



TOURISM PERSISTENCE IN ASEAN COUNTRIES: THE IMPACT OF COVID-19

Abstract

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Purpose – This study deals with the COVID-19's effects on the travel sector in ASEAN countries and applies fractional integration methods.

Methodology/Design/Approach – The persistence and seasonality of foreign tourist visitors in ASEAN members is investigated using monthly data at different time periods.

Findings – The results demonstrate that the series' nature has undergone significant changes as a result of the present epidemic, moving from mean reversion in the period before Covid, to its absence once the data of the pandemic are incorporated in the series. In fact, using the whole dataset, the hypothesis of a unit root cannot be rejected and seasonality becomes almost irrelevant in all series examined. On this basis, the results suggest for more active involvement of certain governments in recovering the tourism industry with the intention of reaching the original trend.

Originality of the research – To our knowledge no previous study was conducted to analyze the COVID-19's effects on the travel sector in ASEAN countries through fractional integration methods.

Keywords ASEAN; Covid-19; Fractional Integration; Persistence; Shocks; Tourism

Research note

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INTRODUCTION

From its appearance the COVID-19 pandemic has been spread with fast pace to each area of the economy, where among those most severely impacted is the travel sector. Countries all over the world have been trying to control the health crisis and to support the economic sectors to somehow ease the financial implications resulting from COVID-19. The pandemic impacted health and economic sectors in ASEAN countries (Sadiq, et al. 2021; Wang et al. 2021) (ASEAN is the initials of Association of Southeast Asian Nations and composes: Cambodia, Philippines, Indonesia, Brunei, Laos, Myanmar, Malaysia, Singapore, Vietnam and Thailand). ASEAN states applied an exemplary pandemic strategy reaction, that brought to effectively alleviate the wellbeing and economic effect of the coronavirus disease (Ibrahim, et al. 2020). The disease impacted the tourism sector in sharply decreasing the number of overseas tourists, in contrast with the extraordinary increase observed in the countries in the period before the pandemic (Sundoro & Seoprpto, 2018).

The aim of this paper is to analyze seasonality and persistence, and the impact of COVID-19 pandemic on the foreign visitors in ASEAN countries by applying fractionally integrated methods. This study introduces fractional integration, a new approach in the area that enables more flexible dynamic specifications than typical structures based on integer differentiation. Previous studies have not employed a fractional integration technique to assess the impact of the COVID-19 pandemic on the number of foreign visitors in ASEAN countries.

The data for each country varies, since they are collected from national institutions of each ASEAN member. Seasonal models can be defined as deterministic (articulated through seasonal dummy variables) and stochastic that also can be divided to stationary ARMA (Autoregressive Moving Average) or unit root (nonstationary) seasonality. Among the articles that applied seasonal models in the tourism sector we find Ghalekhondabi et al. (2019), Shen et al. (2009), Gustavsson & Nordström (2001), Gil-Alana et al. (2004). Regarding persistence, most of the above-mentioned articles use unit root models to analyze if the impacts of shocks are short or long term (Narayan & Liu, 2011; Assaf et al., 2011; Gil-Alana & Huijbens, 2018; Gil-Alana et al., 2020). Thus, if the series is stationary $I(0)$ the shock will be transitory, and will eventually cease to be present in the long term; otherwise, evidence of unit roots implies persistent shocks with their effects becoming permanent. In this research note we use fractional integration, which is broader compared to previous studies just considering integer degrees of differentiation.

The remaining sections of the research are arranged as follows: Section 2 conducts a quick overview of the relevant literature. Section three is devoted to the methods of the analysis of the data; Section three depicts the analyzed data, and it shows the empirical outcomes displaying the relation between tourism persistence and COVID-19 in ASEAN countries; Section 4 details the contribution of the research; Section 5 contains some research implications while Section 6 displays few remarks as conclusions.

1. LITERATURE REVIEW

So far not many studies have used fractional integration for examining the travel industry, especially there are no studies analyzing the impact of COVID-19 for ASEAN countries. Among the few we find Caporale et al.(2022), Gil-Alana & Poza (2020), Imeri & Gil-Alana (2022a, 2022b), Perez-Rodriguez et al. (2019), Payne et al. (2021), Yucel et al. (2022).

Hence, Caporale et al. (2022) show how the Covid-19 has raised the level of persistence in the Southeastern European Countries as well as decreased the importance of their seasonal component. Imeri & Gil-Alana (2022a) discovered that, when using the autocorrelation model, shocks are short-lasting for the annual data; but, for the monthly data, North Macedonia is likely to experience shocks with long-lasting impacts. Imeri & Gil-Alana (2022b) designate that COVID-19 has had a major effect on Bosnia and Herzegovina’s series, eliminating the importance of the time trend, boosting persistence level, and sharply lowering the seasonality issue in the series on arrivals as well as overnight stays.

Consequently, Perez-Rodriguez et al. (2019) applied panel fractional co-integration models, and found proof for the tourism-led growth hypothesis (TLGH) especially for the states in Northern part of Europe, out of the sample size of 14 countries, whereas related to years before financial crisis 2007-2010, also found proof for the TLGH but only for Spain and France. Additionally, Gil-Alana & Poza (2020) discovered that Covid-19 pandemic has expanded the persistence in the five equity markets figures of the Spanish tourism sector, shifting from a mean returning cycle to a non-mean returning cycle in a section of the series. Consequently, shocks that were anticipated to be temporary have turned into permanent ones, suggesting stronger policy measures to reach the long-term projections.

Payne et al. (2021), examined, using the fractional integration technique, the impact of the Covid-19 epidemic on Croatian tourism persistence for foreign visitor arrivals and overnight stays. In addition, as aforementioned, the shock was viewed as permanent. More recently, Yucel et al. (2022) have also analyzed the effect of Covid-19 on tourism industry in Turkey through applying fractional integration model. They observe that the tourism industry’s shocks exhibit modest levels of persistence before to the pandemic, while after the pandemic the degree of persistence became relatively high. We use in this paper a methodology that incorporates both seasonality and persistence in a cohesive approach.

Additionally, Beh and Lin (2022) used a Panel Vector Autoregression technique to investigate the putative bidirectional causation between COVID-19 and visitor arrivals. According to the findings, the COVID-19 pandemic might have a significant impact on global tourism. According to Karim et al. (2020), airline operations were reduced and personnel from various hotels and resorts requested unpaid vacation. The pandemic’s global expansion has had a significant influence on Malaysia’s tourist and hotel economy. Tsui et al. (2021) found that the COVID-19 pandemic had considerable negative repercussions on the tourist and aviation industries in Hong Kong, with asymmetric effects in the source and destination nations.

2. METHODOLOGY

Monthly data were used in an endeavor to examine variations in the degree of persistence in the travel business in the ASEAN countries. The times series range varies due to the accessibility of the data: Cambodia, 1994 (m1) – 2020 (m12, from National Institute of Statistics of Cambodia, 2022); Indonesia, 2008 (m1) – 2020 (m12, from Statistics Indonesia, 2022); Malaysia, 2000 (m1) – 2021 (m12, from Tourism Malaysia, 2022); Myanmar, 2004 (m2) – 2021 (m12, from Myanmar Statistical Information Service, 2022); Philippines, 2008 (m1) – 2021 (m12, from Philippine Tourism, 2022); Singapore, 1978 (m1) – 2022 (m3, from Singapore Tourism Board, 2022); and Thailand, 2015 (m1) – 2022 (m3, from Ministry of Tourism & Sports Thailand, 2022). (See Table 1)

Table 1: Countries under examination and sample size

Country	Starting date	Ending date	N. of observations
Cambodia	January 1994	December 2020	324
Indonesia	January 2008	December 2020	156
Malaysia	January 2000	December 2021	264
Myanmar	February 2004	December 2021	215
Philippines	January 2008	December 2021	168
Singapore	January 1978	March 2022	531
Thailand	January 2015	March 2022	87

Source: Own calculations

Concerning the method used in the following section, the accompanying fractional integration technique is utilized:

$$(1 - B)^d z_t = u_t, \quad t = 1, 2, \dots, \quad (1)$$

B stands for the backshift (B) operator, which is expressed as $B_n x_t = x_{t-n}$, and u_t is assumed to be at most a weakly dependent process, such as ARMA. We assume that z_t may represent the errors in a regression model that includes a linear time trend and a constant, that is,

$$x_t = \alpha + \beta t + z_t, \quad t = 1, 2, \dots, \quad (2)$$

and given that we use monthly data and seasonality seems to be present, a simple monthly AR (1) process is used for u_t such as that:

$$u_t = \rho u_{t-1} + \varepsilon_t, \quad t = 1, 2, \dots, \quad (3)$$

where ε_t is a white noise, d is the essential degree of dependency in the time series, x_t is the perceived time series (in logs), α is a constant, β is the trend time trend, and the seasonal AR coefficient is represented by the parameter ρ . Keep in mind that shocks in this situation will not be lasting if d is less than 1, and that the lower d is, the faster the return to the mean. Conversely, a d value of 1 or greater indicates that shocks are permanent and that there is no reversion to the mean.

The evaluation technique is used and developed on a rudimentary rendition of Robinson's (1994) proposed test for unit root and other non-stationarity hypotheses. This method is based on the Lagrange Multiplier (LM) principle and thus it is based on the null hypothesis that the errors are $I(0)$. Gil-Alana & Robinson (1997) conducted additional research on a very simple version of this test, which is the most effective approach against local departures (see Pitman, 1936), follows the $N(0,1)$ limiting distribution, and is adept in testing any actual value of d (see equation 1 above). These are very interesting features of the test since most unit root methods follows non-standard distributions with the critical values calculated case-by-case on Monte Carlo studies. Moreover, the limiting distribution is invariant to the inclusion of deterministic terms like an intercept or linear trends.

3. RESULTS AND DISCUSSION

We consider a model that incorporates Equations (1), (2) and (3) allowing also for potential deterministic terms in the data. Thus, the model we work with is:

$$y_t = \beta_0 + \beta_1 t + x_t; \quad (1 - B)^d x_t = u_t; \quad u_t = \rho u_{t-4} + \varepsilon_t, \quad (2)$$

where β_0 and β_1 refer respectively to the coefficients for a constant and a time trend, and ρ is seasonal coefficient while ε_t is a white noise.

We first take into consideration the sample that ends in December 2019 in order to investigate the impact of COVID-19. We see in Table 2 the estimated values of d , under three different scenarios: 1) with no deterministic components, i.e., with β_0 and β_1 both set up to zero a priori; 2) with a constant, i.e., $\beta_1 = 0$; and 3) with both coefficients being estimated in the model. We report in bold in the table the values for the most adequate specification for each series, based on this selection on the significance of the estimated parameters.

Table 2: Values of the differencing parameter d (and 95% confidence band). Data ending at Dec. 2019

Country	No regressors	An intercept	An intercept and linear time trend
Cambodia	1.00 (0.91, 1.10)	0.76 (0.67, 0.90)	0.77 (0.66, 0.90)
Indonesia	0.98 (0.87, 1.12)	0.57 (0.53, 0.62)	0.40 (0.30, 0.53)
Malaysia	0.98 (0.89, 1.12)	0.73 (0.61, 0.87)	0.73 (0.62, 0.87)
Myanmar	0.95 (0.86, 1.09)	0.75 (0.67, 0.86)	0.73 (0.64, 0.85)
Philippines	0.97 (0.86, 1.12)	0.66 (0.61, 0.73)	0.48 (0.38, 0.62)
Singapore	0.98 (0.92, 1.06)	0.77 (0.67, 0.92)	0.77 (0.66, 0.92)
Thailand	0.95 (0.79, 1.18)	0.61 (0.52, 0.76)	0.46 (0.26, 0.73)

Source: Own calculations

Table 3: Estimates based on the models selected in Table 2

Country	d	Intercept (t-value)	Time trend (t-values)	AR
Cambodia	0.77 (0.66, 0.90)	9.4910 (60.71)	0.01258 (4.53)	0.618
Indonesia	0.40 (0.30, 0.53)	13.0346 (190.16)	0.00768 (9.05)	0.621
Malaysia	0.73 (0.62, 0.87)	13.5517 (133.56)	0.00440 (2.39)	0.352
Myanmar	0.73 (0.64, 0.85)	10.2077 (46.74)	0.01478 (3.14)	0.427
Philippines	0.48 (0.38, 0.62)	12.4516 (150.37)	0.00687 (6.07)	0.857
Singapore	0.77 (0.66, 0.92)	12.0125 (122.62)	0.00454 (3.71)	0.582
Thailand	0.46 (0.26, 0.73)	14.7263 (188.59)	0.00555 (2.33)	0.887

Source: Own calculations

Table 2 shows that for every series, the time trend and the constant term are important, and the estimated values for the time trend (in Table 3) are positive in all cases, supporting the continuous increase in tourism during the period prior to the pandemic. Focusing on the values of the differentiation parameter (d), since all of them fall inside the interval (0, 1), fractional integration is implied, and the results range from 0.40 in Indonesia to 0.77 in Cambodia and Singapore. The fact that the interval displays values significantly below 1 affirm that mean reversion hypothesis that occurs in all nations, with shocks having temporary though with long lasting effects. Seasonality also seems to be a relevant issue in all countries, with the highest AR coefficients corresponding to Philippines (0.857) and Thailand (0.887).

Table 4: Values of the differencing parameter d (and 95% confidence band) using the whole sample

Country	With no regressors	With a constant	With a constant and a linear time trend
Cambodia	0.97 (0.89, 1.07)	0.91 (0.83, 1.01)	0.91 (0.83, 1.01)
Indonesia	0.98 (0.88, 1.12)	1.24 (1.11, 1.40)	1.24 (1.11, 1.40)
Malaysia	1.05 (0.96, 1.16)	1.09 (0.99, 1.23)	1.09 (0.99, 1.23)
Myanmar	0.96 (0.87, 1.08)	0.95 (0.86, 1.06)	0.95 (0.86, 1.06)
Philippines	0.97 (0.87, 1.11)	0.88 (0.78, 1.02)	0.88 (0.78, 1.02)
Singapore	1.03 (0.96, 1.11)	1.04 (0.95, 1.15)	1.04 (0.95, 1.15)
Thailand	1.01 (0.86, 1.21)	1.01 (0.84, 1.24)	1.01 (0.83, 1.24)

Source: Own calculations

Table 5: Estimates based on the models selected in Table 4

Country	d	Intercept (t-value)	Seasonal AR
Cambodia	0.91 (0.83, 1.01)	9.50501 (35.09)	0.390
Indonesia	1.24 (1.11, 1.40)	12.59729 (96.21)	0.438
Malaysia	1.09 (0.99, 1.23)	13.54944 (42.64)	0.035
Myanmar	0.95 (0.86, 1.06)	10.3557 (32.45)	0.202
Philippines	0.88 (0.78, 1.02)	12.5754 (26.98)	0.158
Singapore	1.04 (0.95, 1.15)	12.0279 (40.73)	0.109
Thailand	1.01 (0.84, 1.24)	14.7770 (7.36)	0.015

Source: Own calculations

In the following, we examine the same model but using the whole sample size. Results can be seen across Tables 4 and 5, and the first noticeable feature is that the trend has become insignificant in all series. However, as important as this is the fact that d values are now significantly greater across the countries and also it is impossible to reject the null hypothesis of a unit root in any particular scenario. Thus, the consequences of Covid-19 are not only the remove of the increasing trend, but also a substantial a rise in the level of reliance that has changed the shocks from temporary nature (prior to the pandemic to permanent at the present moment); finally, seasonality becomes almost irrelevant except for Cambodia and Indonesia though with much lower values than in the previous case.

4. RESEARCH IMPLICATIONS

The key impact of this research is the examination of several periods of the COVID-19 pandemic, specifically two periods: before the epidemic (December 2019), and the period including the epidemic (The time series range changes depending on how accessible the data is, see Table 1). By using fractionally integrated approaches to these two time periods, we may determine the seasonality and persistence of the COVID-19 pandemic, as well as the impact on foreign visitors in ASEAN countries. Furthermore, we included three measures of the estimated values of d that were not previously examined in the literature: without deterministic components, with a constant, and with both coefficients being estimated in the model.

The findings for the sample that ends in December 2019 suggests that the time trend and the constant term are crucial for each series, and the estimated values for the time trend are positive in all cases, indicating that tourism increased continuously before the pandemic. Furthermore, because the interval contains values considerably lower than one, the data confirms the mean reversion hypothesis, which states that shocks have short but long-lasting effects and seasonality appears to be a significant concern in all ASEAN countries.

The findings for the whole sample size indicate that the trend has become unimportant in all series, d values have risen drastically across nations, and it is impossible to reject the null hypothesis of a unit root in any given case. As a result, the consequences of Covid-19 include not only the elimination of the rising tendency, but also the transformation of temporary to permanent shocks at the current time. Seasonality becomes practically negligible, with the exception of Cambodia and Indonesia, which have substantially lower values than in the period before Covid-19. This form of study has significant policy implications, as policy intervention is essential in the event of Covid-19 having long-term consequences.

Moreover, the implications of the study reveal that previous studies (Perez-Rodriguez et al. (2019), Gil-Alana & Poza (2020), Payne et al. (2021), Yucel et al. (2022)) are much related to the topics of non-linear issues and breaks, which are consistent with fractional integration method and long memory.

CONCLUSION

In this research paper, we have analyzed persistence, seasonality and other issues in tourism for the foreign tourist arrivals of ASEAN countries applying fractional integration methods. However, due to data availability, the time series range varies from one series to another, and only the following ASEAN countries are covered in analysis: Cambodia, Philippines, Indonesia, Malaysia, Thailand, Myanmar and Singapore.

The fundamental findings are the followings: all series are highly persistence; however, a different pattern has been observed in light of the current Covid-19 epidemic. Thus, using data ending at December 2019, we observe a significant positive time trend in all countries along with estimates of d that were all positive though significantly smaller than 1, implying transitory though long-lived effects of shocks. Once the data incorporate Covid-19 pandemic, the time trend disappears, the degree of dependence increases up to the point when seasonality practically disappears and the $I(1)$ hypothesis or unit roots cannot be declined. Additionally, with the purpose of reaching the same number of foreign tourist arrivals, there is a need that governments should be more active in considering more recovery actions in the tourism industry in the analyzed ASEAN member states.

For future work might be used the current or different datasets applying other non-linear approaches within the $I(d)$ framework, such as polynomials of Chebyshev (Cuestas & Gil-Alana, 2016) or transforms in time throughout Fourier (Gil-Alana & Yaya, 2021).

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