



The Cointegration and Causality Tests for Tourism and Trade in Malaysia

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Abstract

This paper examines the relationship between tourism and trade that might have evolved in the development of Malaysian economy by using cointegration and causality tests. All analyses have been conducted with quarterly data of international tourism receipts, exports, imports and total trade of Malaysia, over the period of 1995:1 through 2006:4. The results of the unit root tests indicate that the data are stationary in first-difference and not in level. The results of the JJ co integration test however, show that all the series are not cointegrated in the long run, hence, long-run equilibrium did not exist between all the series. Using Granger-causality tests the study found that there is one-way causal effect (unidirectional causality) running from exports to international tourism receipts at 5% significance level. The causality test also shows a one-way causal effect running from imports to international tourist receipts at 5% significance level and total trade to international tourism receipts at 10% significance level. This leads to a conclusion that increase in total trade, exports and imports will cause growth in the tourism sector, which means that most of tourist arrivals are related to business tourism. Therefore, to increase and sustain in the growth of tourism sector, future economic policy should focus more on tourism and trade related, in order to generate more foreign exchange earning to Malaysia.

Keywords: Tourism, Trade, Cointegration test, Causality test, Malaysia

1. Introduction

Tourism can be classified into several distinct categories. They would include holiday travel, visiting friends and relatives (VFR), business travel, health treatment, shopping, conference, incentive travel, official mission, education, sport and others travel (Malaysia Tourism Promotion Board, 2004). Despite uncertainty in the global economic environment, Malaysian tourism industry continues to perform favorably as reflected in the growth of tourist arrivals and tourist receipts. The share of tourism revenue in total earnings of the services account of the balance of payments increased from 32.7% in 2000 to 43% in 2005. Taking into account the inflow of foreign tourists and outflow of local residents traveling abroad, the net contribution by tourism improved from RM11.2 to RM18.1 billion for the same period. The development in tourism also contributed positively to the expansion of activities in other subsectors, particularly the hotel, travel and tour industry, retail and restaurants as well as transport.

During 2000-2005, total trade expanded at an average rate of 7.2% per annum from RM684.7 billion in 2000 to RM967.8 billion in 2005. Gross exports grew at an average rate of 7.4% per annum to RM533.8 billion in 2005. With this performance, Malaysia ranked 18th largest exporter, contributing 1.5% of world export. While gross imports increased at an average rate of 6.9% per annum to RM434.0 billion in 2005 (Ninth Malaysia Plan, 2006-2010). The pattern of trade and tourism data in Malaysia provides cursory evidence that there is a long-run relationship between the two sectors (Figure 1). However, the significance of such a relationship can only be proven by undertaking appropriate studies.

Is there a relationship between international trade and tourism? If so, how? This question can be taken to a more disaggregated level of inquiry. Evidently, international business creates export sale and/or import purchase. Successful business trips will further lead business travel flows and there will be a series of externality effects on both trade and tourism. Increase business travel may also increase holiday and other travel when friends and relatives seeking adventure and recreation accompany business travelers (Kulendran and Wilson, 2000). Earlier studies by Kulendran and Wilson (2000) lend empirical support to the relationship between tourism and trade. They analyzed the direction of causality between different travel and trade categories for Australia and its four major trading partners, using time series data. The study provides empirical evidence in supporting the idea that there is a long-run relationship between international trade and international travel. Using the same approach, Khan and Lin (2002) investigated the relationship between international trade and tourism for Singapore and its major trading partners. Although the results tend to differ

across countries, the study provides strong support for a systematic relationship between business travel and total trade. Furthermore, the causality between travel and trade could run both ways, whereby business arrivals influence trade or vice versa. However, holiday or pleasure travel, is found to be somewhat unrelated to trade.

Other categories of tourism such as VFR, health treatment, shopping, conference, incentive travel, official mission, education, sport and other travels can also influence trade because tourists may demand certain types of product that are produced or otherwise in that country. If they demand products that are not produced in that country, therefore it has to be imported, this may lead to an increase in import. On the other hand, if tourists purchase products that are produced locally, this will increase income of that country. Higher trading volumes countries are likely to be more open economies and more developed in tourism industry. Therefore, expansion in the tourism industry will also lead to an expansion in the trade when demand for tourist commodities increase (Khan and Lin, 2002). According to the World Tourism Organization (UNWTO) the number of international tourist arrivals recorded worldwide grew by 5.4% and exceeded 800 million for the first time in 2005 (ever from 766 million in 2004). Although growth was more moderate, it was still almost 1.5 percentage points above the long-term average annual growth rate of 4.1%. Tourist arrivals to Malaysia reached its target of 16.4 million tourists by the end of December 2005 exceeding 15.7 million tourists in 2004. From the 16.4 million tourist arrivals in 2005, Malaysia received RM32.0 billion in foreign exchange earnings, representing an increase of 7.8% from 2004.

In terms of traveling pattern, holiday arrival, which represented 71.2% of total arrivals in 2005, had declined by 3.7% as compared to 2004. While tourists who came for business, shopping, conference, official mission and sport has increased by 2.4%, 0.1%, 0.4%, 0.3% and 0.9% respectively (see Table 1). This is in conjunction with aggressive promotions made in new and non-traditional markets, particularly in West Asia as well as increasing number of international conferences and exhibitions held in the country (Economic Report, 2005/2006). Average per capita expenditure also registered an increase of 3.2% from RM1,888.20 to RM1,944.70. Tourists spent mostly on accommodation (33.5%), followed by shopping (20.8%), food and beverage (19.9%), transportation (11.6%), and entertainment (4.0%). From the distribution of items purchased in 2005, clothes/textiles/bag constituted more than 50% from overall shopping items. The second most favorite items was handicraft/souvenir at 45.5%. Items such as liquor, DVD/VCD/CD/Cassette, toys, cigarette/cigar, gold/jewellery, electrical/electronic appliances and others were consumed below 10% in 2005.

Besides, total trade consists of exports and imports. ASEAN accounted for 26.1% of Malaysia's exports and 25.5% of imports in 2005, while Japan 9.4% of exports and 14.5% of imports; Australia 3.4% of exports and 1.9% of imports; the U.S 19.7% of exports and 12.9% of imports and the U.K 1.8% of exports and 1.5% of imports. Internationally, tourism represents an important source of foreign exchange earnings and it has been suggested that the potential contribution to the national balance of payments (Oppermann and Chon, 1997). Although tourism is a powerful tool for balance of payments adjustments, its impact may vary according to countries. In the developed countries, the earnings from international tourism could make a significant contribution to the balance of payments in general, and the invisible account in particular. However, for many developing countries with a limited industrial sector and dependence on international aid, tourism plays a significant role in securing foreign exchange, creating employment and attracting overseas investment (Sharpley, 2002). As indicated by the UNWTO and International Monetary Fund (IMF) data, international tourism is the top export earning sector in the world, exceeding both the automobile industry and the chemicals industry, and together with international fare receipts represents about 8% of total export earnings on goods and services worldwide. Tourism is also one of the top five export earning sectors for 83% of countries in the world, and the main source of foreign currency for at least 38% of the countries. In the 1980s, international tourism receipts grew faster than world trade (commercial service and merchandised exports).

Despite the fact that tourism is a major important sector for the world's economy for many countries, it is one of the largest single employers and exporting service sectors; however, to our knowledge there are very few attempts to investigate the relationship between tourism and trade. In addition, literature on relationship between tourism and trade in the developing countries is completely lacking. The present study seeks to investigate the relationship between tourism and trade that might have evolved in the process of development of Malaysian economy by using cointegration and causality tests. The results of the study seem to have important implications for Malaysia's policy concerning tourism and trade. If we can prove that, there is a long-run relationship between international trade and tourism, future economic policy should focus more on tourism and trade related, in order to generate more foreign exchange earning to Malaysia.

2. Methods and materials

All analyses were conducted with quarterly (time series) data of international tourism receipts, exports, imports and total trade (on real terms) of Malaysia, over the period of 1995:1 through 2006:4. These series were obtained by dividing the nominal series by the consumer price indices (2000:Q1=100). In this study, the tourism and trade hypotheses to be tested are as follows, namely: (a) does international tourism receipts cause export. (b) does exports cause international tourism receipts? (c) does an international tourism receipt cause imports? (d) does imports cause

international tourism receipts? (e) does international tourism receipts cause total trade? (f) does total trade cause international tourism receipts? Therefore, with this tourism and trade hypotheses, attempts were made to test and search for evidence of existence of relationship.

Firstly, before estimating the co integration and VAR, it is required to examine the stationarity of the variables. Stationarity means that the mean and variance of the series are constant through time and the auto covariance of the series is not time varying (Enders, 2004). Therefore, the first step is to test the order of integration (I) of the variables. Integration means that past shocks remaining undiluted affects the realizations of the series forever and a series has theoretically infinite variance and a time-dependent mean. For the purpose of this study, we use tests proposed by Dickey and Fuller (ADF, 1979, 1981), Phillips and Perron (PP, 1988) and Kwiatkowski, Phillips, Schmidt and Shin (KPSS, 1992) in testing the properties of unit root for all variables used. If all of the series are non-stationary in levels, it should be stationary in first difference with the same level of lags. For appropriate lag lengths, we use the Akaike Information Criterion (AIC) and Schwartz Bayesian Criterion (SBC).

The ADF test takes the following form:

$$\Delta Y_t = \alpha_0 + \delta T + \beta Y_{t-1} + \sum_{i=1}^p \theta_i \Delta Y_{t-i} + \mu_t \quad (1)$$

The ADF auxiliary regression tests for a unit root in Y_t , namely the logarithm of total tourism receipts, total trade, exports and imports. T denotes the deterministic time trend and ΔY_{t-i} is the lagged first differences to accommodate a serial correlation in the error, μ_t . While, α , δ , β , and θ are the parameters to be estimated.

Meanwhile, the Phillips-Peron (PP) test is shown by the equation below.

$$\Delta Y_t = \mu + \rho Y_{t-1} + \varepsilon_t \quad (2)$$

The PP test is used because it will make a correction to the t-statistics of the coefficient from the AR (1) regression to account for the serial correlation. The PP test is a test of the hypothesis $\rho=1$ in the equation 2. But, unlike the ADF test, there are no lagged difference terms. Instead, the equation is estimated by OLS and then the t-statistics of the ρ coefficient is corrected for serial correlation in ε_t .

In the first two methods, the unit root hypothesis corresponds to the null hypothesis. If we are unable to reject the presence of a unit root, meaning that the series are integrated of order one. However, Kwiatkowski, Phillips, Schmidt and Shin (1992) argued that not all series for which we cannot reject the unit root hypothesis are necessarily integrated of order one. To circumvent the problem that unit root tests often have low power, they offer an alternative test, which is KPSS test. In the KPSS test, stationarity is the null hypothesis and the existence of a unit root is the alternative. The KPSS test is shown by the following equation

$$y_t = x_t' \beta + \mu \quad (3)$$

The LM statistics is given by:

$$LM = \sum_{t=1}^T S_t^2 / \sigma_\varepsilon^2 \quad (4)$$

where, σ_ε^2 is an estimator for the error variance. This latter estimator σ_ε^2 may involve corrections for autocorrelation based on the Newey-West formula. In the KPSS test, if the null of stationarity cannot be rejected, the series might be cointegrated. After identifying the order of intergration, we then use the Johansen (1988, 1991), and Johansen and Juselius (1990) Full Information Maximum Likelihood (ML) technique to determine whether there is a long-run relationships (cointegrating) between the various series. If there is a cointegration between two variables, there, exists a long-run effect that prevents the two series from drifting away from each other and this will force the series to converge into long-run equilibrium.

The study further explores the relationship between the series by using Granger-Causality test to test for the bivariate equation. Granger (1988) points out that if two series are cointegrated, then there must be Granger-causation in at least one direction. A variable X_t Granger causes Y_t , if Y_t can be predicted with better accuracy by using past values of X_t with other factors held constant.

The Granger causality test involves estimating the following model:

$$Y_t = \mu_t + \sum_{i=1}^p \alpha_i Y_{t-i} + \sum_{j=1}^q \beta_j X_{t-i} + \varepsilon_t \quad (5)$$

Where μ_t denotes the deterministic component and ε_t is white noise. Meanwhile, the null hypothesis can be tested by using F -test. When the p -value is significant, the null hypothesis of the F -statistic is rejected, which implies that the first series Granger-causes the second series and vice versa.

In this study, we used quarterly data of international tourism receipts and total trade for Malaysia spanning from 1995:1 to 2006:4. The data used in this study are obtained from Malaysian Tourism Promotion Board (Planning and Research Division), *Annual report of Bank Negara Malaysia* (the Malaysian Central Bank), the *Statistical Yearbook* (various issues) published by the Malaysian Department of Statistic and the IMF *International Financial Statistics Yearbook*.

3. Results and discussion

In order to estimate the long-run relationship between the variables using the cointegration approach, first, we need to examine the stationary properties of the time series data, to avoid spurious regression. Tables 1, 2, and 3 present the stationarity test results of international tourism receipts, exports, imports and total trade in level and first differences, using ADF, PP and KPSS tests. The results of the unit root tests indicate that we could not reject the null hypothesis of the unit root at 1 per cent and 5 per cent critical value. However, the null hypothesis is rejected at 1 per cent critical value, when we test on the first-difference. This suggests that the data are stationary in first-difference and not in level.

Having found that the variables are $I(1)$, we proceed with the cointegration tests in testing for the cointegration between the variables, which are non-stationary in level but stationary in first-difference. The Johansen and Juselius (JJ) approach is employed to test whether there is a long-run relationship between the selected variables. The results of the JJ co integration test however, shows that all the series are not cointegrated in the long-run. In a simple word, long-run equilibrium did not exist between all the series.

In order to examine the causal relationships as well as directions of the series, then we run the Granger causality tests, which can be implied by the non-cointegrating series. The results of Granger-causality tests as reported in Tables 4 and 5 indicate that there is one-way causal effect running from exports to international tourism receipts at 5% significance level. The causality test also shows a one-way causal effect running from imports to international tourist receipts at 5% significance level and total trade to international tourism receipts at 10% significance level.

4. Conclusion

This study attempts to investigate the relationship between tourism and trade that might have evolved in the development of Malaysian economy by using cointegration and causality tests. The findings of the study indicate that there is a one-way causal effect (unidirectional causality) between all the series. Subject to possible caveats of the study, the following are some important policy implications for Malaysia in terms of tourism and trade that can be drawn from the findings. It seems that increase in total trade, exports and imports will cause growth in the tourism sector, which means that most of tourist arrivals are related to business tourism. Hence, future economic policy should focus more on tourism and trade related, in order to generate more foreign exchange earning to Malaysia. Besides, in order to increase and sustain in the growth of tourism sector, more attention should be given to the business tourism since this category of tourism has shown higher growth rate (see Table 1). Furthermore, Malaysia Tourism Promotion Board should also focus on MICE (Meetings, incentives, conferences and Exhibitions) market because this category of tourism also shown a growth as well as relatively a higher value added market.

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Table 1. Malaysia: Categories of Tourism for 2004/2005

Category	2004 (%)	2005 (%)	Growth
Holiday	74.9	71.2	-3.7
VFR	11.2	11.1	-0.1
Business	8.5	10.9	2.4
Shopping	1.2	1.3	0.1
Conference	0.8	1.2	0.4
Sport	0.2	1.1	0.9
Official Mission	0.4	0.7	0.3
Incentive Travel	0.5	0.4	-0.1
Health Treatment	1.7	0.3	-1.4
Education	0.3	0.2	-0.1

Source: Malaysia Profile of Tourists by Selected Markets 2005

Table 2. Unit Root Tests

Augmented Dickey Fuller (ADF) Test						
Variable	Constant			Trend		
	Level	First-Difference	Conclusion	Level	First-Difference	Conclusion
lnTOUR	-1.2803	-8.3413**	I(1)	-2.9989	-8.2989**	I(1)
lnEXP	-1.0624	-6.3891**	I(1)	-2.9880	-6.3142**	I(1)
lnIMP	-1.1309	-6.1333**	I(1)	-2.4785	-5.9962**	I(1)
lnTRADE	-1.0546	-8.1603**	I(1)	-2.8937	-8.0772**	I(1)
Phillip-Perron (PP) Test						
Variable	Constant			Trend		
	Level	First-Difference	Conclusion	Level	First-Difference	Conclusion
lnTOUR	-1.0307	-10.5225**	I(1)	-3.1842	-11.4526**	I(1)
lnEXP	-1.0328	-7.1319**	I(1)	-3.1506	-7.0258**	I(1)
lnIMP	-1.1528	-6.2162**	I(1)	-2.5757	-6.1324**	I(1)
lnTRADE	-0.6781	-11.6934**	I(1)	-3.1664	-11.5027**	I(1)
KPSS Test						
Variable	Constant			Trend		
	Level	First-Difference	Conclusion	Level	First-Difference	Conclusion
lnTOUR	0.7723**	0.4674	I(1)	0.2381**	0.0304	I(1)
lnEXP	0.8778**	0.1356	I(1)	0.2371**	0.0464	I(1)
lnIMP	0.8659**	0.1293	I(1)	0.3792**	0.0563	I(1)
lnTRADE	0.8742**	0.1080	I(1)	0.2341**	0.0345	I(1)

Notes: 1) For ADF and PP tests, ** and * denote rejection of a unit root hypothesis based on Mackinnon (1991) critical values at 1% and 5% respectively.

2) For KPSS tests, ** and * denote rejection of a unit root hypothesis based on Kwiatkowski *et al.* (1992) critical values at 1% and 5% respectively.

Table 3. Cointegration Tests based on the Johansen, and Johansen and Juselius (JJ) Approach

Ho	Trace Statistic	5% CV	Prob.	Max-Eigen Statistic	5% CV	Prob.
Series: TOUR, EXP						
Ho: $r = 0$	12.440	15.495	0.127	12.221	14.265	0.103
Ho: $r \leq 1$	0.463	3.841	0.496	0.463	3.841	0.496
Series: TOUR, IMP						
Ho: $r = 0$	11.389	15.495	0.189	11.349	14.265	0.138
Ho: $r \leq 1$	0.041	3.841	0.840	0.041	3.841	0.840
Series: TOUR, TRADE						
Ho: $r = 0$	11.978	15.495	0.158	11.818	14.265	0.118
Ho: $r \leq 1$	0.159	3.841	0.689	0.159	3.841	0.689

Notes: 1) r stands for number of cointegrating vectors

2) Column 1 lists the null hypothesis of zero, at least one cointegrating vector; column 2 lists the trace statistics; column 3 lists the critical values for trace statistics at 5% significant level; columns 4 and 7 lists the probability value; column 5 lists the maximum Eigen value statistics; column 6 list the critical value for maximum Eigen statistics at 5% significant level.

Table 4. Granger-Causality Test Results

Null Hypothesis	F-Statistics	P-value	Conclusion (Hypothesis)
Exports does not Granger-cause Tourism	9.7203*	0.0032	Rejected
Tourism does not Granger-cause Export	0.2899	0.5930	Accepted
Import does not Granger-cause Tourism	9.3191*	0.0038	Rejected
Tourism does not Granger-cause Import	0.0013	0.9713	Accepted
Trade does not Granger-cause Tourism	3.1456**	0.083	Rejected
Tourism does not Granger-cause Trade	2.0654	0.1578	Accepted

Note: * and ** indicate statistical significance at 5% and 10% levels, respectively.

Table 5. Summary of Granger-Causality Test Results

Granger Causality Relationships	Significance Level
Exports → Tourism	5%
Imports → Tourism	5%
Trade → Tourism	10%

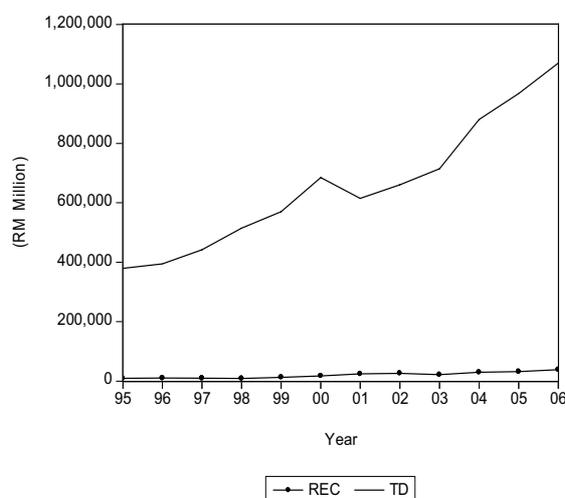


Figure 1. Malaysia: International Tourism Receipts and Trade Earnings