\(^2\)’s are reweighted to base 100% and subsequently multiplied by 100% to acquire the % mentioned in the table.

Charts 2a to 2h in Figure 5.2 show the standardized seasonal factors for total stay-over tourism and tourism expenditure, including the market segments. Visual inspection showed changing seasonal patterns over time, indicating that they were not static. This confirms the position of Salish & Rodrigues (2011) that seasonality is not necessarily fixed over time. According to Franses (1996), this is because certain seasonal fluctuations may be triggered by the behavior of economic agents, which may not be constant over time. The ensuing statistical analysis will provide more clues about the patterns, amplitude, and timing differences between the monetary and non-monetary seasonal factors.
Figure 5.2: Standardized monetary and non-monetary seasonal factors
Correlation analysis
The authors calculated the Pearson’s correlation coefficients for the variables in the analysis, for the whole period (1996-2011) and the two sub-periods (1996-2006 and 2007-2011). The last period was chosen to coincide more or less with the global financial and economic crisis (2007-2010) that had an impact on the island’s tourism (Central Bank of Aruba, 2009, 2010, 2011). The results are shown in Table 5.5, indicating that there was an overall increase in correlation between the seasonal factors of stay-over tourism and tourism expenditures over time. This is particularly visible in the period 2007-2011. The increased linear synchronization in the total has greatly to do with the improved harmonization between the seasonal factors of stay-over tourism and tourism expenditures in the other tourism markets.

| Table 5.5: Pearson's correlation coefficients of standardized seasonal factors |
|---------------------------------------------------|-------------------|
| Overall series                                    |                   |
| **1996-2011**                                    |                   |
| LSTAYVIS_TOT versus LTOUREXP_TOT                  | 0.5834 ***        |
| LSTAYVIS_USA versus LTOUREXP_USA                  | 0.8907 ***        |
| LSTAYVIS_VEN versus LTOUREXP_VEN                  | 0.9703 ***        |
| LSTAYVIS_OTH versus LTOUREXP_OTH                  | 0.6190 ***        |
| **1996-2006**                                    |                   |
| LSTAYVIS_TOT versus LTOUREXP_TOT                  | 0.4677 ***        |
| LSTAYVIS_USA versus LTOUREXP_USA                  | 0.8839 ***        |
| LSTAYVIS_VEN versus LTOUREXP_VEN                  | 0.9768 ***        |
| LSTAYVIS_OTH versus LTOUREXP_OTH                  | 0.4983 ***        |
| **2007-2011**                                    |                   |
| LSTAYVIS_TOT versus LTOUREXP_TOT                  | 0.9003 ***        |
| LSTAYVIS_USA versus LTOUREXP_USA                  | 0.9117 ***        |
| LSTAYVIS_VEN versus LTOUREXP_VEN                  | 0.9807 ***        |
| LSTAYVIS_OTH versus LTOUREXP_OTH                  | 0.8576 ***        |

Note: *** indicates the 1% level of significance.

This outcome in the other tourism markets could be explained by changes in the heterogeneity of the markets involved in this group. For example, the Colombian market has become less significant in terms of its share in the total number of visitors to the island, as time progressed, whereas the Dutch
and Canadian markets have increased in significance over time. Each of these markets has their own spending pattern, and length of stay, both affecting the seasonal spending pattern. Moreover, a study by the World Travel & Tourism Council (2011) suggest that there has been a general increase in access to the internet around the start of the millennium onwards, where tourists have been more and more facilitated with their online reservations. This, according to the report, also led to shorter lead-times for bookings, with consumers making last-minute decisions, often based on special offers. The latter may have brought the co-movement of the seasonal factors of stay-over tourism and tourism expenditures in all markets much closer to each other over time.

Amplitude analysis
Charts 3a-3l in Figure 5.3 provide the results of the amplitude difference test between the seasonal factors of stay-over tourism and tourism expenditures, including the respective market segments. The first chart in each column provides the output of the ADR calculation, while the charts in the second and third columns provide an overview of the developments of the maximum and minimum seasonal points of, respectively, stay-over tourism and tourism expenditures. With respect to the total ADR (Chart 3a), there are interchangeable periods of increases and decreases between 1996-2005, after which the ADRs show an increasing pattern. The latter can be explained by the increasing amplitudes of the seasonal factors of stay-over tourism, both in the peaks and troughs (Chart 3b). This implies that both peaks and troughs of the seasonal factors of stay-over tourism have a more pronounced effect on the overall outcome of the ADR. On the other hand, the amplitudes of the seasonal factors of tourism expenditures have become smaller since 2003 (Chart 3c), particularly in the seasonal peaks. The latter suggests that there are less seasonal influences on tourism expenditures during peak times. This could reflect in part the effects of the global financial and economic crisis (2007-2010), which, according to Yeoman (2012), has led to an increase in mercurial consumption, where tourists have become shrewd at searching for bargains, possibly inducing businesses to lower their prices in order to remain competitive.

In the case of the amplitude differences in the US market, the ADR results show a gradual decrease between 1996-2004, and a gradual increase afterwards (Chart 3d). This outcome could be explained by looking at the seasonal amplitude differences in stay-over tourism, which had been contracting between 1996-2004 at a faster rate than those of tourism expenditures (Charts 3e and 3f). This means that the seasonal peaks and troughs of the US market’s stay-over tourism were less influential on the
overall US market stay-over series in this period than in the case of tourism expenditures. This outcome likely became more pronounced in the 2001-2004 period, reflecting the immediate and aftermath effects of the September 2001 terrorist attacks. However, while the seasonal amplitudes of US stay-over tourism expanded between 2005-2011, those of US tourism expenditures kept mostly on the contraction path. The latter could reflect in part the mercurial consumption mentioned above, and implicates that the seasonal peak and trough impulses of this market have become less avid in influencing the outcome of tourism expenditures.

The ADR for the Venezuelan market shows an almost continuously decreasing pattern (Chart 3g). This was the result of opposite behaviors in the seasonal amplitudes of both stay-over tourism and tourism expenditures. In the early years, the seasonal amplitudes of stay-over tourism were wider than those of tourism expenditures, while those of tourism expenditures were much smaller (Charts 3h and 3i). In other words, while the width of the seasonal peaks and troughs on Venezuelan market’s stay-over tourism have become smaller, those of tourism expenditures have actually expanded. The contraction in seasonal amplitudes in Venezuelan stay-over tourism over time could reflect in part the effects of the global financial and economic crisis (Central Bank of Aruba, 2009) and the foreign currency controls that have been applied since 2003, making it more difficult for Venezuelans to travel abroad. On the other hand, the expansion in the seasonal amplitudes in Venezuelan tourism expenditures could be linked to the same currency controls, which had stimulated currency tourism, whereby Venezuelans travel abroad to use credit cards to acquire US dollars to resell on the domestic black market (a process called ‘el raspadito’) (http://www.theguardian.com/world/2013/sep/25/raspadito-venezuelans-currency-controls). While this could explain the growing seasonal peaks, the lack of available US dollars for travel stemming from these same currency controls could explicate the increasing seasonal troughs in tourism expenditures.

The ADRs for the other markets’ segment show a volatile pattern, probably attributed to the composition of the markets in this segment over the course of time (Charts 3j, k, l). For example, the Canadian market saw its share in the other markets’ segment gradually increase from 12.6% in 1996 to slightly more than 18% in 2011, whereas the share of the Colombian market decreased from a peak of 20.8% in 2000 to only 7.6% in 2011. The heterogeneity in these markets could explain the seasonal amplitudes in both stay-over and tourism receipts.
Figure 5.3: Amplitude differences between standardized seasonal factors of stay-over tourism and tourism expenditures (1996-2011)
Figure 5.3: Amplitude differences between standardized seasonal factors of stay-over tourism and tourism expenditures (1996-2011) (continued)
Timing analysis

The results of the timing differences between the seasonal factors of stay-over tourism and tourism receipts are presented in Table 5.6. The results in the total show two quarters lag effects occurring in the seasonal peaks between 1998-2004, because the peaks of stay-over tourism occurred in the third quarter, whereas those of tourism expenditures happened in the first quarter. These lag effects were not found in the US and Venezuelan markets, suggesting that the explanation should be found in other aspects such as the duration of stay and/or the tourist price. On average, stay-over visitors did not remain relatively longer during the third quarters of 1998-2004, compared to the third quarter average for 1996-2011, so the duration of stay could be ruled out. The tourist price factor is more difficult to analyze, given the lack of data on this indicator. Therefore, the average daily room rates (ADRR) was used as a proxy for the ensuing analysis. The average of the ADRRs of hotels during the third quarters of 1998-2004 was 9.3 percent lower than that during the third quarter of the 1996-2011 period. The relatively lower ADRR between 1998-2004 was probably influenced by increased competition from other (Caribbean) destinations and from the cruise industry, as well as the political instability in Venezuela (Central Bank of Aruba, 1999; 2000; 2003; 2004), and may be responsible for the lag effect in the seasonal peaks between these two indicators.

Moreover, two quarter lag effects were also the case in the seasonal troughs between 2000-2004, because stay-over tourism seasonally troughed in the fourth quarter, compared to second quarter seasonal troughs in tourism expenditures. Again, these seasonal lag effects were not found in the US and Venezuelan markets. This lag effect in seasonal troughs may be explained by the fact that, despite the seasonal trough in the fourth quarters of this period, the tourists who still visited the island remained on average slightly longer during this period (compared to the average between 1996-2011), thereby possibly impeding the occurrence of a seasonal trough in tourism expenditures during this quarter.

The lag effects in the seasonal factors of total stay-over tourism and tourism expenditures disappear completely after 2004, signaling that the seasonal peaks and troughs of both stay-over tourism and tourism receipts have become more synchronized in the recent years. The outcome for the US market indicate almost perfect synchronization between seasonal peaks and troughs among stay-over tourism and tourism expenditures (peaks in the first, and troughs in the third quarters), but the case of the Venezuelan market shows some lead effects of the seasonal troughs of stay-over tourism on those of tourism expenditures (troughs of stay-over tourism in the first quarters and troughs of tourism expenditures in the second quarters). This outcome could be explained, to some extent, by the Easter Holiday
celebrations, which had occurred (mostly) in early April. Venezuelans could have been arriving in late March (first quarter) to the island, and departed in April (second quarter), the latter being the month where they would report their spending while being in Aruba. As such, this produces a lead effect in stay-over tourism over tourism expenditures.

The case of the other markets shows various instances of leads and lags, caused by variations in seasonal peaks and troughs of tourism expenditures. This has to do with the diversity of the markets involved under this segment, although the effect of this section on the totals of all markets seems to be negligible.

5.6 Conclusion

Seasonality in tourism is both a monetary and a non-monetary matter, and understanding the seasonal factors of both types of indicators could provide important information on the nature of short-term developments in tourism. This study has investigated the discrepancies between seasonal factors of monetary and non-monetary indicators of tourism development in Aruba, by analyzing the pattern, amplitude, and timing differences between stay-over tourism and tourism expenditures. The results show important differences between the three dimensions of analysis. First, the pattern analysis showed more similar movements between both indicators in the recent years, both in the total and the selected markets. Second, the amplitude analysis generally showed that the seasonal influence of stay-over tourism has increased in the recent years, and that of tourism expenditures has actually contracted. A similar development was found in the US market, but not in the Venezuelan and other markets, implicating the dominant position of the US market in explaining the seasonality in Aruba’s tourism. Third, the timing effects showed that seasonal peaks and troughs of both total stay-over tourism and tourism expenditures were closely aligned in the recent years, again with the US market being a leading player.
Table 5.6: Timing of peaks and troughs

<table>
<thead>
<tr>
<th>Year</th>
<th>Peaks</th>
<th>Troughs</th>
<th>Peaks</th>
<th>Troughs</th>
<th>Peaks</th>
<th>Troughs</th>
<th>Peaks</th>
<th>Troughs</th>
<th>Peaks</th>
<th>Troughs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>q1</td>
<td>q1</td>
<td>0</td>
<td>q2</td>
<td>q2</td>
<td>0</td>
<td>q1</td>
<td>q1</td>
<td>0</td>
<td>q1</td>
</tr>
<tr>
<td>1997</td>
<td>q1</td>
<td>q1</td>
<td>0</td>
<td>q2</td>
<td>q2</td>
<td>0</td>
<td>q3</td>
<td>q3</td>
<td>0</td>
<td>q1</td>
</tr>
<tr>
<td>1998</td>
<td>q3</td>
<td>q1</td>
<td>-2</td>
<td>q2</td>
<td>q2</td>
<td>0</td>
<td>q3</td>
<td>q3</td>
<td>0</td>
<td>q1</td>
</tr>
<tr>
<td>1999</td>
<td>q3</td>
<td>q1</td>
<td>-2</td>
<td>q2</td>
<td>q2</td>
<td>0</td>
<td>q3</td>
<td>q3</td>
<td>0</td>
<td>q1</td>
</tr>
<tr>
<td>2000</td>
<td>q3</td>
<td>q1</td>
<td>-2</td>
<td>q4</td>
<td>q2</td>
<td>-2</td>
<td>q3</td>
<td>q3</td>
<td>0</td>
<td>q1</td>
</tr>
<tr>
<td>2001</td>
<td>q3</td>
<td>q1</td>
<td>-2</td>
<td>q4</td>
<td>q2</td>
<td>-2</td>
<td>q3</td>
<td>q3</td>
<td>0</td>
<td>q1</td>
</tr>
<tr>
<td>2002</td>
<td>q3</td>
<td>q1</td>
<td>-2</td>
<td>q4</td>
<td>q2</td>
<td>-2</td>
<td>q3</td>
<td>q3</td>
<td>0</td>
<td>q1</td>
</tr>
<tr>
<td>2003</td>
<td>q3</td>
<td>q1</td>
<td>-2</td>
<td>q4</td>
<td>q2</td>
<td>-2</td>
<td>q3</td>
<td>q3</td>
<td>0</td>
<td>q1</td>
</tr>
<tr>
<td>2004</td>
<td>q3</td>
<td>q1</td>
<td>-2</td>
<td>q4</td>
<td>q2</td>
<td>-2</td>
<td>q3</td>
<td>q3</td>
<td>0</td>
<td>q1</td>
</tr>
<tr>
<td>2005</td>
<td>q1</td>
<td>q1</td>
<td>0</td>
<td>q2</td>
<td>q2</td>
<td>0</td>
<td>q3</td>
<td>q3</td>
<td>0</td>
<td>q1</td>
</tr>
<tr>
<td>2006</td>
<td>q1</td>
<td>q1</td>
<td>0</td>
<td>q2</td>
<td>q2</td>
<td>0</td>
<td>q3</td>
<td>q3</td>
<td>0</td>
<td>q1</td>
</tr>
<tr>
<td>2007</td>
<td>q1</td>
<td>q1</td>
<td>0</td>
<td>q2</td>
<td>q2</td>
<td>0</td>
<td>q3</td>
<td>q3</td>
<td>0</td>
<td>q1</td>
</tr>
<tr>
<td>2008</td>
<td>q1</td>
<td>q1</td>
<td>0</td>
<td>q2</td>
<td>q2</td>
<td>0</td>
<td>q3</td>
<td>q3</td>
<td>0</td>
<td>q1</td>
</tr>
<tr>
<td>2009</td>
<td>q1</td>
<td>q1</td>
<td>0</td>
<td>q2</td>
<td>q2</td>
<td>0</td>
<td>q3</td>
<td>q3</td>
<td>0</td>
<td>q1</td>
</tr>
<tr>
<td>2010</td>
<td>q1</td>
<td>q1</td>
<td>0</td>
<td>q2</td>
<td>q2</td>
<td>0</td>
<td>q3</td>
<td>q3</td>
<td>0</td>
<td>q1</td>
</tr>
<tr>
<td>2011</td>
<td>q1</td>
<td>q1</td>
<td>0</td>
<td>q2</td>
<td>q2</td>
<td>0</td>
<td>q3</td>
<td>q3</td>
<td>0</td>
<td>q1</td>
</tr>
</tbody>
</table>
The findings are important, because they shed light on the relationship between the seasonal factors of monetary and non-monetary tourism indicators. As such, they map out the anatomic features of seasonality in both monetary and non-monetary indicators of tourism, providing managers with information that could assist them in their pricing strategy (e.g., seasonal room rates and promotional prices) during peak and trough periods. This information could assist policy-makers as well when delineating the tourism diversification strategy. For example, policy-makers could try to fill the gap during the trough period in US tourism to the island (third quarter), by more marketing spending on other markets to stimulate these during that period. The information could also assist policy-makers in their tourism taxing policies (e.g., seasonal room and airport taxes).

Some limitations may apply to the data involved in this study. Firstly, the published data was available only on a quarterly basis, which hampers an analysis of the seasonal differentiation on a more frequent level of periodicity, for example, on a monthly basis. Secondly, the analysis was based only on two variables representing, respectively, monetary and non-monetary tourism demand. In practice, there could be other variables that could equally represent the financial and volume flows of tourism, for example, the average daily expenditures by visitors and tourism nights. Thirdly, the US and Venezuelan markets accounted for more than 75% of the total stay-over tourism in Aruba, and were, therefore, presented separately, while the other markets have remained in an aggregate form in this study to avoid complications in the analysis due to data overflow. Additional studies to analyze seasonality in the markets grouped under this heading could improve the understanding of tourism seasonality in Aruba.

Future research should focus on extending this investigation to target the markets incorporated under the other markets’ category. This could prove to be useful when authorities are considering policies to diversify the tourism portfolio to lessen the vulnerability of tourism to developments in the US and Venezuelan markets. Moreover, this study could be expanded to include other destinations, for example, other Caribbean islands, in order to compare the present findings with the results in these destinations. This could assist in benchmarking Aruba’s tourism performance in terms of seasonality with its competitors, which could assist the island in improving its market share in Caribbean tourism.
References


