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Examining the Seasonality of Travel-Related Expenditure by Travel Purpose: The Case of Japan

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Addressing seasonality for the travel industry has been a challenge for many tourist destinations. Japan is no exception, and with its recent focus on developing into a tourism nation, it has become even more critical to understand seasonality trends. Methods to address seasonality, such as differential pricing, diversified attraction, market diversification, and facilitation by the state will require the segmentation of the market to form appropriate strategies. Therefore, to provide insight into the seasonality of different markets, this paper categorises the travel-related expenditure into six consumption items for three travel purposes: holiday travel, visiting friends and relatives (VFR) travel, and business travel. It examines the trends and characteristics of the seasonality and the fluctuation across the fiscal years from 2010 to 2017 for domestic travel in Japan. The results show that amongst all three travel purposes, the consumption items with relatively low seasonality and fluctuation across the observation period with stable highest and lowest expenditure months over the years, are shopping/travel gifts expenditure for holiday travel; transportation and food/drink expenditure for VFR travel; and transportation expenditure for business travel. In contrast, the consumption items across the travel purposes with relatively significant seasonality and inconsistent highest and lowest expenditure months over the years are package holidays/tours expenditure and attraction/entrance expenditure for VFR and business travel; and accommodation expenditure for business travel.

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Introduction

Tourism is an attractive industry with the significant impact it can have on the economy through not only the additional income but also the effect it can have on a wide range of industries. Japan has been introducing policies to encourage inbound travel alongside the reinforcement of domestic tourism by Japanese residents with the aim of becoming a tourism nation.

One phenomenon that has been widely studied is the seasonality aspect of tourism. The influential work by Bar-On (1975) provides a comprehensive study of 16 countries over 17 years. Bar-On (1975) and Hartmann (1986) identify the leading causes of seasonality as natural factors and institutional factors. Natural factors include climate, such as the duration of daylight, as well as the amounts of sunshine, rain, and snow, which are difficult to overcome (Hartmann, 1986; Lundtorp, Rassing, & Wanhill, 1999). Institutional factors include public and school holidays, which are affected by social factors, such as religion and culture (Hartmann, 1986; Allcock, 1989; Butler, 1994; 2001; Hinch & Jackson, 2000). Butler and Mao (1997) suggest that the ageing society may affect seasonal patterns in the future since they are less restricted in planning their travels. This is identified in a number of literature resources as an essential segment for countries, such as Sweden

(Gustafson, 2002) and areas such as southern Europe (Williams, King, Warnes, & Patterson 2000).

The adverse effects of tourism seasonality on the economy have also been researched (Bar-On, 1975; Murphy, 1981; Go, 1990; Lockwood & Guerrier, 1990; Snepenger, Houser, & Snepenger, 1990; Faulkner & Tideswell, 1997). Some of the economic impacts of having an off-peak and peak times are the underutilisation and the overuse of the available capacity, which affects employment and capital investment (Nadal, Riera-Font, & Rossello, 2004). The inefficient use of resources and facilities often causes loss of profit (Sutcliffe & Sinclair, 1980; Manning & Powers, 1984), and the heavy reliance on the business during the peak seasons makes it difficult to attract investors from the private sector, which then may require public support (Mathieson & Wall, 1982). The impact on accommodation and occupancy rate has also been discussed (Jeffrey & Barden, 1999; Jeffrey, Barden, Buckley, & Hubbard, 2002; Fernández-Morales & Mayorga-Toledano, 2008; De Cantis, Ferrante, & Vaccina, 2011). The seasonality impact on employment has been frequently studied (e.g., Ball, 1988; Aswhorth & Thomas, 1999; Krakover, 2000; Jolliffe & Farnsworth, 2003; Getz & Nilsson, 2004).

There are also the social-cultural effects on tourists and host destinations. Peak periods can cause congestion and overcrowding of facilities, increase costs, and reduce the quality of services, which impacts both tourists and local residents (Hinch & Jackson, 2000; Kennedy & Deegan, 2001). A higher number of people could also lead to an increase in crime during peak seasons (Mathieson & Wall, 1982). Extra facilities and services such as public toilets, parking, and police may be required. In this way, it has been argued that the socio-cultural impacts put a strain on the social carrying capacity (Manning & Powers, 1984). There are similar arguments concerning the environmental impacts during the peak time, which could also impact the carrying capacity of the environment (Manning & Powers, 1984).

Considering the broad impact that seasonality has on the economy, society, and the environment and that the need to forecast tourism requires the understanding of the stability or instability of seasonality, there are extensive studies that measure it to understand the trends across many tourist destinations. For example, Fernandez-Morales, Cisneros-Martinez, and McCabe (2016) examine the seasonality of the number of tourists in the UK by using the Gini coefficient. Duro (2016) analyses the trend of the seasonality of the number of overnight stays in Spain, also by utilising the Gini coefficient. Coshall, Charlesworth, and Page (2015) examine the inbound tourists' trend for VFR travel and holiday travel in Scotland. Moreover, Juganaru, Aivaz, and Juganaru (2017) investigate the seasonality trends, comparing Romania and other EU countries, applying the mobile average method and Struck method, for travel with overnight stays. A recent study on tourism seasonality in Spain by Turrión-Prats and Duro (2018) examines the impact of prices, exchange rates, and income levels.

In these examples, studies on seasonality have been conducted for various regions. However, the seasonality study focused on Japan is not well documented except for the study by Oi (2013; 2016). Oi (2016) analyses the seasonality trends for domestic travel, examining the number of tourists by categorising them into occupational segments. Studying the number of overnight stays, Oi (2013) analyses the seasonality and identifies two types of tourists: tourists with the high motivation of leisure travel and tourists with the low motivation of leisure travel for each region of Japan.

Possible solutions to address tourism seasonality have also been well documented in previous studies. The strategies to address seasonality impacts summarised by Lee, Bergin-Seers, Galloway, O'Mahony, and McMurray (2008) are differential pricing, diversified attraction, market diversification, and facilitation by the state. Differential pricing includes the introduction of seasonal or promotional prices or offers to increase or discourage visitation (Commons & Page, 2001; Jang, 2004; Jeffery & Barden, 1999). Butler (2001) suggests the closure of businesses during off-peak season to reduce operational costs. Suggestions for diversified attraction include the hosting of festivals and events, such as sports in low seasons or the development of new attractions and facilities (Witt & Moutinho, 1995; Higham & Hinch, 2002; Goulding, Baum, & Morrison, 2004). Off-season holiday pack-

ages and complementary offers and diversifying into niche products or services are also suggested (Jeffery & Barden, 1999; Witt & Moutinho, 1995; Goulding et al., 2004; Jang, 2004). Approaches identified for market diversification include marketing campaigns to attract different markets during different periods (Witt & Moutinho, 1995), the determination of the optimal segment mix (Jang, 2004) and aligning with tour operators and travel agents (Jeffery & Barden, 1999). Areas recommended for facilitation by the state include the staggering of holidays, initiatives to increase and encourage flexibility in the labour market, and the provision of financial support such as loans, subsidies and tax concessions (Witt & Moutinho, 1995; Goulding, et al., 2004; Krakover, 2000; Baum & Hagen, 1999).

To develop such strategies, the segmentation of the market will be necessary. Therefore, in order to provide insight into the seasonality of the different markets, this paper categorises the travel-related expenditure into consumption items for holiday travel, VFR travel and business travel. The most frequent measurement unit of seasonality is the number of visitors (Lundtorp, 2001). Other units include the number of arrivals or departures, the number of overnight stays, the length of stay, and the expenditures of the visitors (Koc & Altinay, 2007; Karamustafa & Ulama, 2010; Duro, 2018; Šegota & Mihalič, 2018). However, seasonality research based on a range of travel-related expenditures is limited.

For Japan, such studies do not exist and, to the best of my knowledge, a study of the seasonality on the different types of travel purpose has not been conducted. This paper applies several methods to examine the trends and characteristics of the seasonality and the fluctuation across the fiscal years between 2010 and 2017 for domestic travel in Japan. It also examines the consistency of the highest and lowest expenditure months over the observation period for each consumption item and travel purpose.

The structure of this paper is as follows. The next section will describe the methods and data, and in the third section, we will analyse the seasonality and the fluctuation and the consistency of the highest and lowest expenditure months across the fiscal years for each travel purpose and each consumption item. The fourth section will summarise the main results, followed by a discussion section regarding policy implications. The conclusion is provided at the end.

Methods and Data

The data applied are the domestic travel-related expenditure by Japan residents for each consumption item for each type of travel purpose from the Japan National Tourism Survey from the Japan Tourism Agency for the period from 2010 to 2017 (http://www.mlit.go.jp/kankocho/siryou/toukei/shouhidoukou.html?). The Japan National Tourism Survey is a survey sent twice a year to a random sampling of 2.5 million residents in Japan (from the Basic Residents Registry). The total domestic travel expenditure is obtained by the sum of the domestic travel expenditure with overnight stays and the domestic travel expenditure without such stays. There are three travel purposes identified: holiday, VFR, and business. The six consumption items for the travel expenditures are: package holiday and tours expenses (*package*); transportation expenses (*transportation*); accommodation expenses (*accommodation*): food and drink expenses (*foode&drink*); shopping and 'omiyage (travel gifts)' expenses (*souvenir*); and entrance and attraction expenses (*attraction*).

As an indicator for seasonality, the coefficient of variation (CV) will first be adopted. The CV is calculated by dividing the standard deviation with the mean in order to address the problem in which the variance depends on the mean. Thus, the equation is as follows.

$$\mathrm{CV} = \frac{1}{{}^{p}_{i}\mu_t}\sqrt{\frac{1}{n}\sum({}^{p}_{i}y_{m,t} - {}^{p}_{i}\mu_t)^2} = \frac{{}^{p}_{i}\sigma_t}{{}^{p}_{i}\mu_t}. \qquad (1)$$

i refers to each consumption item. p denotes the purpose of travel, which is classified as holiday, VFR, and business. m represents months. t is fiscal year, ${}^{p}_{i}y_{m,t}$ is the domestic travel-related expenditure by Japan residents for a given month of a fiscal year for a specific consumption item for each travel purpose. ${}^{p}_{i}\mu_t$ represents the mean monthly domestic travel-related expenditure by Japan residents for a specific fiscal year for each consumption item by travel purpose. n represents the number of months.

As the second indicator of seasonality, the standard deviation of logarithms (SDL) will be utilised. The equation is as follows.

$$\text{SDL} = \sqrt{\frac{1}{n}\sum(\ln {}_i^p y_{m,t} - \ln {}_i^p \mu_t)^2}. \quad (2)$$

The logarithmic conversion enables an analysis of fluctuations between months with low expenditure. This indicator is also not dependent on a unit since it is free from absolute values.

As the third indicator, we adopt the relative mean deviation (RMD), which can be represented as follows.

$$\text{RMD} = \frac{1}{n {}_i^p \mu_t}\sum |{}_i^p \mu_t - {}_i^p y_{m,t}|. \quad (3)$$

The numerator of the right-hand side of equation (3) represents the difference between ${}_i^p y_{m,t}$, the domestic travel-related expenditure by Japan residents for a given month of a fiscal year for a specific consumption item for each travel purpose and ${}_i^p \mu_t$, the mean monthly domestic travel-related expenditure by Japan residents for a given fiscal year for each consumption item for each travel purpose, which is measured in absolute values. As in the case with CV, in order for the indicator to not depend on the mean, it is divided by ${}_i^p \mu_t$. Therefore, this represents the relative dispersity of domestic travel-related expenditure by Japan residents, which is measured in absolute values. If the domestic travel-related expenditure for Japan residents each month is equivalent, then the indicator is 0. In contrast, if the expenditure for one month completely makes up the entire annual expenditure, the indicator will be $2(n-1)/n$. Thus, the smaller the indicator, the smaller the dispersity between the months. However, since this indicator relies on the absolute value difference of the monthly travel-related expenditure and the mean monthly travel-related expenditure, it is unresponsive to changes amongst months taht are above or below the mean (Sen, 1973).

The fourth indicator applied to overcome this challenge is the Gini coefficient. The indicator is defined as follows. Suppose that the number of months in a year is, n, the domestic travel-related expenditure by Japan residents for a given month of a fiscal year for a specific consumption item for each travel purpose is ${}_i^p y_{m,t}$ and the mean monthly domestic travel-related expenditure by Japan residents for a given fiscal year for each consumption item by travel purpose is ${}_i^p \mu_t$. Then, the order from the smallest monthly expenditure would be, i.e. ${}_i^p y_{m=1st,t} \leq {}_i^p y_{m=2nd,t} \leq {}_i^p y_{m=3rd,t} \cdots$. From the above, the Gini coefficient is represented as follows.

$$\text{GINI} = \frac{1}{2n^2 {}_i^p \mu_t}\sum\sum |{}_i^p y_{m,t} - {}_i^p y_{l,t}|. \quad (4)$$

Here, the Gini coefficient represents the ratio between the mean annual domestic travel-related expenditure and the mean of the absolute value difference between travel-related expenditures of two randomly selected months, m, l. Based on this indicator, if the distribution of the domestic travel-related expenditure for each month is entirely equivalent, GINI is 0. In contrast, if the domestic travel-related expenditure is concentrated in one month and the other $n-1$ months have no expenditure, GINI becomes 1. The characteristic of the Gini coefficient is its sensitivity to central observations, giving greater weight to changes that occur in the months situated around the mode of monthly distribution (Duro, 2016; Turrión-Prats & Duro, 2018).

Next, as the indicator of seasonality, the Theil index, which incorporates the entropy concept to information theory, is applied. The index utilises the characteristics that the maximum value of entropy is attained by a uniformly distributed random variable. According to this index, the larger the difference between the maximum value and the entropy of the domestic travel-related expenditure is, the larger the dispersity. The Theil index can be represented as follows.

$$\begin{aligned}\text{TI} &= \frac{1}{n}\sum \frac{{}_i^p y_{m,t}}{{}_i^p \mu_t}\left(\ln \frac{{}_i^p y_{m,t}}{{}_i^p \mu_t}\right) \\ &= \frac{1}{n}\sum {}_i^p \mu_t \ln \frac{1}{{}_i^p \mu_t} - \sum {}_i^p y_{m,t} \ln \frac{1}{{}_i^p y_{m,t}}. \end{aligned} \quad (5)$$

Results

Seasonality for Each Consumption Item by Travel Purpose

For each travel purpose, seasonality will be examined for each consumption item for each of the fiscal years

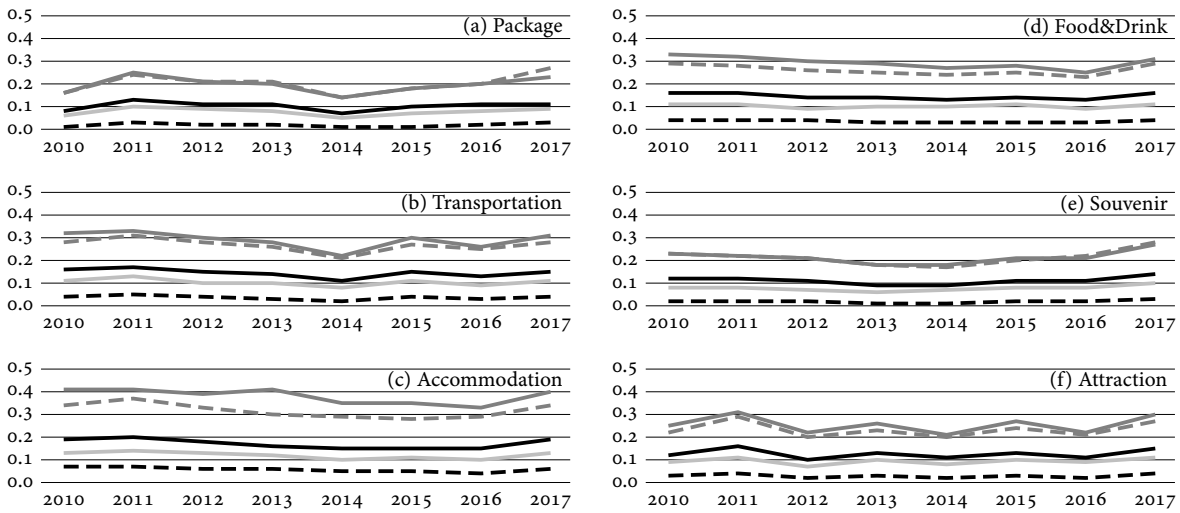

Figure 1 Seasonality Fluctuation for Holiday Travel

Notes Light gray – relative mean deviation, dark gray – coefficient of variation, dark gray dashed – standard deviation of logs, black – Gini coefficient, black dashed – Theil entropy measure.

observed. The seasonality indicator results from each analysis will be examined in the following figures. The first travel purpose reviewed is holiday travel. Figure 1(a) shows that, regarding *package* for holiday travel, most indicators peak in 2011 and then decrease until 2014, followed by a gradually increasing trend. Next, from Figure 1(b), the *transportation* results show that all indicators slightly peak in 2011 and gently decrease until 2014, followed by an increase and decrease for every other year. Figure 1(c) indicates that for *accommodation,* most indicators slightly decline from 2011 to 2016 and then increase in 2017. Figure 1(d) indicates that all indicators for *food&drink* show a modest decline and then an increase in 2017. The results for *souvenir* in Figure 1(e) show a gentle U shape for almost all indicators. The overall fluctuations are not large. Figure 1(f) indicates that for *attraction* the fluctuations between the years are rather large, with all indicators increasing and decreasing every other year.

Next, with regards to VFR travel, the results for each consumption item are as follows. Figure 2(a) shows that for *package,* most indicators drop in 2011 and then peak in 2013 and 2016, indicating large fluctuations in the seasonality across the fiscal years. Next, from Figure 2(b), the results for *transportation* show limited fluctuations for all indicators except for increases in 2017. Figure 2(c) indicates a declining trend for *accommodation* with large fluctuations for most indicators. Figure 2(d) shows that most indicators for *food&drink* show slight fluctuations with increases in 2017. For most *souvenir* indicators, Figure 2(e) shows some small fluctuations over the years, with increases in 2017. Figure 2(f) indicates that all indicators for *attraction* decline in 2011 and peak in 2012 and 2015 and most remain flat after that.

Finally, we will review the trends for business travel. The indicators for *package* in Figure 3(a) show gentle inverted U shapes with peaks in 2012 and declines ending in 2014. They then increase for most indicators. Moreover, the fluctuations in seasonality over the observation period are large. Next, from Figure 3(b), the results for *transportation* show gradual increasing trends for most indicators, though the seasonality fluctuations over the years are very small. Figure 3(c) shows large fluctuations across the years for *accommodation* with drops in 2011 and 2014 and peaks in 2013 and 2016 for all indicators. Figure 3(d) indicates that for *food&drink* almost all indicators show gradual increasing trends with peaks in 2014. Figure 3(e) indicates that for *souvenir,* all indicators show a slight

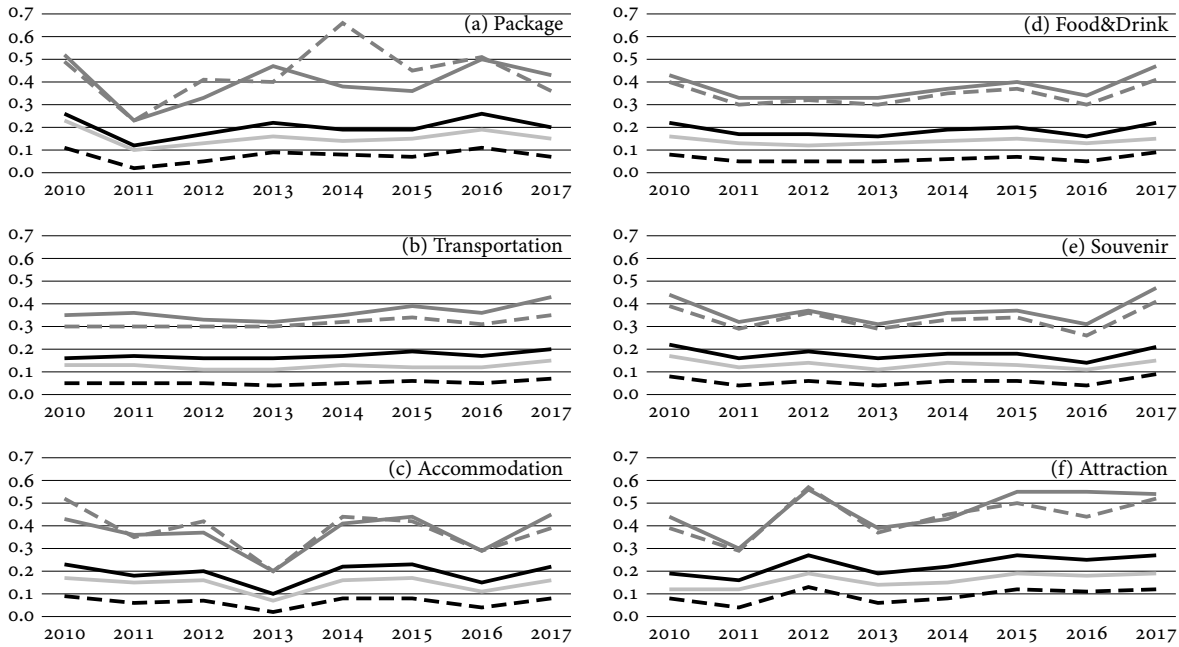

Figure 2 Seasonality Fluctuation for VFR Travel

Notes Light gray – relative mean deviation, dark gray – coefficient of variation, dark gray dashed – standard deviation of logs, black – Gini coefficient, black dashed – Theil entropy measure.

decrease in 2011 and a gradual increase after that with a large increase in 2017. The results are large fluctuations in seasonality over the observation period. Figure 3(f) shows fluctuations for *attraction* with drops in 2011, followed by inverted U shapes with peaks in 2013 and ending in 2016 with large increases in 2017 for most indicators. This indicates large fluctuations in seasonality over the observation period.

Changes to Seasonality over the Observation Period for Each Consumption Item of Each Travel Purpose

Next, the changes in the seasonality between the first and last fiscal year of the observation period will be compared for holiday travel, VFR travel, and business travel to observe whether the seasonality is increasing or decreasing over the years. From Table 1, business travel shows that for all consumption items, all the indicators are increasing. This suggests that business travel has not been able to reduce the seasonality during the observation period, compared to holiday and VFR travel. For VFR travel, the indicators have increased in four out of the six consumption items: *transportation, food&drink, souvenir,* and *attraction.* However, the monthly seasonality for *package* and *accommodation* have decreased. Concerning holiday travel, the indicators for half of the consumption items, *package, souvenir,* and *attraction* have increased, while they have decreased for *transportation, accommodation,* and *food&drink.*

Since the results for the different indicators (relative mean deviation, coefficient of variation, the standard deviation of logs, Gini coefficient and Theil entropy measure) on seasonality show consistently similar trends, the remaining analysis will focus on the Gini coefficient, which is frequently used to examine seasonality.

The Magnitude of the Seasonality for Each Consumption Item by Travel Purpose over the Observation Period

Next, the magnitude of the seasonality over the observation period will be examined for each consumption

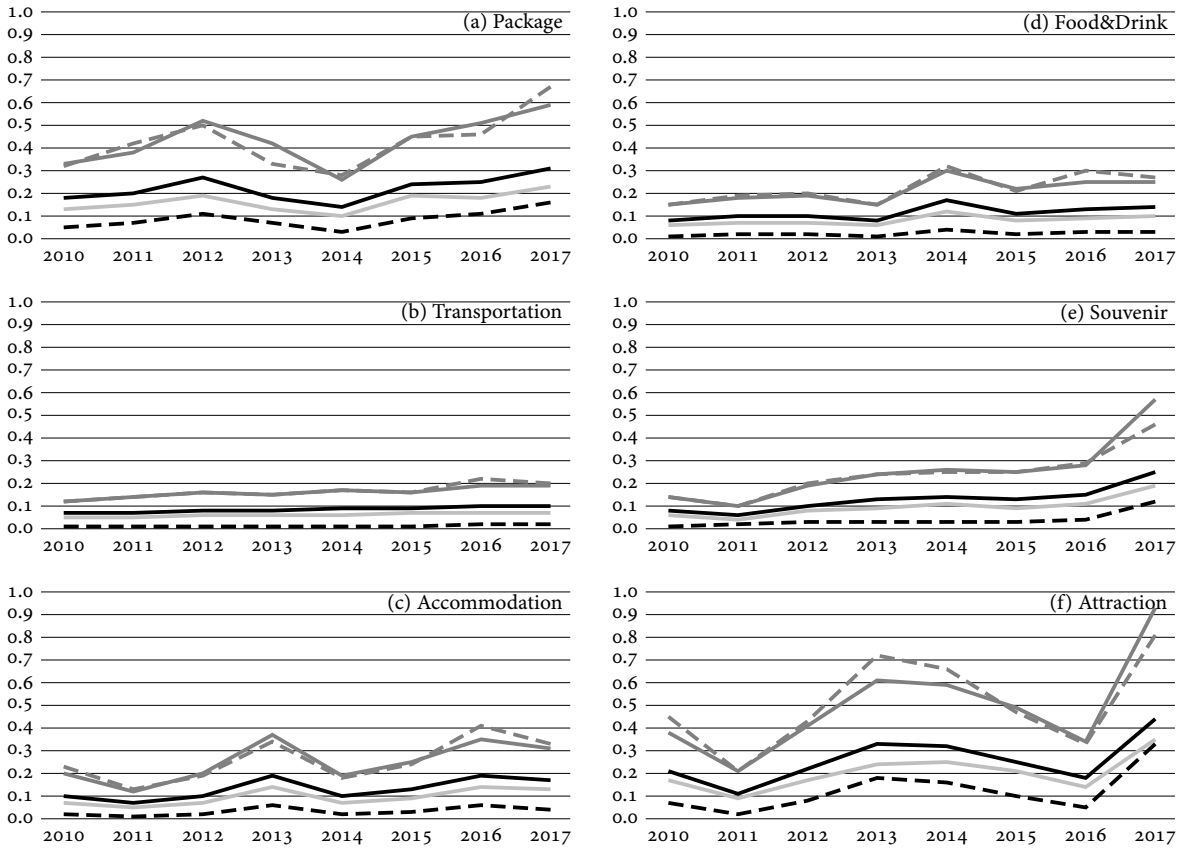

Figure 3 Seasonality Fluctuations for Business Travel

Notes Light gray – relative mean deviation, dark gray – coefficient of variation, dark gray dashed – standard deviation of logs, black – Gini coefficient, black dashed – Theil entropy measure.

item by travel purpose. The mean of the Gini coefficient for the observation period will be used to determine the magnitude of the seasonality.

From Figure 4(a) and Table 2, concerning holiday travel, the seasonality for *accommodation* is the largest amongst the six consumption items during the observed period. This is followed by the seasonality for *transportation* and *food&drink*. *Attraction* is next in most years with *souvenir* and *package* showing the smallest seasonality. The seasonality for *package* is not only low but is stable for the more recent years. This suggests that travel agencies have been able to reduce seasonality differences with effective group travel or package tours throughout the year.

Next, from Table 2, as for VFR travel, the seasonality for *attraction* is larger than others during the observed period. In particular, as seen in Figure 4(b), seasonality has been great in recent years. Table 2 shows that *package* has the second largest seasonality out of the six consumption items with substantial changes by year. This is followed by *accommodation* and *food&drink*. Figure 4(b) shows that *accommodation* has large fluctuation in seasonality depending on the year. In contrast, Figure 4(b) shows that *food&drink* seasonality is stable throughout the observed years, maintaining the middle position over the observation period. *Souvenir* achieves a lower level of seasonality in the more recent years, achieving one of the lowest positions. *Transportation* maintains a low position throughout the observation period with min-

Table 1 Comparison of Seasonality between the First Year of Observation and the Last Year of Observation

Item	Holiday	VFR	Business
Package	Increase in all indicators	Decrease in all indicators	Increase in all indicators
Transportation	Moderate decrease in all indicators	Increase in all indicators	Increase in all indicators
Accommodation	Moderate decrease in majority of indicators	Moderate decrease in majority of indicators and decrease for remaining	Increase in all indicators
Food&Drink	Moderate decrease in all indicators	Moderate increase in more than half of indicators	Increase in all indicators
Souvenir	Increase in all indicators	Moderate increase in more than half of indicators	Increase in all indicators
Attraction	Increase in all indicators	Increase in all indicators	Increase in all indicators

Notes 'Majority': 4 out of 5 indicators; 'More than half': 3 out of 5 indicators; 'Moderate': The ratio of difference of each indicator between the first year and the last year to the indicator of the last year is ±0.1.

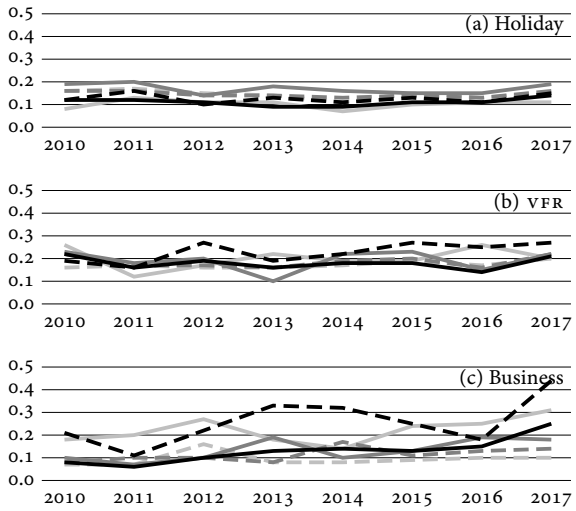

Figure 4 Fluctuation by Consumption Item: Gini

Notes Light gray – package, light gray dashed – transportation, gray – accommodation, gray dashed – food&drink, black – souvenir, black dashed – attraction.

Table 2 Mean of Gini Coefficient from 2010 to 2017

Item	Holiday	VFR	Business
Package	0.104 (6)	0.202 (2)	0.220 (2)
Transportation	0.145 (2)	0.172 (6)	0.085 (6)
Accommodation	0.170 (1)	0.192 (3)	0.130 (3)
Food&Drink	0.143 (3)	0.187 (4)	0.112 (5)
Souvenir	0.112 (5)	0.180 (5)	0.128 (4)
Attraction	0.127 (4)	0.228 (1)	0.257 (1)
Mean	0.134 (3)	0.194 (1)	0.156 (2)

Notes Numbers in parentheses represent the rank order.

imum fluctuation over the years, which suggests the least impact of seasonality.

With respect to business travel, Table 2 shows that *attraction* has the most substantial fluctuation in seasonality out of the six consumption items for the period observed. Figure 4(c) confirms that it is also the largest in most years. This is followed by *package* and then *accommodation* and *souvenir*. Figure 4(c) shows that the fluctuation in seasonality for *accommodation* is not consistent over the years. The seasonality for *food&drink* is stable for the most recent fiscal years at a consistently low level. *Transportation* has the least fluctuation over the years, mostly at the lowest level. This is similar to the results of VFR travel.

Comparing the Magnitude of the Seasonality between Travel Purposes

Table 2 shows that the seasonality of holiday travel is the smallest of the three travel purposes with a value of 0.134. Business travel is second with 0.156. VFR travel is third with 0.194, suggesting that it is the most unstable.

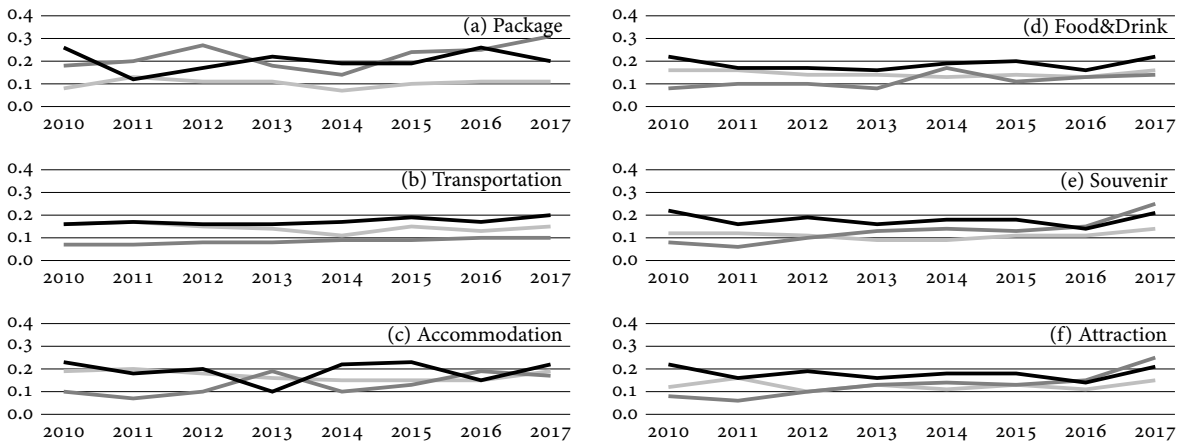

Figure 5 Seasonality Trends by Consumption Item

Notes Light gray – holiday, dark gray – business, black – VFR.

Comparing Seasonality Trends between Travel Purposes for Each Consumption Item

Next, for each consumption item, we compare the annual seasonality trends for each travel purpose. Concerning *package,* Figure 5(a) shows that holiday travel has the lowest seasonality difference during most of the period observed. There is also an indication that the fluctuations across the fiscal years are limited for holiday travel.

In contrast, the difference in seasonality is high for business and VFR travel, and the fluctuations across the fiscal years are large for both. Hence, depending on the year, business travel or VFR travel may have the largest seasonality.

Next, concerning *transportation,* Figure 5(b) indicates that business travel consistently has the least seasonality impact out of the three travel purposes for the period observed. It also shows that the fluctuations across the fiscal years for business travel are limited. Holiday travel appears second concerning the level of seasonality. Seasonality for VFR travel is the greatest for most of the period observed and is consistently high over the years.

With respect to *accommodation,* Figure 5(c) shows that holiday travel is mostly in second place concerning seasonality for most of the years, and the seasonality is stable across the period observed. Business travel and VFR travel show large changes in the order of seasonality. Business travel often shows the lowest seasonality, but it appears as the highest twice, showing large fluctuations depending on the year. VFR travel often shows the largest seasonality, but it appears as the lowest twice, which represents large changes in seasonality.

With regard to *food&drink,* Figure 5(d) shows that the seasonality of VFR travel is consistently larger than the others during the observation period and the seasonality of business travel is smaller than the others for most of the period. The seasonality for holiday travel is the second largest and stable over the years observed.

As for *souvenir,* Figure 5(e) indicates that the seasonality of holiday travel is smaller than others for most of the period observed, and the fluctuations across the fiscal years are small. The seasonality of business travel starts at the lowest level of the three travel purposes, but shows an increasing trend, ending with the highest level of seasonality. Excluding the last two years, VFR travel shows the greatest seasonality over the years.

Concerning *attraction,* Figure 5(f) shows that the seasonality for business travel tends to increase. The seasonality of VFR travel is larger than others for most of the period observed. The seasonality of holiday travel is relatively small and alternates between an increase and decrease every year,

Table 3 Spearman's Rank Correlation Test: Mean of Gini Coefficient

Item	Holiday vs VFR	Holiday vs Business	VFR vs Business
Spearman's rho	−0.3143	−0.4286	0.9429
Pro. > |*t*|	0.5441	0.3965	0.0048
N	6	6	6

Seasonality Characteristics for Each Consumption Item by Travel Purpose

Next, the similarities between seasonality for the different travel purposes for each consumption item and their characteristics will be observed. Table 2 shows that the seasonality for *souvenir* is relatively small and stable compared to the other consumption items for each of the travel purposes. In contrast, Table 3 shows that the seasonality for *accommodation* is substantial in all of the travel purposes.

According to Spearman's rank correlation coefficient of Table 3, the rank for the seasonality of the consumption items for business travel and that of VFR travel are significantly positively correlated, suggesting that they are similar. For instance, in Table 2, the seasonality for *attraction* and *package* for both business and VFR travel are significant and, thus, unstable. In contrast, the seasonality for *transportation* for both business and VFR travel are smaller and more stable than the others. Moreover, Table 3 shows that the ranking between the seasonality for consumption items of holiday travel and VFR/business travel are negatively correlated, suggesting that they have opposite results. However, it should be noted that the correlation is not significant.

The Fluctuation of the Seasonality for Each Consumption Item for Each Travel Purpose over the Observation Period

Next, in order to observe the fluctuation of the seasonality during the observation period, the standard deviation of the Gini coefficient will be measured for each consumption item.[1] The aim is to examine whether the year-to-year fluctuations of the seasonality of consumption items for each fiscal year are large. The confirmation of such trends will aid in understanding the stability and predictability of the market.

Table 4 Standard Deviation of Gini Coefficient between 2010 and 2017

Item	Holiday	VFR	Business
Package	0.018 (3)	0.046 (1)	0.056 (3)
Transportation	0.018 (4)	0.014 (6)	0.012 (6)
Accommodation	0.019 (2)	0.045 (2)	0.047 (4)
Food&Drink	0.013 (6)	0.025 (5)	0.030 (5)
Souvenir	0.016 (5)	0.025 (4)	0.059 (2)
Attraction	0.020 (1)	0.043 (3)	0.102 (1)
Mean	0.017 (3)	0.033 (2)	0.051 (1)

Notes Numbers in parentheses represent the rank order.

First of all, Table 4 indicates that, concerning holiday travel, the order of fluctuation over the fiscal years concerning the seasonality of the expenditure, starting from the largest, is *attraction, accommodation, package, transportation, souvenir,* and *food&drink*. With respect to holiday travel, the fluctuations of the seasonality for *food&drink* (0.013) and *souvenir* (0.016) are particularly small, and *attraction* (0.020) and *accommodation* (0.019) are relatively large for holiday travel. The mean of the fluctuations of the seasonality of all consumption items for holiday travel is smaller than those of the other travel purposes and is the most stable.

Next, concerning business travel, Table 4 shows that the order of seasonality fluctuation amongst the fiscal years, starting from the largest, is *attraction, souvenir, package, accommodation, food&drink,* and *transportation.* In particular, *attraction* (0.102), *souvenir* (0.059), and package (0.056) are large. Compared to the seasonality fluctuations for all consumption items for holiday and VFR travel, business travel shows a relatively large fluctuation for all consumption items, excluding *transportation.* The fluctuation for *attraction, souvenir,* and *package* are especially large, which means there are opportunities to address the

[1] Due to limitation of space, the results on the fluctuation of the seasonal range have been omitted due to similar results obtained from the standard deviation. Results can be provided upon request.

seasonality in business travel for these areas. Finally, concerning VFR travel, Table 4 indicates that the seasonality fluctuation amongst the fiscal years, in order of size, is *package, accommodation, attraction, souvenir, food&drink,* and *transportation*. In order to reduce the seasonality in VFR travel, consumption items with the largest fluctuation, such as *package* (0.046) and *accommodation* (0.045), will need to be prioritised.

The Seasonality Fluctuation for Total Travel Expenditure by Travel Purpose across the Observation Period

From Table 4, the fluctuation amongst the fiscal years concerning seasonality of the total travel expenditure for holiday travel shows the lowest level of fluctuation and that it is the most stable over the observation period with a value of 0.017. The second is VFR travel with a value of 0.033. The third is business travel with a value of 0.051, suggesting that it is the most unpredictable of the three travel purposes. Hence, business travel is where there are the most significant opportunities to reduce the seasonality fluctuations and develop a more stable market.

Characteristics of the Seasonality Fluctuation for Each Consumption Item across the Observation Period for Each Travel Purpose

Next, concerning the fluctuation of seasonality across the fiscal years for each consumption item by travel purpose will be examined for similarities and characteristics. Table 4 shows that the seasonality fluctuations across the fiscal years for *attraction* and *package* are significant in each of the travel purposes. Therefore, these businesses could be considered unstable and challenging from a planning perspective. In contrast, Table 4 shows that the seasonality fluctuation across the fiscal years for each travel purpose is small for *transportation* and *food/drink*. Therefore, these can be considered to be stable in each of the travel purposes. According to Spearman's rank correlation coefficient in Table 5, the rank between the seasonality of the consumption items for holiday travel and that of VFR travel; between that of holiday travel and that of business travel; and between that of VFR travel and that of business travel, are all positively correlated, suggesting that they are similar. However, it should be noted that these correlations are not significant.

Table 5 Spearman's Rank Correlation Test: Standard Deviation of Gini Coefficient

Item	Holiday vs VFR	Holiday vs Business	VFR vs Business
Spearman's rho	0.6	0.4857	0.5429
Pro. > |*t*|	0.208	0.3287	0.2657
N	6	6	6

Highest and Lowest Expenditure Months for Each Consumption Item by Travel Purpose

Next, the months with the highest and lowest expenditure for each consumption item by travel purpose will be examined. The primary purpose is to understand the months when expenditure is concentrated and when it is light for each consumption item and travel purpose.

Concerning holiday travel, Table 6 shows that August has the most significant expenditure for all the fiscal years observed for all consumption items excluding *package*. It can be assumed that this is due to August being the month when most workers in Japan take their summer holidays as well as children and students being out of school for summer. Though August does appear to have the largest expenditure for *package* in some years, others show October and November to have the largest expenditure. This is likely to do with autumn being a popular season to take holidays to enjoy the autumn foliage. Concerning the month with the smallest expenditure, Table 6 shows that February is the smallest month for the majority of the fiscal years observed, for all consumption items except for *package*. This may be due to February being one of the coldest months and the shortest one.

Next, concerning VFR travel, Table 7 indicates that August has the largest expenditure for *transportation, food&drink, souvenir,* and *attraction* for all of the fiscal years observed. Concerning *accommodation,* though August is the largest for most years, May, which has the Golden Week holiday, also appears as the largest in some years. Concerning the month with the smallest

Table 6 Highest/Lowest Month: Holiday Travel

Year	Category	Package		Transportation		Accommodation		Food&Drink		Souvenir		Attraction	
		Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest
2010	Month	Aug	Dec	Aug	Jan	Aug	Feb	Aug	Feb	Aug	Feb	Aug	Feb
	AC	259859	136560	378480	139755	267149	75877	182239	62890	227685	102993	113717	53790
2011	Month	Nov	Jan	Aug	Feb	Aug	Apr	Aug	Mar	Aug	Jan	Aug	Feb
	AC	288206	131273	387680	141676	256961	61236	180941	69076	225305	114052	109787	41491
2012	Month	Nov	Jan	Aug	Jan	Aug	Feb	Aug	Feb	Aug	Feb	Aug	Jan
	AC	257769	137887	382490	128591	270117	74050	172653	58856	219980	104617	105279	46177
2013	Month	Nov	Jan	Aug	Feb	Aug	Jan	Aug	Feb	Aug	Feb	Aug	Apr
	AC	266378	136819	380309	144192	290260	97202	186826	73534	222944	111822	111254	52937
2014	Month	Oct	Feb	Aug	Feb	Aug	Apr	Aug	Jun	Aug	Apr	Aug	Feb
	AC	212634	139701	453342	209616	245880	80528	181486	80833	220746	123243	101917	50574
2015	Month	Nov	Jan	Aug	Jan	Aug	Jun	Aug	Feb	Aug	Feb	Aug	Feb
	AC	255862	142842	404871	158664	289070	95127	198797	82746	215031	109328	116608	51556
2016	Month	Aug	Feb	Aug	Feb	Aug	Feb	Aug	Feb	Aug	Feb	Aug	Feb
	AC	253083	131237	403812	154507	293535	96196	189689	79821	215239	98960	108370	53189
2017	Month	Oct	Jan	Aug	Feb	Aug	Feb	Aug	Feb	Aug	Jan	Aug	Jan
	AC	223251	91173	444908	157122	343839	88511	211194	75414	239616	92355	134485	51114

Notes AC: the amount of consumption. Unit of AC: Million yen.

Table 7 Highest/Lowest Month: VFR Travel

Year	Category	Package		Transportation		Accommodation		Food&Drink		Souvenir		Attraction	
		Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest
2010	Month	Jan	Sep	Aug	Feb	Aug	Feb	Aug	Feb	Aug	Feb	Aug	Jun
	AC	27837	7920	267710	87326	29814	4398	81327	20758	116172	30131	31257	6457
2011	Month	Jul	Mar	Aug	Oct	May	Jan	Aug	Oct	Aug	Jun	Aug	Nov
	AC	18456	10349	284114	103719	31322	9438	65654	25699	103865	37237	19182	7648
2012	Month	Aug	Dec	Aug	Feb	May	Feb	Aug	Feb	Aug	Feb	Aug	Feb
	AC	22401	4750	266385	82303	29800	8268	69559	19209	101836	26946	26454	2725
2013	Month	Jan	Feb	Aug	Feb	Aug	Feb	Aug	Feb	Aug	Feb	Aug	Jul
	AC	28410	6506	266396	79140	26120	12766	75068	26164	93767	31094	22067	5622
2014	Month	Dec	Apr	Aug	Feb	Aug	Apr	Aug	Feb	Aug	Apr	Aug	Feb
	AC	11989	1354	252633	79910	29724	6991	62438	18197	91645	29009	20047	3741
2015	Month	Dec	Feb	Aug	Feb	Aug	Jun	Aug	Feb	Aug	Feb	Aug	Nov
	AC	20815	5448	293842	87252	46395	11309	83428	23798	99102	24525	22382	4067
2016	Month	Oct	Mar	Aug	Feb	Aug	Jan	Aug	Feb	Aug	Feb	Aug	Jun
	AC	28660	4184	279914	85960	30406	11854	77845	27170	95495	39284	26666	5572
2017	Month	Jan	Oct	Aug	Feb	Aug	Jul	Aug	Feb	Aug	Feb	Aug	Feb
	AC	23301	6385	339206	93179	46771	11305	106443	21976	129032	21349	25535	3322

Notes AC: the amount of consumption. Unit of AC: Million yen.

expenditure for VFR travel, Table 7 indicates February is the most frequent for all the consumption items. In particular, the frequencies are high for *transportation, food&drink,* and *souvenir. Package* does not show a clear largest or smallest expenditure month.

Finally, concerning business travel, Table 8 shows

Table 8 Highest/Lowest Month: Business Travel

Year	Category	Package		Transportation		Accommodation		Food&Drink		Souvenir		Attraction	
		Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest
2010	Month	Feb	Nov	Feb	Aug	Feb	Aug	Feb	Oct	Feb	Dec	Feb	Nov
	AC	1881	666	9733	6605	3295	1558	7442	4412	6205	3932	1562	450
2011	Month	Oct	Mar	Jun	Jan	Sep	Jan	Jun	Apr	Jul	Apr	Feb	Sep
	AC	1344	343	9155	5428	2696	1720	7044	3742	5617	4169	1114	591
2012	Month	Jul	Jan	May	Jan	Jun	Jan	Feb	Jan	Jul	Jan	May	Dec
	AC	45289	8164	168714	96883	46058	22693	39065	18179	27119	13716	10026	2475
2013	Month	Jul	Mar	Jun	Jan	Jan	Nov	Mar	Aug	Feb	Mar	Jun	Dec
	AC	57084	16594	171642	97825	60233	20711	37509	24568	29503	14463	11556	1328
2014	Month	Feb	Dec	Mar	Aug	Mar	Aug	May	Aug	Feb	Apr	Oct	Jan
	AC	26426	10192	167316	96650	43908	24249	53300	18374	32462	14594	12394	2008
2015	Month	Dec	Feb	Jun	Jan	Dec	Oct	Nov	Jan	Oct	Jan	Dec	Sep
	AC	48280	14039	171392	106743	51190	22503	47332	23597	28623	11593	8165	2402
2016	Month	Nov	Apr	Jun	Jan	Jun	Jan	Jul	Jan	Nov	Mar	Sep	Oct
	AC	50219	10877	183015	95890	68123	15875	55358	16978	33335	13490	6414	2387
2017	Month	May	Jan	Jun	Feb	Oct	Feb	Dec	Jan	Nov	Jan	Nov	Aug
	AC	54659	4606	177996	91970	56674	19927	49673	22559	62008	9766	22605	1975

Notes AC: the amount of consumption. Unit of AC: Million yen.

that there is no clear largest or smallest month, except for *transportation* where June is the largest month and January the smallest.

Discussions

The main results regarding seasonality are summarised as follows.

- Based on total expenditure, holiday travel is found to be the least impacted by seasonality and is the most stable of all the travel purposes. This is followed by business travel. Results from VFR travel suggest that it is the most unstable of the travel purposes. However, past studies by Fernández-Morales, Cisneros-Martinez, and McCabe (2016) on the United Kingdom (UK) and by Fernández-Morales (2017) on Spain, which compare the seasonality of these three travel purposes, find that holiday travel has the strongest seasonality impact and business travel the weakest. These studies examine the number of tourists, whereas this paper examines travel-related expenditure, which may be the reason for the difference, or it could be the difference in market conditions compared to Japan. Japan has 40–50% more public holidays than the UK and Spain do, and they are spread out throughout the year. This suggests that the state interventions in Japan to provide a public holiday every month and the encouragement of the usage of paid holidays have been effective in reducing seasonality and improve productivity in the travel business (Morikawa, 2008; Yagasaki, 2015). The high seasonality in VFR travel could be due to a social-cultural effect. During the Bon Festival in August, the Japanese often return to their home town.

- For each travel purpose, the seasonality for *souvenir* is relatively small and stable compared to the other consumption items. The tradition in Japan of giving 'omiyage' (travel gifts) to colleagues at work and neighbours may be working positively to limit seasonality in this instance. In contrast, the seasonality for *accommodation* is large and irregular. The seasonality for each consumption item for business and VFR travel are positively related, and thus, are similar. For

example, while the seasonality of *attraction* and *package* are large and unstable, the seasonality for *transportation* is the smallest and most stable of the consumption items for both business and VFR travel. However, holiday travel and business/VFR travel are negatively correlated, but statistically insignificant concerning the order of the seasonality of the consumption items.

- The main results concerning the increase/decrease in seasonality for each consumption item for the period observed are as follows.
  1. Concerning business travel, the seasonality for all the consumption items increased. For VFR travel, the seasonality for four consumption items (*transportation, food&drink, souvenir,* and *attraction*) increased. In contrast, those of *package* and *accommodation* decreased. Finally, concerning holiday travel, the seasonality for half of the consumption items (*package, souvenir,* and *attraction*) increased, and the other half (*transportation, accommodation,* and *food&drink*) decreased.
  2. For all travel purposes, the seasonality of *souvenir* and *attraction* increased for the period observed.

Next, the main results concerning the fluctuation of the seasonality over the fiscal years are as follows.

- Seasonality fluctuation for holiday travel was the smallest and the most stable, followed by VFR travel and then business travel, which was the greatest. All the consumption items within holiday travel show the smallest fluctuation in seasonality over the fiscal years compared with the other travel purposes. In particular, the seasonality fluctuation for *food/drink* and *souvenir* are small. These results are slightly different from the intra-year seasonality result for which VFR travel showed the greatest seasonality. The impact on seasonality over the observed period on business trips may be influenced by the economy, which may have a larger impact on seasonality. Kulendran and Wilson (2000) suggest that the impact of economic variables is essential to understanding business travel.
- Concerning business travel, the seasonality fluctuation for *attraction, souvenir,* and *package* are large, indicating substantial changes in the seasonality depending on the year.
- *Attraction* and *package* are substantial for each of the travel purposes in terms of seasonality fluctuations across the fiscal years. This indicates instability and unpredictability. In contrast, the seasonality fluctuations for *transportation* and *food&drink* are small for each of the travel purposes across the fiscal years, which make them easier to plan.
- The seasonality fluctuation of all the consumption items between holiday travel and business travel; between holiday travel and VFR travel; and between VFR travel and business travel are all positively-correlated, but the results are insignificant.

Next, the main observations concerning the largest and the smallest expenditure months are provided below.

- Concerning holiday travel, August is the month when the expenditure is the largest and February is the smallest. From the details of each consumption item, *transportation, accommodation, food&drink, souvenir,* and *attraction,* the largest expenditure month for the observation period is August. The spending on *package* is high not only in August but also during the autumn foliage season of October and November. The lowest spending on *transportation, accommodation, food&drink, souvenir,* and *attraction* is in February for most of the years observed. The same trend is seen in VFR travel, except the concentrations in the highest and lowest months are not as severe. The highest month for *transportation, food&drink, souvenir,* and *attraction* is again August during the observation period. It is also the highest month for *accommodation* in most of the years observed. February is again the lowest month for all the consumption items. The concentration in February is especially high for *transportation, food&drink,* and *souvenir.* These observations indicate that for holiday and VFR

travel, the seasonality is stable over multiple years, which will enable the development of a targeted strategy. Finally, concerning business travel, the seasonality for the largest and smallest expenditure months are more dispersed than holiday and VRF travel are. In particular, the large months are dispersed. Since the high seasonality months are not consistent over the years, a more flexible plan may be required to tackle the business travel market.

- Next, we will identify the three consumption items for each travel purpose concerning low seasonality and fluctuation across the period observed with stable[2] largest and smallest months. These are *souvenir* of holiday travel, *transportation* and *food&drink* of VFR travel and *transportation* of business travel. Since these areas are stable and predictable within each travel purpose, they will not be as difficult to plan and manage. In contrast, the three consumption items across the travel purposes with relatively significant seasonality and fluctuation and inconsistent largest and smallest months over the years, are *package* and *attraction* of VFR and business travel and *accommodation* of business travel. The magnitude of the seasonality and the fluctuation across multiple years will be substantial for these areas and the peak and off-peak months will not be consistent, which suggests unpredictable businesses which will be more challenging to plan and maintain.

These results that identify the areas of strong seasonality suggest future research opportunities to examine the determining factors behind the strong seasonality. For example, why is the seasonality impact on *souvenirs* weak and why is it strong for *accommodations,* and why is the seasonality for the consumption items for business and VFR travel similar? Considering that the seasonality results obtained for the three travel purposes were not consistent with previous research studying other countries, which examined the number of visitors as the measurement unit of seasonality, it would be interesting to examine whether the results differ if the number of visitors was applied as the unit. This would provide insight into whether the differences are influenced by the measurement unit or if they stem from the markets examined.

[2] Definition for stable in this section is if the largest (smallest) consumption month is consistent in five of the eight years observed between 2010 to 2017. For years or less will be considered unstable.

Conclusions

As Japan aims to become a large tourist nation, it focuses on inbound policies and reinforcing domestic tourism by Japan residents. The travel industry is required to reduce the seasonality in the travel business in order to develop a more stable business with reliable income and to provide more stable employment. This paper aims to provide insight into the seasonality for each travel purpose. It analyses Japan holiday travel, VFR travel and business travel for each travel-related expenditure by consumption item using data for the fiscal years from 2010 to 2017 on domestic travel by Japan residents to observe the trends in seasonality.

These results that identify the consumption items that have predictable and stable seasonality as well as those that are difficult to predict and show an increasing seasonality trend provide several policy implications. The observation of the different travel purposes could assist in the development of strategies in differential pricing, diversified attraction, market diversification and facilitation by the state to address seasonality. Since the analysis is based on the expenditure of the various travel-related consumption items rather than the number of visitors, it provides insight to the areas that differential pricing may be effective and may assist in decisions concerning areas of the business to close during the off-season to reduce operational costs. Based on this analysis, the areas identified with seasonality challenges include *package* and *attraction* of VFR travel. This suggests opportunities for differential pricing of package holiday/tours expenses and entrance/attraction expenses aimed at families during the VFR travel off-peak seasons. Concerning the diversification of attraction, the timing or attracting the hosting of sport events and festivals could be considered based on the seasonality of the *attraction* expenditure. For example, during the off-peak of VFR

travel, attractions and events aimed at families could be considered. Since *package* and *attraction* for business travel were also identified as a seasonality challenge for Japan, the timing of conferences and exhibitions during the off-peak seasons for business travel may be an effective solution. Promotion to encourage corporate incentives and meetings during this time and the development of packages could be considered. The analysis based on travel purposes and a range of travel expenditure may also facilitate the diversification of niche products and services. For example, in order to help address the business travel *accommodation* seasonality, the inclusivity of breakfast buffets, which is the 2nd reason for the choice of accommodation (Development Bank of Japan & Japan Economic Research Institute Inc., 2017), could be developed as a niche product aimed for business travel. The results of this paper also assist in identifying areas for market diversification. The observation of the seasonality for package holidays/tours, for instance, suggests an opportunity for tour operators and travel agents to develop new products and services for the VFR travel off-peak period, such as family-targeted packages. Considering that *accommodation* of business travel was also identified as an area with seasonality challenges, there is an opportunity for lodging and transportation businesses to cooperate and encourage business trips during the off-peak season for business travel.[3] This analysis could also help target areas for state intervention. The seasonality challenge with VFR travel identified in this analysis may be addressed with the encouragement of companies providing more flexibility to enable paid holidays to be taken during the children's school breaks[4] or the staggering of public holidays by region. The identification of consumption items and travel purposes with similar seasonality trends could also assist the local government in the development of relevant local business partnerships as well as in targeting necessary financial provisions such as loans and subsidies.

Granular analysis to support the segmentation of the tourism market is now easier to utilise with the development of the internet and social media. Local businesses and destinations can target and promote to an international niche audience. Information technology also supports the monitoring of performance and assists in planning differential pricing. With such possibilities in mind, this paper aims to support the appropriate development of policies that encourage the dispersity of tourism seasonality and support the sustainable development of tourism.

[3] JTB has introduced such packages.

[4] In 2010, the Japan Tourism Agency set up the 'Family Time Development Project' to support this.

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