TOURISM AND ECONOMIC GROWTH IN MALAYSIA: COINTEGRATION AND CAUSALITY ANALYSIS

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Abstract
The Tourism-Led-Growth hypothesis is investigated in this study. Univariate unit root tests confirm that GDP, tourist arrivals and tourism receipts are non-stationary. Alternative Autoregressive distributed lag (ARDL) and Gregory and Hansen (1996) cointegration tests are employed and the results suggest that there is a long-run relationship between tourist arrivals and GDP and between tourism receipts and GDP. Unlike the previous studies results, we find a bi-directional causality between tourism and growth.

Keywords: Tourism; economic growth; Toda and Yamamoto causality; cointegration; developing country

1. Introduction
Tourism has become one of the most important global industries today. The ease of movement across borders has gained tourism industry a position as the world’s biggest export earner. Tourism represents a source of receipts; therefore, researchers are interested in demonstrating that tourism can be considered as a main factor of economic growth, especially for developing countries. Brida and Pulina (2010) list different channels through which the tourism sector can exert a positive impact on economic growth. In particular, like increasing personal income, taxes, revenues and employment opportunities (Lee and Chang 2008), increasing foreign exchange earnings, which yield capital goods accumulation (McKinnon, 1964) contributing in this way to the balance of payment (Nationmaster, 2010), stimulation of investments in new infrastructures (Eugenio-Martín and Morales 2004; Sakai 2009), human capital (Blake et al. 2006) and technology (Feng and Morrison 2007). Furthermore, tourism stimulates other related industries by direct, indirect and induced effects (Spurr 2009) and causes positive economies to scale and scope (Weng and Wang 2004). Finally, Sinclair (1998) points out that developing countries often are more endowed with natural resources (e.g., wildlife, coral reefs, canyons, caves, falls and deserts). This belief that tourism can promote or cause long-run economic growth it is known in the literature as the tourism-led growth hypothesis. There are also disadvantages, together with advantages, deriving from tourism development, like costs incurred from the provision and maintenance of infrastructures and the need for specialized education (Sinclair 1998), increased pollution, congestion or despoliation of the environment (Pearce 1985; Jenner and Smith 1992; Gursoy and Rutherford 2004), and potential increase of crime and violence (Dunn and Dunn 2002). Overall, taking into account the potential economic, social, cultural, environmental and political benefits and costs of tourism development, there is a
general consensus to the point that tourism sector may significantly contribute to economic growth. Analogously to, the tourism-led growth analyzes the possible temporal relationship between tourism and economic growth, both in the short and long run. The question is whether tourism activity leads to economic growth or, alternatively, economic expansion drives tourism growth, or indeed a bidirectional relationship exists between the two variables.

Four hypotheses have been identified with regard to the tourism-economic growth relationship (Oh, 2005): tourism-led economic growth, economic-driven tourism growth, bi-directional causal relationship and no absolute relationship between tourism and economic growth. The tourism-led economic growth hypothesis indicates a one way causal relationship running from tourism development to economic growth. If this happens, policy in promoting tourism might increases the income level. In contrast, the reverse causation with the economic-driven tourism growth hypothesis exhibits a unidirectional causal nexus from economic growth to tourism expansion. The economic expansion might enhance the tourism revenues. However, the reciprocal hypothesis benefits both tourism expansion and economic growth by exerting a dynamic interaction in both areas (Chen and Chiou, 2009). Finally, it is believed that tourism and economic growth in special circumstances, has no significant relationship on each other, which means they are neither capturing the benefits from the economic nor the tourism expansion. In this case, enthusiasm in promoting tourism or aggressive economic expansion may not as effective as the real scenario.

In this paper, we extend the existing empirical analysis on the relationship between tourism and economic growth. In the first place, and in order to avoid the econometric problems mentioned above, we make use of recent developments in cointegrated regression models with single structural change. Specifically, we use a new approach proposed by Gregory and Hansen (1996) to test for structural changes in cointegrated regression models in the case of Malaysia. In the second place, we use Toda and Yamamoto (1995) granger non-causality test in tourism literature.

The paper is organised as follows. The next section reviews the literature and describes the novelty of the research. Section 3 presents the data, methodology and results. Finally, Section 4 concludes the paper.

2. Literature review
Since tourism is one of the key service industries in Malaysia, researchers are motivated to investigate whether there is a tourism-growth nexus for the country. Over the last decade, several attempts have been carried out to explore on this topic but mixed-results are produced, either favouring the tourism-led growth or growth-led tourism link. Nevertheless, the recent findings provided by researchers are more in favour of the tourism-led growth hypothesis.

Nanthakumar et al. (2008) examine the hypothesis of economic-driven tourism growth in Malaysia for the period 1980-2007, by using the data on annual basis of total tourist arrivals (receipts) to Malaysia, real gross domestic product (GDP), and consumer price index (CPI). As usual, unit root tests are employed for testing the stationarity of the series. The results of
Johansen and Juselius (1990) cointegration test do not support cointegration among the series. Based on the results of Granger causality using block exogeneity Wald test, bidirectional causality is found between CPI and tourist arrivals, as well as between CPI and GDP. The analysis based on variance decomposition confirms the contribution of GDP and CPI towards tourist arrivals in Malaysia. As the economic-driven tourism growth hypothesis is found valid, the growth-led tourism nexus is supported.

Lau et al. (2008) provide the evidence of tourism-led growth link by testing for the comovement and causality between tourist arrivals and economic growth in Sarawak. The annual data of tourist arrivals and GDP for Sarawak over the period 1972-2004 are obtained, and estimated by using unit root tests, Johansen and Juselius (1990) cointegration test, and Granger causality test based on the vector error correction model (VECM). It is found that, tourist arrivals and economic growth share a common trend in the long-run. In the short-run, no causality is observed between the two variables. Meanwhile, there is unidirectional causality running from tourist arrivals to economic growth in the long-run. According to the authors, intensifying promotions may help to increase the number of tourist arrivals in Sarawak.

The growth-led tourism hypothesis is supported in the study carried out by Kadir et al. (2010). The authors study a sample consists of nine countries, namely Australia, Germany, Indonesia, Japan, Philippines, Singapore, Thailand, United Kingdom, and United States. The estimation is based on the quarterly data of international tourism receipts, real GDP, real effective exchange rates, and consumer price indices (relative prices of tourism) over the period 1994-2004. Unit root tests are used to test for stationarity. The cointegration tests based on Johansen (1988, 1991) and Johansen and Juselius (1990) produce results that indicate the presence of a common trend among all the series. By using the multivariate causality tests based on VECM, it is evident that real GDP, relative prices of tourism, and exchange rates Granger cause international tourism receipts in the long-run. In the short-run, relative price of tourism Granger cause real GDP and international tourism receipts. As the growth-led tourism hypothesis is supported, this suggests that economic growth may accelerate business opportunity in the domestic tourism industry.

Strong evidence of the tourism-led growth relationship in Malaysia is contributed by several other recent studies. The findings of Kadir and Karim (2012) support that tourism and economic growth are cointegrated and tourism Granger cause economic growth. Similarly, Othman et al. (2012) found the evidence of the cointegration between tourism and economic growth. Meantime, the unidirectional causation from tourism to economic growth is again proven.

Most currently, the tourism-led growth hypothesis is found valid in the study by Tang and Tan (2015). They utilize a multivariate model based on the Solow growth theory to examine the tourism-led growth hypothesis in Malaysia for the period 1975-2011. Specifically, per capita real gross national product (GNP) is modelled as a function of per capita real tourism receipts, the measure of political stability, per capita real gross national savings, population growth, technical progress growth, and the depreciation rate of capital stock. The study employs the annual data of the variables and includes the unit root test, cointegration test, Ordinary Least Square (OLS) regression, and Granger causality test. By employing the cointegration test based on Johansen and Juselius (1990), the series of economic growth, tourism, political stability, savings, and population growth are found to be cointegrated in the long-run. The OLS estimator shows that
these variables significantly determine economic growth in the long-run and short-run, except for political stability which is only significant in the long-run. Further, the results of causality test based on VECM indicate that tourism Granger cause economic growth in the long-run and short-run. Clearly, the findings are in favour of the tourism-led growth hypothesis hence policy for promoting inbound tourism is applicable.

3. Model specification and data

Following the earlier studies (e.g. Gunduz & Hatemi, 2005; Lean & Tang, 2010; Oh, 2005; Tang, 2011), the relationship between tourism and economic growth in Malaysia is examined within a bivariate framework. The standard log-linear functional specification of long-run relationship between tourism and economic growth may be expressed as:

\[ \text{GDP}_t = \alpha + \beta \text{TOURISM}_t + \varepsilon_t \]  

and

\[ \text{TOURISM}_t = f(\text{TOUR}_t, \text{RCPT}_t) \]

Where \( \varepsilon_t \) is the error term. GDP\( _t \) is per capita real gross domestic product (GDP) which is proxied for economic growth. The validity of the relationship between tourism and economic growth may also be sensitive to the indicators employed. Therefore, in the present study, the tourism is proxied by international tourist arrivals (TOUR\( _t \)) from different tourism markets and international tourism receipts (RCPT\( _t \)), respectively. All variables are transformed into natural logarithms to reduce heteroscedasticity and to obtain the growth rate of the relevant variables by their differenced logarithms. The annual time series data from 1989 to 2013 are extracted from the World Development Indicators (WDI) and statistical bulletins of Malaysia. Figure 1 show the trends of the variables.
4. Methodology and Results

4.1 Univariate Unit root test
Before we start our analysis of cointegration, we employ three different unit root tests namely Augmented Dickey–Fuller (1979, ADF), ADF-GLS proposed by Elliot et al. (1996) and Kwiatkowski–Phillips–Schmidt–Shin (1992, KPSS) to check on the order of integration of each series. As the testing procedure for these tests are well explained, a brief survey of these tests is warranted. The ADF-GLS unit root test is a modified test of the ADF test, which is power invariant. The KPSS test considers the observed time series as the sum of both stationary and nonstationary components and tests the stationarity of the variance of the nonstationary component. In ADF and ADF-GLS tests, the null hypothesis is ‘the series has a unit root against the alternative of stationarity’, while for KPSS the null hypothesis is ‘the series is stationary’. Thus, KPSS is used to complement ADF and ADF-GLS tests in order to have robust results.

In Table 1, we report the results of the traditional linear unit root tests for the level and first-differenced series. The ADF and ADF-GLS, unit root test results clearly show that all the GDP, TOUR and RCPTS series are non-stationary in their level but are stationary at their first difference in both unit root statistics. While the KPSS unit root tests indicate that the level series
are nonstationary at least at the 10% level, as we reject the null hypothesis of stationarity, for the differenced series of GDP, TOUR and RCPTS, we fail to reject the null at least at the 10% levels of significance. Thus, the overall tests results confirm that the level series are integrated of the order one, \( I(1) \). Importantly, none of the data series are \( I(2) \) or above. Thus we can proceed to examine for the presence of cointegration by using the ARDL estimators between tourism and economic growth in Malaysia.

Table 1. Unit root tests

<table>
<thead>
<tr>
<th>Series</th>
<th>GDP</th>
<th>TOUR</th>
<th>RCPTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No trend</td>
<td>Trend</td>
<td>No trend</td>
</tr>
<tr>
<td><strong>Levels</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADF</td>
<td>-2.19</td>
<td>-2.76</td>
<td>-0.83</td>
</tr>
<tr>
<td>ADF-GLS</td>
<td>0.08</td>
<td>-2.07</td>
<td>-0.03</td>
</tr>
<tr>
<td>KPSS</td>
<td>*0.73</td>
<td>***0.14</td>
<td>**0.70</td>
</tr>
<tr>
<td><em>First differences</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADF</td>
<td>*-4.20</td>
<td>*-4.56</td>
<td>*-5.95</td>
</tr>
<tr>
<td>ADF-GLS</td>
<td>*-4.17</td>
<td>*-4.78</td>
<td>*-4.39</td>
</tr>
<tr>
<td>KPSS</td>
<td>0.12</td>
<td>0.11</td>
<td>0.12</td>
</tr>
</tbody>
</table>

Note: *, **, *** denote significance at 1%, 5% and 10% levels respectively. The optimal lag order for ADF and ADF-GLS tests is determined by AIC, while the bandwidths for KPSS test are determined by using the Newey-West Bartlett kernel.

4.2 Cointegration methodology

4.2.1 Autoregressive distributed lag (ARDL) bounds tests Analysis

Having established that all variables are \( I(1) \), we now proceed to the cointegration analysis. We first test for cointegration without allowing for a structural break. Therefore, we may apply ARDL bounds testing procedures for establishing the long-run relationship between tourism and economic growth. An ARDL model is a general dynamic specification, which uses the lags of the dependent variable and the lagged and contemporaneous values of the independent variables, as opposed to the cointegration VAR models where different lags for different variables is not permitted, through which the short-run effects can be directly estimated, and the long-run equilibrium relationship can be indirectly estimated. The bounds testing approach has certain advantages over the conventional cointegration techniques. Unlike the conventional cointegration techniques, the bounds testing approach can be applied to the model irrespective of whether the variables are purely \( I(0) \) or purely \( I(1) \). In addition to that, the Monte Carlo analysis exhibits that the ARDL cointegration approach has superior properties in small sample (Pesaran and Shin, 1999).
The ARDL model for bounds testing approach to cointegration can be formulated as follows:

\[
\Delta TOUR_t = a_0 + \pi_1 TOUR_{t-1} + \pi_2 GDP_{t-1} + \sum_{j=1}^{k} b_{1j} \Delta TOUR_{t-j} + \sum_{j=0}^{k} b_{2j} \Delta GDP_{t-j} + e_t \quad (1)
\]

\[
\Delta GDP_t = a_2 + \pi_1 \ln TOUR_{t-1} + \pi_2 GDP_{t-1} + \sum_{j=1}^{k} b_{1j} \Delta TOUR_{t-j} + \sum_{j=0}^{k} b_{2j} \Delta GDP_{t-j} + e_{2t} \quad (2)
\]

Here \( \Delta \) is the first difference operator, \( k \) is the lag order selected by Akaike’s Information Criterion (AIC). The residuals \( e_t \) are assumed to be normally distributed and white noise. According to Pesaran et al. (2001), we can use the F-test to determine the presence of a long-run relationship by restricting the coefficients of the lagged level variables (\( H_0: \pi_1 = \pi_2 = \pi_3 = 0 \)) from equations (1) to (2). The F-test has a non-standard distribution which depends upon whether variables included in the ARDL model are (a) \( I(0) \) or \( I(1) \); (b) the number of regressors; (c) whether the ARDL model contains an intercept and/or a trend; and (d) the sample size. Two sets of critical \( F \) values have been provided by Pesaran et al. (2001) where one set assuming that all variables in ARDL model are \( I(1) \) and another assuming that all variables are \( I(0) \) in nature. If computed \( F \)-statistics falls outside the band, a conclusive decision can be taken without needing to know whether the underline variables are \( I(0) \) or \( I(1) \). Cointegration exists only if the computed \( F \)-statistics is higher than the upper bound critical value while inference remains inconclusive if the computed \( F \)-statistics falls within the critical band.

We have to select appropriate lag order of the variables using unrestricted VAR. The appropriate selection of lag length is helpful to compute ARDL \( F \)-statistic in examining whether cointegration exists or not. We select lag length which is 2 in our sample data and our results are based on the Akaike information criterion (AIC) due to its superior power properties (Pesaran et al. (2001)).

ARDL bounds tests results for cointegration are reported in Table 2. In all cases, the calculated \( F \)-statistics are greater than the 1 per cent upper bound critical values provided by Pesaran et al. (2001). Therefore, the null hypothesis of no cointegration can be rejected, implying that a long-run equilibrium relationship exist tourism and economic growth in Malaysia.

### Table 2 ARDL Bounds tests for the existence of a long relationship

<table>
<thead>
<tr>
<th>Bounds testing to cointegration</th>
<th>1%</th>
<th>5%</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>( F_{TOUR} ) (TOUR/GDP)</td>
<td>18.96*</td>
<td>I(0)</td>
<td>I(1)</td>
</tr>
<tr>
<td>( F_{GDP} ) (GDP/TOUR)</td>
<td>7.55*</td>
<td>I(0)</td>
<td>I(1)</td>
</tr>
<tr>
<td>( F_{RCPTS} ) (RCPTS/GDP)</td>
<td>9.68*</td>
<td>4.94</td>
<td>5.58</td>
</tr>
<tr>
<td>( F_{GDP} ) (GDP/RCPTS)</td>
<td>6.16*</td>
<td>3.62</td>
<td>4.16</td>
</tr>
<tr>
<td>Note: * denote significant at 1% levels.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7
4.2.2 Structural break cointegration approach

The traditional cointegration tests have limitations especially when dealing with a long data span when the data generating process may be affected by major economic events such as financial and economic crises, shifts in industrial structure and productivity growth. These events could alter the equilibrium relationship. Several studies have shown the sensitivity of the outcome of the traditional tests to structural breaks. To examine further the robustness of our results to structural breaks, we apply the Gregory and Hansen (1996) cointegration tests that account for an endogenously-determined break. It is important to consider the possibility of a shift in the equilibrium relations that occurs at an unknown point in time. The results of Gregory and Hansen (1996) approach could be especially insightful when the null hypothesis of no cointegration is not rejected by the traditional tests. When it is rejected by the Gregory and Hansen (1996) test, we receive an important indication that a cointegration relation in fact exists, with the parameters of the cointegration relations being subject to change.

The Gregory and Hansen (1996) test assumes the null hypothesis of no cointegration against the alternative hypothesis of cointegration with one structural break. The timing of the structural change is not known a priori but is determined by the data. Gregory and Hansen (1996) present three models, whereby the shifts can be either in the intercept alone (C):

\[ y_t = \mu_1 + \mu_2 \phi_{t\tau} + \alpha_2^T y_{2t} + e_t \quad t=1,2,\ldots,n \]  

(2)

or, in both trend and level (C/T)

\[ y_t = \mu_1 + \mu_2 \phi_{t\tau} + \beta_1 + \alpha_2^T y_{2t} + e_t \quad t=1,2,\ldots,n. \]  

(3)

or, allows a change in the intercept, the trend as well as slope coefficients (C/S/T)

\[ y_t = \mu_1 + \mu_2 \phi_{t\tau} + \beta_1 + \beta_2 \phi_{t\tau} + \alpha_1^T y_{1t} + \alpha_2^T y_{2t} + e_t \quad t=1,2,\ldots,n. \]  

(4)

where \( \mu_1, \beta_1 \) and \( \alpha_1 \) represents the intercepts, trend coefficients and slope coefficients respectively before the regime shift and \( \mu_2, \beta_2 \) and \( \alpha_2 \) are the corresponding changes after the break off. \( y_{1t} \) and \( y_{2t} \) are of I(1) and \( y_{2t} \) is a variable or a set of variables. \( t \) represents a time trend. The dummy variable \( \phi_{t\tau} \) that captures the structural change is defined by:

\[ \phi_{t\tau} = \begin{cases} 0, & \text{if } t \leq \lfloor \eta \tau \rfloor \\ 1, & \text{if } t > \lfloor \eta \tau \rfloor \end{cases} \]  

(5)

where the unknown parameter \( \tau \in (0,1) \) denotes the timing of the structural change point and \( \lfloor \rfloor \) denotes the integer part. The non-stationarity of the residuals under the null Hypothesis is then tested based on a procedure that trims a small Percentage of the data at two ends and calculates the ADF, and the Phillips (1987) \( Z_\alpha \) and \( Z_\tau \) statistics for each of the remaining observations as being the potential break point. Gregory and Hansen (1996) tests choose the break point that gives the least support for the null hypothesis of a unit root in the residuals and hence no cointegration. Hence the three test statistics suggested are as follows (Gregory and Hansen, 1996):
\[
Z^*_\alpha = \min_{\tau \in \mathcal{T}} Z_\alpha(\tau), \\
Z^*_t = \min_{\tau \in \mathcal{T}} Z_t(\tau), \\
ADF^* = \min_{\tau \in \mathcal{F}} ADF(\tau).
\]

These test statistics based on the minimal values of overall possible breakpoints.

The test results of Gregory and Hansen (1996) are reported in Table 4. We follow Gregory and Hansen (1996) to compute the ADF and PP test statistics for each breakpoint in the interval, 0.15T to 0.85T (where T is the number of observations). We will choose the breakpoint associated with the smallest value at which the structural break occurred. Panel A investigates the relationship between TOUR and GDP.

According to the Gregory and Hansen (1996) cointegration test results, for the level shift (C) model the null of no cointegration is not rejected at the 10% significance level by the ADF, \( Z_\alpha \) and at \( Z_t \) tests. For the level shift with trend (C/T) and the regime and trend shift (C/S/T) models, the null is rejected by the ADF and \( Z_t \) tests, but is not rejected by the \( Z_\alpha \) test at any level of significance. Similar picture emerged from the panel B when we used RCPT variable as a measure of tourism. We can reject the null of no cointegration at the 5% and 10% significance level by the ADF and \( Z_t \) tests. Hence, the Gregory–Hansen tests support a cointegrating relationship between tourism and economic growth.

<table>
<thead>
<tr>
<th>Models</th>
<th>ADF*</th>
<th>( T_b )</th>
<th>( Z^*_\alpha )</th>
<th>( T_b )</th>
<th>( Z^*_\alpha )</th>
<th>( T_b )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A: TOUR</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>-0.63</td>
<td>1997</td>
<td>-3.57</td>
<td>1994</td>
<td>-17.96</td>
<td>1993</td>
</tr>
<tr>
<td>C/T</td>
<td>*-5.60</td>
<td>2008</td>
<td>***-4.73</td>
<td>1992</td>
<td>-21.54</td>
<td>1992</td>
</tr>
<tr>
<td><strong>Panel B: RCPTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>**-4.79</td>
<td>2001</td>
<td>***-4.35</td>
<td>1999</td>
<td>-22.03</td>
<td>1999</td>
</tr>
<tr>
<td>C/S/T</td>
<td>**-5.53</td>
<td>2006</td>
<td>***-5.33</td>
<td>1998</td>
<td>-27.06</td>
<td>1998</td>
</tr>
</tbody>
</table>

Note: Critical values were obtained from Gregory and Hansen (1996). *, ** and *** imply significance at 1%, 5% and 10%, respectively.

### 4.3 Causality Analysis

The existence of a long-run relationship among the variables suggests that there must be causality at least in one direction. In this study, the Granger-causality testing procedure developed by Toda and Yamamoto (1995) is adopted. Unlike the aforementioned approaches, the Toda and Yamamoto approach is applicable irrespective of whether the variables are stationary, integrated of an arbitrary order or cointegrated of an arbitrary order, as long as the order of
integration does not exceed the optimal lag length. As such, one is able to test linear or nonlinear restrictions on the coefficients by estimating a vector auto regression (VAR) in levels, paying little attention to the integration and cointegration properties of the time series at hand (see Toda and Yamamoto, 1995). VAR can be estimated without true lag order \( k \) but it is applicable with \( (k + d) \) lag order where \( d \) indicates possible order of integration for variables. The Toda and Yamamoto (1995) causality test is examined by performing hypothesis exercise disregarding the additional lags \( k + 1, \ldots, k + d \) in vector auto regression (VAR). The Toda-Yamamoto causality technique involves the estimation of the following models:

\[
GDP = \alpha_0 + \sum_{i=1}^{k + d_{\text{max}}} \alpha_i GDP_{t-i} + \sum_{i=1}^{k + d_{\text{max}}} \alpha_i TOUR_{t-i} + \eta_1 \tag{6}
\]

\[
TOUR = \beta_0 + \sum_{i=1}^{k + d_{\text{max}}} \beta_i TOUR_{t-i} + \sum_{i=1}^{k + d_{\text{max}}} \beta_i GDP_{t-i} + \eta_2 \tag{7}
\]

\[
GDP = \delta_0 + \sum_{i=1}^{k + d_{\text{max}}} \delta_i GDP_{t-i} + \sum_{i=1}^{k + d_{\text{max}}} \delta_i RCPTS_{t-i} + \eta_3 \tag{8}
\]

\[
RCPTS = \lambda_0 + \sum_{i=1}^{k + d_{\text{max}}} \lambda_i RCPTS_{t-i} + \sum_{i=1}^{k + d_{\text{max}}} \lambda_i GDP_{t-i} + \eta_4 \tag{9}
\]

In the models, each variable is regressed on each other with lag order starting from 1 towards \( k + d_{\text{max}} \). \( \eta_1 \) and \( \eta_2 \) are the error terms, \( k \) indicates the maximum number of lags to be taken while \( d \) shows order of integration of running variables. Since the procedure requires a VAR only in levels, it does not lead to a loss of information as it would happen in the case of differencing. For this reason, the procedure can be used only as a long-run test.

The results of Wald test with the null hypothesis that the values of the estimated coefficients \( (\alpha_i \text{ and } \lambda_i) \) are zero, obtained from the SUR estimation of the level VAR model outlined in equation (6) to (7), are in table 5. The optimum lag length \( (k) \) of VAR is determined by using the Schwarz Information Criterion (SIC), was found to be 6. We then estimate a VAR\(^1(k + d_{\text{max}})\) to use the Wald test for linear restriction on the parameters of a VAR\((k)\), which has an asymptotic \( \chi^2 \) distribution. Moreover the coefficient of the extra lag will not be used in the computation of the Wald test for causality. Therefore, we ignore the coefficient of the last \( d_{\text{max}} \) of order of integration and applied the linear restriction only on the first \( k \) coefficients of matrices by mean of Wald test. The null hypothesis that ‘TOUR does not Granger Cause GDP’ and ‘RCPTS does not Granger Cause GDP’ can decisively be rejected at the 1 and 5 percent level of significance respectively. On the other hand, the hypothesis that ‘GDP does not Granger Cause TOUR’ can be rejected at the 1 percent level of significance. Therefore we on the whole found out the evidence that there is bidirectional causality where tourism and economic growth Granger cause one another.

\(^1\) VAR order is now VAR (7) that is we added extra lags of the variables equal in number to the maximum order of integration.
Table 5: Toda-Yamamoto Test of Granger Causality a Modified Wald test

<table>
<thead>
<tr>
<th>Null Hypothesis of non-causality</th>
<th>$\chi^2$-statistic</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP does not Granger Cause TOUR</td>
<td>133.67</td>
<td>Reject $H_0$</td>
</tr>
<tr>
<td>TOUR does not Granger Cause GDP</td>
<td>28.53</td>
<td>Reject $H_0$</td>
</tr>
<tr>
<td>GDP does not Granger Cause RCPT</td>
<td>34.10</td>
<td>Reject $H_0$</td>
</tr>
<tr>
<td>RCPTS does not Granger Cause GDP</td>
<td>14.11</td>
<td>Reject $H_0$</td>
</tr>
</tbody>
</table>

5 Summary and Conclusions

The objective of this paper was to investigate the long-run relationship between tourism and economic growth for Malaysia, using conventional, Autoregressive Distributed Lag (ARDL) and Gregory and Hansen (1996) cointegration tests. This study adopts time series analysis and data have been collected over the period from 1989 to 2013. The empirical results from conventional ARDL cointegration test suggest that there is no long-run relationship between tourism and economic growth. Gregory and Hansen (1996) cointegration test that consider the presence of possible structural breaks, however, provided evidence of significant long-run relationship between tourism and economic growth. Granger non causality test of Toda and Yamamoto (1995) was also used to check the causation. The results indicate that there is a bidirectional Granger causality running from tourism to economic growth.

The policy implication that emerges from the study is quite straightforward: Since economic-driven tourism growth hypothesis holds in Malaysia, government should allocate funds and resources in developing the leading industries in the country so that the overall economy will be improved. Conversely, as tourism activity leads economic growth in Malaysia, the resources allocation and efforts in promoting tourism or assertive economic expansion strategies, is perceived to intensify the real scenario. Further, the policy implication thus emanating from these findings is that a sole reliance on the tourism sector can be harmful, and so it is recommended that policy makers simultaneously pay attention to not only the tourism industry, but all other major industries as well. In addition, positive economic growth inclines to attract more foreign investment and thus, increases tourism activity in Malaysia. Given the rapid expansion of the world best low-cost airline, AirAsia as a budget carrier in Malaysia and the ease of accommodation and tour booking or e-tourism, travelers have more flexibility in planning a visit to Malaysia. Therefore, government should ensure the stability and the development in transportation and infrastructures are in order to gain on the tourism expansion.

Notwithstanding the insights the study has provided, it is not without its limitation. Indeed, a corollary of the findings of the study is the sensitivity of the results to the measure of tourism used. For instance, it is possible that an alternative measure (say, tourism expenditure) could present rather different results. Unfortunately, a breakdown of tourist expenditure by source
market was not attainable at the time of research. Hence, the presented results are more indicative than conclusive.

References


