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HOW REAL OIL PRICES AND DOMESTIC FINANCIAL INSTABILITIES ARE GOOD FOR GCC COUNTRIES TOURISM DEMAND IN MALAYSIA?

Nanthakumar Loganathan,
Universiti Teknologi Malaysia,
Johor, Malaysia,
E-mail: n4nantha@yahoo.com

Dalia Streimikiene,
Lithuanian sports university,
Kaunas, Lithuania,
E-mail:
Lithuaniadalia.streimikiene@knf.vu.lt

Tirta Nugraha Mursitama,
Bina Nusantara University,
Jakarta, Indonesia,
E-mail: tmursitama@binus.edu

Muhammad Shahbaz,
Montpellier Business School,
Montpellier, France,
E-mail: m.shahbaz@montpellier-bs.com

Abbas Mardani,
Universiti Teknologi Malaysia,
Johor, Malaysia,
E-mail: mabbas3@live.utm.my

ABSTRACT. Malaysia, located in the heart of Southeast Asia, is a multicultural country whose 'green' and 'blue' tourism attractions have become the main tourism spot for the Cooperation Council for the Arab States of the Gulf (GCC) tourists. We employed the Threshold Error Correction (TECM) cointegration and the nonlinear causality estimates to capture the nexus between real energy prices and financial stability for the GCC countries' tourism demand in Malaysia using the monthly-based dataset covering the period since 1995 till 2017. The main TECM estimate shows that real energy price fluctuations and financial instability condition in Malaysia positively boost tourists' arrivals from the GCC countries to Malaysia. Indeed, there is evidence of an asymmetric speed of adjustment of the GCC countries' tourism demand with 25.9% and 36.7% of positive and negative deviations, respectively. In addition, this study found a strong evidence of unidirectional nonlinear causal relations running from real energy prices to tourism demands; and also bidirectional causalities running from tourism demand to financial stability. These findings will be helpful for tourism policy makers in Malaysia while drawing a future roadmap to increase the numbers of the GCC tourists' arrivals in future years.

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Introduction

During the past three decades, tourism industry has become the major source of income for many countries worldwide, including Malaysia. In 2017, nearly 28 million tourists visited Malaysia; receipts from tourism are estimated to be approximately RM82 billion, which represents nearly 18% of Malaysian GDP (Ministry of Tourism and Culture Malaysia, 2018; World Bank, 2018). In addition, during the last 2 decades, international tourist arrivals to Malaysia have grown with an average rate of 4% per annum, and the ASEAN region alone contributes approximately 50-60% of the total arrivals; in addition, tourism is the main contributor of foreign exchange earnings for Malaysia. Within the ASEAN region, Singapore, Thailand, Brunei and Indonesia are the major tourist providers for Malaysia. According to the World Tourism Organization (2018), Malaysia is ranked among the top-20 countries worldwide and also 3rd in Asia for the most visited destinations by international tourists. The country is also ranked 26th by the Travel and Tourism Competitiveness Index (2017), with a 30% share of the tourism sector contributing to nation's GDP performance. Since the recession period in the 1980s, which was caused by unstable global oil prices, and the Asian Financial crisis of 1997/1998, the tourism sector has enabled recovery. This recovery has occurred through a high volume of tourism receipts, while quick development of retail trade and the services' sector was primarily linked with tourism industries. The multiplier effect on tourism industry contributes positively to the economic development of Malaysia via the income, sales, output, employment and government revenue multipliers (Horváth and Frechtling, 1999).

The inception of Visit Malaysia Year has contributed positively to the promotion Malaysia worldwide, and more tourism activities were created to attract international tourists. Although Visit Malaysia Year 2014, which targeted 28 million international tourists, was launched victoriously, two unexpected events, namely the MH17 and MH370 tragedies also in 2014, have slowed the nation's achievement of its international tourism demand target. Despite these unexpected events, Malaysia tirelessly exerted efforts to attract Middle Eastern and Asian tourism demand with the hope that the influx of these tourists will contribute to Malaysia's economic development.

Since the work by Kulendran (1996), Lim (1999) and Song and Witt (2000), the number of tourism demand research articles using econometric tools has grown rapidly. In the early stages, most studies concentrated more on linear estimation with cointegration and causality analysis. Primarily, those studies evaluated the tourism-led-growth hypothesis, and there are several studies that focused on tourism demand elasticities. A large number of previous studies on tourism demand used empirical analysis focusing on Malaysia. From the empirical analysis perspective, Salleh *et al.* (2007), Loganathan *et al.* (2012), Kumar *et al.* (2014), and Shahbaz *et al.* (2017) were among the first to investigate the link between tourism and economic growth in Malaysia. These studies proved that tourism demand for Malaysia is in accordance with tourism-led-growth effects. Salleh *et al.* (2007), for example, showed that tourism prices and economic growth have a direct cause for certain selected Asian countries' tourist arrivals to Malaysia. Other recent studies, which find evidence in favor of the tourism-led-growth hypothesis, include Kumar *et al.* (2014), who indicated the acceptance of the tourism-led-growth hypothesis in the case of Malaysia. This finding is not surprising because results from studies conducted by Kadir and Karim (2012), Kumar *et al.* (2014), and Shahbaz *et al.* (2017) are similar in nature when empirical models are formed using Malaysian datasets.

There are also a number of studies discussing the demand of tourism from the Middle East to Malaysia (Ariffin and Hasim 2009; Abooali and Mohammed, 2011; Salman and

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Hasim, 2012). Ariffin and Hasim (2009), for example, has demonstrated the importance of the Middle East market in the Malaysian tourism industry and suggested that the Malaysian government should provide more focus on catering to Saudi Arabian and United Arab Emirates (UAE) tourists. In addition, the study also suggested that to develop distinctive youth-oriented tourism products, the following should be done: increase the air transportation frequency between Malaysia and the Middle East region, fully utilize the internet media for promotion and distribution, and encourage Arabs to purchase timeshare vacations in Malaysia. Furthermore, according to Abooali and Mohamed (2011), and Bhuiyan *et al.* (2011), the pull factors attracting Middle East tourist arrival to Malaysia include the natural, historic and environment sustainability of Malaysia. Bhuiyan *et al.* (2011) revealed that there is a huge opportunity to develop Islamic tourism on the East Coast of Peninsular Malaysia because there are many naturally beautiful sites, as well as cultural, historical and religious places. Furthermore, Malaysia is perceived as an adventurous holiday with the chance to see wildlife and beautiful beaches and also to enjoy the natural scenic beauty with suitable amenities. In addition, there is a positive and significant relationship between the destination image and the destination (Salman and Hasim, 2012).

With the wide range of empirical tourism studies, there has been work on the effect of energy prices on tourism demand (Yeoman and McMahon-Beattie, 2006; Lennox and Schiff, 2008; Becken, 2011a; Becken, 2011b; Logar and Van den Bergh, 2013; Szymańska *et al.*, 2017; Mačerinskienė, Kremer-Matyškevič, 2017). Logar and Van den Bergh (2013), for example, examined the effects of peak oil prices on Spanish tourism activities and indirectly on the remainder of the economy using an input and output (IO) approach. The results show that a decreased demand for tourism services resulted in the greatest decrease in outputs of tourism-related shares of transport sectors. However, Lennox and Schiff (2008) found a positive relationship between world oil prices in New Zealand's tourism sector using the computable general equilibrium (CGE) model. Conversely, during the Asian Financial crisis in 1997-1998, the number of outbound tourists from Thailand and Indonesia decreased dramatically because of increases in air transportation costs as well as unstable exchange rates (Prideaux, 1999).

In addition, the exchange rate is also widely used to observe the nexus between tourism demand and financial stability (Webber, 2001; Eugenio-Martin, 2004; Santana *et al.*, 2010; Baharumshah *et al.*, 2016). Most of these studies found that a flexible and low exchange rate promotes international tourism demand primarily in developing countries. In certain isolated cases, the exchange rates appear to not be an important variable that causes tourism growth; and this has been discussed in-depth by Eugenio-Martin (2004) for Latin American countries. Conversely, Zeren *et al.* (2014) have investigated the relationship between the tourism index, tourism advertising and tourism revenue in Turkey use monthly data. In contrast to more empirical studies, this study used the tourism index, which represents businesses in Turkey's tourism sector; the empirical findings show that there is no causality between these three variables except unidirectional causality running from the tourism revenue to the tourism index when the advanced Hacker and Hatemi (2010) causality test is used. Certain recent researchers also emphasized the spill over index approaches introduced by Diebold and Yilmaz (2012) to examine the dynamic relationship between tourism and economic growth (Antonakakis *et al.*, 2015). Recent study by Samitas *et al.* (2018) has explored the impact of terrorism on international tourism demand in Greece and the empirical finding show a negative impact on tourist arrival causes from terrorism effects. Even, in some cases, international competitive advantages also played an important role to attract international tourism demand (Simionescu *et al.*, 2017). Algieri *et al.* (2018) had studied this for European countries recently and found that, specific factors which related to trade theories

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able to cause on the international competitive advantages in the context of demand for tourism for 28 European countries which in line with Crouch (2011) and Mazanec *et al.* (2007) or Wróblewski *et al.* (2017) empirical findings.

In accordance with tourism demand studies, there are very limited numbers of works currently available using a nonlinear modelling approach. In our study, we will construct nonlinear estimates for a Middle East tourism demand model using cointegration and causality analysis between real energy prices and financial stability. From our perspective, this is a comprehensive study that combines nonlinear empirical analysis involving 6 GCC countries tourism demand for Malaysia, focusing on real energy prices and financial stability. As such, this study's contribution will magnify the real-world scenario of nonlinearity in tourism demand. The study is structured as follows: the second section will focus on data and model specification, the third section will discuss the estimated results, and the final section will present our conclusions.

1. Data and Model Specifications

The data used in this study are monthly-based time series data for the period from 1995 (January) to 2016 (December) and are extracted from several sources. For the GCC tourist arrivals, the data are enrolled from the Ministry of Tourism and Culture Malaysia (2017), which involved 6 countries, such as Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates. Meanwhile, the data for Kuala Lumpur Composite Index (KLCI), a measure of financial stability, and the Consumer Price Index (CPI), with year 2010 as the base year, are gathered from the Monthly Statistical Bulletin (Central Bank of Malaysia, 2018) and the global oil price data are obtained from Organization of the Petroleum Exporting Countries Dataset (OPEC, 2018) All data series are valued in USD currency and transformed to logarithm form to avoid a robustness problem and to obtain suitable estimation results. The basic function of the estimated model in this study is as follows:

$$Tour_t = f(\overset{+}{\widehat{REP_t}}, \overset{+}{\widehat{Fin_t}}) \qquad (1)$$

$$Tour_t = \beta_0 + \beta_1 REP_t + \beta_2 Fin_t + \beta_3 (REP_t \text{ x } Fin_t) + \varepsilon_t \qquad (2)$$

where, Tour represents the total numbers of GCC countries tourist arrival to Malaysia, REP is the real energy price (per barrel in US$) based on the nominal global oil price divided by the deflator and multiplied by 100, Fin is the Kuala Lumpur Composite Index (KLCI) proxy for Malaysia's financial instability condition, and the third coefficient represent the iteration process between the REP and Fin series. All series are transformed to the logarithm formation before handing further estimations.

To capture the stationarity problem, we employed the ADF (Dickey and Fuller, 1981), KPSS (Kwiatkowski *et al.*, 1992) and Bierens (1997) univariate stationarity tests. These approaches are used for two reasons. First, we intended to identify the structural break effect for the variables; second, we want to avoid the traditional stationarity analysis, which is more focused on a linear trend with an unstable residual series. In addition to the linear stationarity tests, we also attempted to include the monthly seasonal stationarity test introduced by Franses (1991) and the nonlinear stationarity test introduced by Bierens (1997). Usually, time series analysis is modelled using linear unit root estimates, and this may be biased in the presence of nonlinearities' problem. The Bierens (1997) nonlinear unit root test has the ability

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to overcome the structural breaks problem because nonlinear trends are approximated by breaking time trends. Bierens introduced this test based on the extended Augmented Dickey-Fuller (ADF) regression with a Chebyshev polynomial term. The identification of Bierens (1997) nonlinear unit root test can be written as follows:

$$\Delta x_t = \gamma x_{t-1} + \sum_{i=1}^{k} w_i \Delta x_{t-i} + \theta^T P_{t,n}^{(m)} + v_t \qquad (3)$$

where $\theta^T P_{t,n}^{(m)} = \left(P'_{0,n(t)}, \ldots, P'_{M,n(t)} \right)$ are the Chebyshev polynomials, and m is the order of the polynomials. The Bierens test emphasizes the t-test via all coefficients tested $(\gamma, \hat{t}(m))$. Second, the $\hat{A}(m)$ is tested using:

$$\hat{A}(m) = \frac{n\hat{\gamma}}{\left| 1 - \sum_{j=1}^{r} \hat{w}_i \right|} \qquad (4)$$

he hypothesis testing for the Bierens unit root will be $H_o: \gamma = 0$ and $H_o: \gamma \neq 0$; and the last m components of θ are zero. Furthermore, for the joint hypothesis of $\hat{F}(m)$ under the $H_o: \hat{\gamma} = 0$ and $H_o: \hat{\gamma} \neq 0$, the last m components of θ are equal to zero.

Testing for unit roots in monthly time series is equivalent to testing for the significance of the parameters in the auxiliary regression estimated by OLS based on equation 5, where μ_t, the deterministic part, consists of a constant, a time trend and seasonal dummies. The null hypothesis of unit roots is tested both by running a t-test of the separate π's, as well as the joint F-test of the pairs and the π's in the interval of $\pi_3 \ldots \pi_{12}$. If the null hypothesis is rejected, one can treat the variable of interest as seasonally stationary. The critical values for the seasonal unit root test are based on Franses (1991).

$$\phi^*(B)y_{8,t} = \pi_1 y_{1,t-1} + \pi_1 y_{1,t-1} + \pi_2 y_{2,t-1} + \pi_3 y_{3,t-1} + \pi_4 y_{4,t-1} + \pi_5 y_{5,t-1} + \pi_6 y_{6,t-1} +$$
$$\pi_7 y_{7,t-1} + \pi_8 y_{8,t-1} + \pi_9 y_{9,t-1} + \pi_{10} y_{10,t-1} + \pi_{11} y_{11,t-1} + \pi_{12} y_{12,t-1} + \mu_t + \varepsilon_t \quad (5)$$

To capture the linearity effect, we used a Brock-Dechert-Scheinkman (BDS) test based on the concept of a correlation integral proposed by Brock *et al.* (1997). This BDS test emphasizes the identically and independently distributed error term, where the integral correlation can be defined as follows:

$$C_m(T, e) = \sum_{t=1}^{T_m - 1} \sum_{s=t+1}^{T_m} I(X_t^m, X_s^m, e) \times \frac{2}{T_m(T_m - 1)} \qquad (6)$$

where $I(X_t^m, X_s^m, e)$ is an indicator function, and

$$I(X_t^m, X_s^m, e) = \begin{cases} 1 \\ 0 \end{cases} \qquad (7)$$

The Euclidian distance between X_t^m, X_s^m and T_m represent the sample size, and T can be divided into T_m sun-samples and m is a dimension vector. The BDS test statistic can be defined as follows:

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$$W_m(T,e) = \frac{\sqrt{T}[C_m(T,e) - C_1(T,e)^m]}{\sigma_m(e)} \tag{8}$$

where $W_m(T,e)$ represents the standard normal limiting distribution, T is the sample size, $\sigma_m(e)$ indicates the standard deviation, and 'm' is the dimensions. In terms of nonlinearity testing, the rejection of the hypothesis will indicate that there is a nonlinear relationship.

In the third stage of the estimates, we continue with the threshold cointegration test. The Ender and Siklos (2001) cointegration test or known as ES test, proposes two types of tests: the F-joint statistic test, which is based on the equation, the $H_0: \rho_1 = \rho_2 = 0$, and the F-equal statistic test, which is based on the equation, $H_0: \rho_1 = \rho_2$. Both F-statistics encountered the non-standard distribution and, for the purpose of identifying the null rejection, we can emphasize the bootstrap simulated critical values. The important part of this estimate is the symmetric and asymmetric adjustments from the adjusted error coefficients. Based on the ES cointegration rules of thumb, the asymmetric adjustment arises when both the F-joint and F-equal hypotheses are rejected. Therefore, to incorporate the asymmetric adjustment (ρ_1 and ρ_2), The ES test proposed the following model:

$$\Delta\varepsilon_t = I_t\rho_1\hat{\varepsilon}_{t-1} + (1 - I_t)\rho_2\hat{\varepsilon}_{t-1} + \sum_{i=1}^{k} \delta_i\Delta\hat{\varepsilon}_{t-i} + \mu_t \tag{9}$$

where ρ_1, ρ_2 and δ_i represent the coeficient values, μ_t is the white-noise disturbance, k is the lag length, and I is the indicator function. Furthermore, the ES test also suggested an alternative adjustment process using the Momentum Threshold Autoregressive (MTAR) cointegration model. The MTAR model depends on the changes on $\hat{\varepsilon}_{t-1}$ in the previous period, and the MTAR indicator can be defined as follows:

$$M_t = \begin{cases} 1 \ if \ \Delta\varepsilon_{t-1} \geq 0 \\ 0 \ if \ \Delta\varepsilon_{t-1} < 0 \end{cases} \tag{10}$$

Next, once the $H_0: \rho_1 = \rho_2 = 0$ hypothesis is tested with the standard F-statistic using the bootstrap simulated critical values, and if the hypothesis is rejected (i.e., the series of TAR or MTAR), we should proceed testing the asymmetric adjustment based on $H_0: \rho_1 = \rho_2$. Thus, the corresponding asymmetric error correction representation with positive and negative deviations can be written as:

$$\Delta Tour_t = \mu + \delta_1\widehat{W}_{t-1}^+ + +\delta_2\widehat{W}_{t-1}^- + \sum_{i=1}^{k1} \alpha_i\Delta Tour_{t-i} + \sum_{i=0}^{k2} \emptyset_i\Delta REP_{t-i} + \sum_{i=0}^{k3} \gamma_i\Delta Fin_{t-i} + v_t$$

$$\sum_{i=0}^{k4} \gamma_i\Delta(REP \ x \ Fin)_{t-i} + v_t \tag{11}$$

where the first difference and the Δ indicate the difference operator, and the optimum lag order is represented by k, $\widehat{W}_{t-1}^+ = I_t\mu_{t-1}$ and $\widehat{W}_{t-1}^- = (1 - I_t)\mu_{t-1}$. μ is the error correction term (ECT), which measures the speed of adjustment. The asymmetric error correction estimates also allow us to consistently estimate the unknown threshold value, where the adjustment to long-run equilibrium path differs depending on the changes in the deviation from the positive and negative sides and $\delta_1 \neq \delta_2$ (Ibrahim and Chancharoenchai, 2014; Grasso and Manera, 2007). Next, we attempted to employ the Diks and Panchenko (2006) nonlinear Granger causality test to capture the causal effect. The null hypothesis of this approach can be described as follows:

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$$H_{0:} \; Y_{t+1} \left| \left(X_t^{\ell_x} \; ; \; X_t^{\ell_y} \right) \sim Y_{t+1} \right| Y_t^{\ell_y} \tag{12}$$

According to Wang and Wu (2012), the past observation of $X_t^{\ell_x}$ contains useful information of Y_{t+1}, and $\sim$ denotes the equivalence in disturbance. Based on equation (12), the distribution of ($\ell_x = \ell_x = 1$) is a dimensional vector of $W_t = (X_t, Y_t, Z_t)$, where $Z_t = Y_{t+1}$. Finally, Diks and Panchenko (2006) formulated the nonlinear Granger causality null hypothesis as follows:

$$q = E \left(f_{X,Y,Z}(X,Y,Z) f_Y(Y) - f_{X,Y}(X,Y) f_{Y,Z}(Y,Z) \right) = 0 \tag{13}$$

3. Empirical Findings

The analysis employs monthly data covering the period of January 1995 to December 2013. First, the order of the integration of the series is estimated; this is followed by cointegration and causality tests. In this study, we began with ADF and KPSS univariate unit root tests with linear formation, and then followed with Bierens using nonlinear estimates. *Table 1* shows the estimated ADF, KPSS and Bierens stationarity results. Overall, we found that all variables are integrated at I(1), and these results are consistent with Kumar *et al.* (2015), Loganathan *et al.* (2012), Salleh *et al.* (2007), and Kadir and Karim (2012) who found I(1) integration level for the international tourist arrivals to Malaysia in addition to macroeconomic indicators.

Table 1. Linear and nonlinear univariate stationarity test

Variables	Linear		Nonlinear
	ADF	KPSS	Bierens
	At level		
Tour	-1.614	0.166**	-1.895
REP	-2.231	0.127*	-2.715
Fin	-2.547	0.276***	-2.772
	At first difference		
$\Delta Tour$	-7.600***	0.091	-7.718***
ΔREP	-11.875***	0.033	-6.300***
ΔFin	-12.605***	0.030	-4.789***

Notes: *, ** and *** show significance at 10%, 5% and 1% levels, respectively. The optimal lag lengths are chosen based on the Akaike Information Criterion (AIC).
Source: own compilation.

Moreover, we also attempted to determine the seasonal unit root test using Franses and Hobijn's (1997) estimation technique (refer to *Table 2*). For the purpose of estimating the seasonal unit root, we determined the best lag length based on the minimum value of AIC, we found that there is a seasonal effect in the months of June and July during the period of this study. We found that the number of GCC countries tourist arrivals had increased dramatically during this particular period because, during this period, most GCC countries encounter an extremely hot climate. This finding also coincides with the annual holiday season of Middle Eastern tourists from (Ariffin and Hasim, 2009). Although the fasting months of Ramadan changes based on the Islamic calendar, the arrival trend surprisingly has remained the same in the months of June and July for the past 2 decades. This finding shows that the GCC countries tourist arrivals have unique trend sets.

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Table 2. Univariate seasonal unit root test results

Months	Tour (k=3)	REP (k=2)	Fin (k=3)
π_1	2.422	-2.647*	2.799
π_2	2.691	-2.000	2.725
π_3	1.127	-2.084*	2.549*
π_4	1.300*	-2.156	2.720
π_5	2.152	-2.536	2.993
π_6	2.053*	-3.019	2.810
π_7	1.990*	-3.044*	3.099*
π_8	2.148	2.510	2.821
π_9	2.246	0.426	1.519
π_{10}	-1.390	-3.330*	-5.184*
π_{11}	0.585	-4.158*	-5.628*
π_{12}	-0.955	-3.830*	-2.039
π_3,π_4	0.6559	17.139**	18.321**
π_5,π_6	15.575**	12.440**	14.117**
π_7,π_8	9.672**	14.337**	18.826**
π_9,π_{10}	15.756**	21.744**	20.416**
π_{11},π_{12}	14.618**	24.493**	17.234**
$\pi_1,...,\pi_{12}$	9.553**	20.568**	25.630**
$\pi_2,...,\pi_{12}$	9.981**	19.528**	25.526**

Notes: *, ** and *** show significance at 10%, 5% and 1% levels, respectively. Critical values for t-statistics are derived from Franses (1991). Test for π_1 and π_2 are one-sided tests, while other t-tests are two-sided. The optimal lag lengths (k) are chosen based on the Akaike Information Criterion (AIC) which is stated in parentheses.
Source: own compilation.

Furthermore, for the series used in this study, we also checked for the BDS analysis (Brock *et al.*, 1987). This is a well-known test to identify the presence of nonlinear effects. According to Dergiades *et al.* (2013) and Chiou-Wei *et al.* (2008), the BDS nonlinearity test is a tool used to capture the linearization process within the VAR estimation model. The residual based correlation matrix based on VAR estimates and BDS test is listed in Table 3. We found that under the 1% significance level, irrespective of the dimension, the null hypothesis of the i.i.d residuals was rejected in the VAR estimate model of Tour, REP and Fin. On the basis of these results, we suggest further analyses of the asymmetric cointegration and causality tests.

Table 3. Correlation and BDS test results

Variables	Residual based correlation matrix		
	Tour	REP	Fin
Tour	**1.000**		
REP	0.877*** (0.000)	**1.000**	
Fin	0.653*** (0.000)	0.777*** (0.000)	**1.000**
Dimension	BDS linearity test		
	BDS statistics	z-statistics	Std. errors
2	0.018***	3.561	0.005
3	0.026***	3.355	0.008

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| 4 | 0.031*** | 3.348 | 0.009 |
| 5 | 0.026*** | 2.632 | 0.009 |

Notes: *, ** and *** show significance at 10%, 5% and 1% levels, respectively. The BDS test estimates is based multivariate vector-autoregressive estimates. Values in ( ) represent p-values.
Source: own compilation.

After accepting the BDS nonlinearity test, we conducted a unit root test. In this situation, we employed the Enders and Siklos (2001) and Bierens (1997) nonlinear unit root test. From *Table 4*, we can observe that the null hypothesis was rejected. This indicates an existence of a long-run relationship among the variables being studied. In other words, oil prices and financial stability are able to contribute to GCC countries tourist arrivals in the long run with threshold effects. Income generated from rising oil prices for GCC countries increases the purchasing power of the inbound GCC tourists. Indeed, most of the GCC countries are also under the OPEC cartel; in addition, the volatile effects of global oil prices are reflected in the economic horizon of those countries. The rise of global oil prices will always indicate a positive reflection for GCC countries' overall economic performance, as argued by Becken (2011b) and Chatziantoniou *et al.* (2013).

As tabulated in *Table 4*, the ES cointegration estimates clearly reject the null hypothesis, particularly in the TAR and MTAR models. Turning to our main objective of this study, we found both tests rejected the null hypothesis and allowed a threshold adjustment process for the long-run GCC tourism demand to Malaysia.

Table 4. Asymmetric cointegration test

Dependent variables	ES test		Asymmetry test	
	TAR	MTAR	TAR	MTAR
Tour	13.710**	14.550**	6.727**	12.192**
	[8.084]	[9.405]	[5.868]	[8.209]

Note: *, ** and *** show significance at 10%, 5% and 1% levels, respectively. Values in [ ] represent simulated critical values with 10000 simulations. Optimal lag order of the test equation is based on the Akaike Information Criterion (AIC).
Source: own compilation.

In the second stage of the cointegration test, we estimated the asymmetric error correction model using the MTAR specification based on the general-to-specific reduced form of the lags approach by trimming the insignificant variables. The following equation provides the long-run asymmetric MTAR estimates results in addition to the diagnostic tests. (Note: Values in brackets represent the p-values respectively).

$$\Delta Tour_t = -0.011 - 0.259 W_{t-1}^+ - 0.367 W_{t-1}^- - 0.049 \Delta Tour_{t-1} - 0.133 \Delta Tour_{t-2} -$$
$$\quad\quad (0.832) \quad (0.019) \quad\quad (0.001) \quad\quad (0.043) \quad\quad\quad (0.055)$$

$$0.201 \Delta Tour_{t-3} + 0.668 \Delta REP_t + 0.494 \Delta Fin_t + 0.587 (REP \text{ x } Fin)_t$$
$$\quad\quad (0.002) \quad\quad\quad (0.019) \quad\quad\quad (0.046) \quad\quad\quad (0.031)$$

$$\text{Adj-}R^2 = 0.705 \quad\quad\quad \chi^2_{Normality}(2) = 0.591 \ (0.121) \quad\quad\quad \chi^2_{ARCH}(2) = 2.444$$
$$(0.119)$$

$$F\text{-stat} = 8.213 \ (0.000) \quad\quad\quad \chi^2_{LM}(3) = 8.082 \ (0.151)$$

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We found that the estimated results are satisfactory with an acceptable indication of adjusted R^2 and a significant level of the F-statistic. We found that the lagged *Tour* variable had a negative sign and was significant at the fundamental stages. Changes in *REP* and *Fin* are likely to have positive impacts on GCC tourism demand in Malaysia. Moreover, any increases in real energy prices and financial stability will positively affect the GCC countries tourism demand. Chatziantoniou *et al.* (2013), for example, affirmed that the impact of rising oil prices varies between oil-importing countries and oil-exporting countries. Because this study involves most of the oil-exporting countries, higher oil prices will have less impact on the tourism industry. Conversely, financial stability would also encourage higher investments, disposable income and increased tourism demand and spending. Indeed the iteration between *REP* and *Fin* also indicate a positive sign with 5% significance level, which proofed that both series are positive reflected with GCC countries tourist arrival to Malaysia.

Furthermore, the coefficients of W_{t-1}^+ and W_{t-1}^- indicate the asymmetric adjustment speeds (long-run asymmetry) of the estimated results. The results show 25.9% and 36.7% of positive and negative deviations, respectively. The results suggest that negative coefficients are generally larger than their positive counterparts in the long run. This finding confirms that the deviations of both values are corrected in the upcoming months in the long-run equilibrium path of the estimated model. Given the presence of asymmetric cointegration, we estimated asymmetric causalities based on the Diks and Panchenko (2006) framework. We set the Bandwidth value as 0.5 and 1.0, where $\ell_x=\ell_y=1$ and $\ell_x=\ell_y=2$, respectively. *Table 5* presents the results causalities between *Tour, REP* and *Fin*. In general, we found strong evidence of the existence of a unidirectional nonlinear causal relation running from *REP* towards tourism demands; and bidirectional causalities running between *Tour* to *Fin*. The findings of this study confirm the findings from previous studies, such as that conducted by Chang *et al.* (2014) where the authors used the Granger causality test to determine stock prices for tourist arrival for Taiwan.

Table 5. Test for nonlinear Granger causality

$\ell_x=\ell_y$	Bandwidth	H_o: $Tour-/\rightarrow REP$	H_o: $Tour \leftarrow/-REP$
1	0.5	0.599 (0.154)	1.541* (0.061)
	1.0	3.569 (0.100)	1.982*** (0.003)
2	0.5	2.215 (0.113)	2.307*** (0.010)
	1.0	2.683 (0.103)	1.527* (0.063)
$\ell_x=\ell_y$	Bandwidth	H_o: $Tour-/\rightarrow Fin$	H_o: $Tour \leftarrow/-Fin$
1	0.5	1.497* (0.067)	2.788*** (0.002)
	1.0	1.694** (0.045)	2.562*** (0.005)
2	0.5	1.342* (0.089)	2.256** (0.012)
	1.0	1.132 (0.128)	2.464*** (0.006)

Note: *, ** and *** show significance at 10%, 5% and 1% levels, respectively. Values in parentheses represent probability values.
Source: own compilation.

Conclusion

The tourism sector is now becoming the most important contributing sector to Malaysia's economy. The Economic Transformation Plan (ETP) of Malaysia also highlights this sector as a high-yielding sector for the nation's development. After encountering a number of unexpected tragedies, such as airline crashes, disasters and currency instability, and the GCC countries respiratory syndrome coronavirus (MERS-Cov), the current demand for international tourism in Malaysia is shifting to European and Middle Eastern regions. In this study, we have attempted to estimate the nonlinear model for tourism demand in Malaysia using cointegration and causality techniques. The results show that real energy prices have indirect effects on most of the tourism-related hospitality and services sector, and it is essential to the financial stability of Malaysia. In our view, one of the main findings is that when the ES asymmetric cointegration tests were adopted, an asymmetric cointegration existed between the variables used in this study. From the causality analysis, the existence of bidirectional and unidirectional causalities between the variables can be concluded.

According to these empirical findings, we suggest comprehensive tourism development planning, and development of more infrastructures and the promotion of Malaysia as a preferred destination internationally with strong relationships between government, tourism industry players, local authorities and private agencies focusing of GCC countries. This can be done by promoting Muslim tourism packages and increase halal tourism markets, and develop more halal standard for hotel industries, such as the Salam Standard hospitality schemes for Muslim friendly accommodations. In addition, maintaining a sound financial system in Malaysia is pertinent to encourage the inflow of inbound tourism from the GCC countries. As a future direction of our study, we suggest the use of a nonlinear autoregressive distributed lag model (NARDL), which may be more accurate to identify long- and short-run nonlinear relationships. Similarly, substitute tourism prices based on the Almost Ideal Demand System (AIDS) estimate can be considered for future use in asymmetric tourism demand analysis in Malaysia.

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