# CHAPTER 5

# RESULTS AND ANALYSIS

## 5.1 Introduction

Based on the methodologies outlined in Chapter 4, the existence of the long-run relationship between tourism and economic growth in Malaysia and the tourism-led growth hypothesis are tested, and the empirical results are discussed in this chapter.

## 5.2 Data Description

All data used in this analysis are seasonally unadjusted and in logarithmic form. Real variables are obtained by deflating nominal variables with implicit GDP deflator and expressed on 1990 base year. Plots of the time series used in this study are shown in Figures 5.1-5.3.

**Figure 5.1: Gross Domestic Product Series**

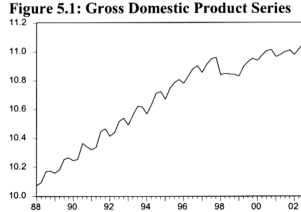
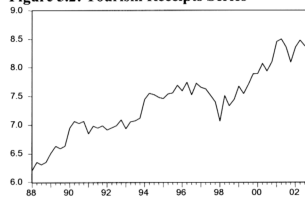


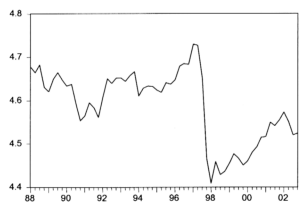
Figure 5.1 shows the real GDP series. It shows a persistent upward movement throughout the period of study with a brief interruption in 1998-99.

**Figure 5.2: Tourism Receipts Series**




The tourism receipts and REER series trend upward but are much more volatile than the GDP series (see Figures 5.2 and 5.3).

**Figure 5.3: Real Effective Exchange Rate Series**



## 5.3 Unit Root Test Results

Before identifying the potential long-run relationship among the variables included in the model, the ADF and PP tests of unit roots are conducted to verify the order of integration of the time series involved. The unit root tests are computed based on the equations 4.2 to 4.7. The lag length for these tests (m) is set to three quarters. The test results for individual time series on both levels and first differences of variables are shown in Table 5.1.

For each of the series, the levels of the series are considered first. The ADF test results indicate that the null hypothesis of a unit root (Ho: $\hat{\delta}=0$) cannot be rejected in any of the series at 5% level, thereby indicating that all series are nonstationary on levels. The PP test results are consistent with ADF test results. Subsequently, the ADF and PP tests are computed using the first difference of the same variables. The results of both tests indicate that all series are individually significant at the 5% level, thus suggesting the null hypothesis of a unit root is rejected and that series is stationary. Since all series are found to be stationary in their first differences, it is concluded that **LY, LTOUR and LREER are integrated of order 1, I(1)**.

**Table 5.1: Augmented Dickey-Fuller and Phillips-Perron Unit Root Test Results**

| | ADF test statistic | | PP test statistic | |
|---|---|---|---|---|
| **Series** | **Level** | **First Difference** | **Level** | **First Difference** |
| **m=1** | | | | |
| LY | -2.301 | -10.318* | -2.346 | -8.054* |
| LTOUR | -2.549 | -6.282 * | -3.091 | -9.541* |
| LREER | -2.909 | -5.874* | -2.344 | -5.620* |
| **m=2** | | | | |
| LY | -0.988 | -8.118* | -2.050 | -8.519* |
| LTOUR | -2.504 | -4.993* | -3.102 | -9.642* |
| LREER | -2.219 | -3.900* | -2.369 | -5.470* |
| **m=3** | | | | |
| LY | -0.604 | -4.175* | -1.878 | -9.688* |
| LTOUR | -2.481 | -4.189* | -3.124 | -9.751* |
| LREER | -2.768 | -3.547* | -2.386 | -5.406* |

Notes: * denotes significant at the 5% level.
See MacKinnon (1991) for critical values.

## 5.4 Cointegration Test Results

After establishing the order of integration, i.e. all three series are I(1), the Johansen cointegration test is therefore applied on these series to examine whether cointegration exists among the variables. Since there are three variables in the model, there can be at most two cointegrating vectors (r), so r could be equal to 0, 1 or 2. Also, given that data used in this study are quarterly time series, up to eight lags have been included for the cointegration test. The results of Johansen tests for cointegration are presented in Table 5.2.

**Table 5.2: Trace Test Statistics for Johansen Cointegration Test**

| Lags interval | Null hypothesis | | |
|---|---|---|---|
| | r = 0 | r ≤1 | r ≤2 |
| 1 to 1 | 18.02 | 9.75 | 2.83 |
| 1 to 2 | 19.93 | 10.09 | 4.83 |
| 1 to 3 | 31.41* | 14.96 | 3.84 |
| 1 to 4 | 21.20 | 9.25 | 2.11 |
| 1 to 5 | 17.87 | 10.23 | 4.78 |
| 1 to 6 | 33.54* | 17.70* | 3.47 |
| 1 to 7 | 30.62* | 11.29 | 3.11 |
| 1 to 8 | 34.56* | 10.97 | 3.28 |

Notes: * denotes significant at the 5% level.
r refers to the number of cointegrating vector.
See Osterwald-Lenum (1992) for critical values.

Based on the values of the trace test statistics ($Q_r$), the null hypothesis of one cointegrating vector (r=1) cannot be rejected at the 5% level of significance for lag order of 3, 7 and 8. Meanwhile, evidence of two cointegrating vectors, albeit weak, is found in the case of lag order of 6. Given that three out of four cases supported strongly the presence of a long-run relationship, there is evidence to show that **Malaysian economic growth and tourism are cointegrated**.

As for the selection of optimal lag length, p, in the VAR for the Johansen procedure, the Akaike Information Criteria (AIC) and the Bayesian Schwarz Criteria (BSC) for a system of equations are used to determine the appropriate lag length. As a guide to model selection, the model with the smallest AIC and BSC values is preferred. In this analysis, the AIC with a value of -8.389 has identified seven lags as optimal while the BSC with a value of -7.0577 has identified three lags as the appropriate lags. Since the BSC tends to choose models that are more parsimonious, a VAR (3) model is opted for this analysis.

Given that the cointegration test result (with the optimal lag length of 3) indicates the presence of one long-run relationship, the cointegrating equation and the corresponding error-correction term (ECT) are as follows:

$$\underset{t\text{-}stat}{LY_{t-1} = -11.754 + \underset{(2.698)}{0.462LTOUR_{t-1}} + \underset{(1.079)}{4.146LREER_{t-1}}} \quad (5.1)$$

$$R^2 = 0.587, \qquad AIC = -8.360, \qquad BSC = -7.058$$

$$ECT_{t-1} = LY_{t-1} - 0.462LTOUR_{t-1} - 4.146LREER_{t-1} + 11.754 \quad (5.2)$$

The estimated normalized coefficients of the cointegrating relation (Equation 5.1) are significantly different from zero for all the variables. Furthermore, the statistically significant ECT (t-statistic of -3.25, from Table 5.3) provides strong evidence in favor of the presence of a long-run relationship between the variables. Therefore, the cointegration test result suggests that **a long-run relationship**

**exists between tourism and economic growth in Malaysia during the period of 1988-2002.**

Based on equation 5.1, the positive sign and the coefficient of 0.46 implies that a 1% increase in the growth of foreign exchange earnings from tourism, on the average GDP will increase by 0.46%, ceteris paribus. The magnitude of the estimated parameter indicates the impact of international tourism earnings on Malaysian economic growth in the long run via the income multiplier effects.

## 5.5 Estimation of the Error Correction Model

Having identified the existence of a cointegrating relationship between tourism and economic growth in Malaysia, in accordance to the Granger representation theorem, the dynamic relations between these variables must be examined within the framework of an ECM. The appropriate lag length (p) applied in the ECM is determined as three lags based on the information on BSC. The ECM models with the optimal lag length are reported in Table 5.3.

**Table 5.3: The Vector Error Correction Model**

| Independent Variable | Dependent variable | | |
|---|---|---|---|
| | $\Delta LY_t$ | $\Delta LTOUR_t$ | $\Delta LREER_t$ |
| Constant | 0.0372<br>(5.52) | -0.0056<br>(-0.79) | 0.0620<br>(1.87) |
| $ECT_{t-1}$ | -0.0417<br>(-3.25) | 0.0213<br>(1.56) | 0.0826<br>(1.31) |
| $\Delta LY_{t-1}$ | -0.4091<br>(-3.02) | -0.1097<br>(-0.76) | -0.7962<br>(-1.19) |
| $\Delta LY_{t-2}$ | -0.5795<br>(-4.90) | 0.1351<br>(1.08) | 0.3900<br>(0.67) |
| $\Delta LY_{t-3}$ | -0.3502<br>(-2.65) | 0.1165<br>(0.83) | 0.1234<br>(0.19) |
| $\Delta LTOUR_{t-1}$ | -0.0028<br>(-0.09) | -0.2663<br>(-1.83) | 0.0183<br>(0.58) |
| $\Delta LTOUR_{t-2}$ | 0.0394<br>(1.29) | -0.1069<br>(-0.71) | 0.0326<br>(1.01) |
| $\Delta LTOUR_{t-3}$ | -0.0027<br>(-0.10) | -0.0610<br>(-0.42) | 0.0141<br>(0.45) |
| $\Delta LREER_{t-1}$ | 0.2306<br>(1.68) | 1.4303<br>(2.11) | 0.4741<br>(3.24) |
| $\Delta LREER_{t-2}$ | 0.0276<br>(0.18) | -0.0100<br>(-0.01) | -0.2216<br>(-1.36) |
| $\Delta LREER_{t-3}$ | 0.1100<br>(0.75) | 0.8242<br>(1.14) | 0.0921<br>(0.59) |

Note: Figures on the brackets are t-statistics

This study finds the ECT is statistically significant in the GDP equation, but not in the TOUR and REER equations. Concomitantly, the ECT enters in the GDP equation with a coefficient of -0.0417 and a highly significant t-statistic of -3.25. This implies that when GDP deviate from long-run etuqilibrium with respect to

the changes in tourism receipts and REER, GDP adjust at a rate of 4.17% of the deviation to return to equilibrium.

## 5.6 Granger Causality Test Results

Thus far, the cointegration test has detected the presence of a long-run relationship between tourism and economic growth in Malaysia. The existence of this equilibrium relation implies that variables are causally related at least in one direction (Engle and Granger, 1987). However, the question remains is whether tourism Granger-causes growth or growth leads tourism. Towards this end, the Granger causality test is applied. Since the hypothesis of cointegration was not rejected, the Granger causality of these variables would be analyzed using the ECM model. As the results from the Granger-causality tests are also sensitive to the selection of lag length, the optimal lag length which is 3 in this case is determined based on the BSC. The results of the causality test are presented in Table 5.4.

**Table 5.4: Granger-Causality Test Results**

| Null Hypothesis | F-statistic | p-value | Decision at 5% level |
|---|---|---|---|
| **ΔLTOUR** does not Granger cause **ΔLY** | 5.4427 | 0.0012 | Reject Ho |
| **ΔLREER** does not Granger cause **ΔLY** | 3.3691 | 0.0170 | Reject Ho |
| **ΔLY** does not Granger cause **ΔLTOUR** | 1.3183 | 0.2777 | Do not reject Ho |
| **ΔLREER** does not Granger cause **ΔLTOUR** | 1.4918 | 0.2206 | Do not reject Ho |
| **ΔLY** does not Granger cause **ΔLREER** | 1.5624 | 0.2007 | Do not reject Ho |
| **ΔLTOUR** does not Granger cause **ΔLREER** | 0.8573 | 0.4968 | Do not reject Ho |

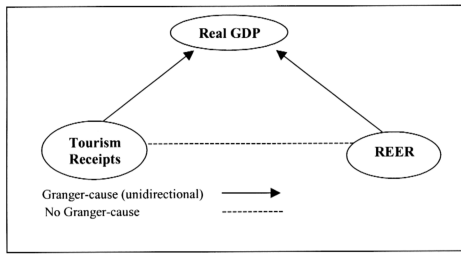
The above Granger-causality test results show the following outcomes which is also illustrated in Figure 5.5:

(i) Changes in tourism receipts Granger causes changes in real GDP but changes in real GDP fails to Granger cause changes in tourism receipts, thereby indicating **unidirectional causality from ΔLTOUR** to **ΔLY**.

(ii) Changes in the REER Granger causes changes in real GDP but changes in real GDP do not Granger cause changes in the REER, thereby suggesting **unidirectional causality from ΔLREER** to **ΔLY.**

(iii) Changes in the tourism receipts do not Granger cause changes in the REER and vice-versa; therefore, **ΔLTOUR and ΔLREER** are causally independent.

**Figure 5.4: Key Findings of the Granger Causality Tests**




## 5.7 Conclusion

Both the long-run and causal relationship between tourism and economic growth in Malaysia are analyzed using a cointegration framework and the Granger-causality tests respectively. The Johansen cointegration test result and the statistically significant ECT in the ECM confirm the presence of a long-run equilibrium relationship between Malaysian economic growth and tourism for the period 1988 to 2002. Meanwhile, the Granger causality test results show that tourism and the real effective exchange rate unidirectionally affect Malaysian economic growth. In sum, therefore, the empirical results support the tourism-led growth hypothesis for Malaysia.

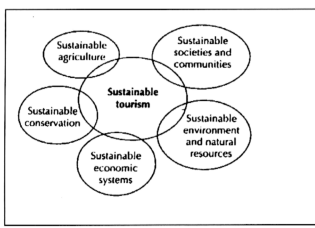
The results obtained in this study are consistent with the international trade theory that suggests tourism, which is considered an export for a country, is one of the determinants for the long-run economic growth. Based on the past performance

of tourism sector, there is no doubt that tourism has contributed positively to the development of the Malaysian economy. A priori, tourism receipts are expected to be positively related to economic growth. Based on the result obtained shown in equation 5.1, it shows that these variables have the expected signs in the model. This positive relationship between tourism and economic growth is consistent with the two-gap model developed by Chenery and Associates (Voivodas, 1973). The impact of international tourism earnings on Malaysian economic growth in the long run through the income multiplier effects can be inferred from the estimated parameter in equation 5.1, which implies the elasticity of economic growth with respect to Malaysian tourism. From the estimates, it can be inferred that a 1% increase in the growth of foreign exchange earnings from tourism in Malaysia would imply an estimated increased of 0.46% in GDP in the long run, ceteris paribus. This magnitude of the impact is considered significant compared to the Spanish case which increase in GDP is only 0.3% (Balaguer and Cantavella-Jorda, 2002), in view of the fact that Spain is one of the top five tourism earner in the world. There is a clear indication that tourism in Malaysia has relatively strong multiplier effects in terms of generating higher GDP, thus government policies of identifying tourism as one of major growth contributors appear to be vindicated.

However, it is unwise to argue for the active promotion of tourism only on the basis of high income or employment impacts as a non-optimal use of the natural resources might initially spur high growth rates that turn out to be unsustainable

in the longer run, in a way similar to the one described by the literature on the so-called "Dutch disease". Therefore, we need to place a much greater emphasis in ensuring a sustainable, long-term tourism industry in Malaysia. The Malaysian government's commitment to the development of sustainable, nature-based tourism is reflected in its National Ecotourism Plan developed in1996. However, sustainable tourism is not only about conservation of natural environment and preservation of cultural heritage, it is also concerned with long-term economic viability sand well-being of all communities in Malaysia. This is because sustainable tourism is part of a larger sustainable development system in a country. The relationship between sustainable tourism and sustainable development is illustrated in Figure 5.6. The combination of growth and conservation objectives in a country's development strategy can bring out the comparative and competitive advantages of the country.

**Figure 5.6: Sustainable Tourism and Sustainable Development**




Source: adapted from Swarbrooke, J. (2000)