

Estimating European Tourism Demand for Malaysia

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Abstract—Tourism industry is an important sector in Malaysia economy and this motivates the examination of long-run relationships between tourist arrivals from three selected European countries in Malaysia and four possible determinants; relative prices, exchange rates, transportation cost and relative prices of substitute destination. The study utilizes data from January 1999 to September 2008 and employs standard econometric techniques that include unit root test and cointegration test. The estimated demand model indicates that depreciation of local currency and increases in prices at substitute destination have positive impact on tourist arrivals while increase in transportation cost has negative impact on tourist arrivals. In addition, the model suggests that higher rate of increase in local prices relative to prices at tourist country of origin may not deter tourists from coming to Malaysia.

Keywords—origin country, unit root test, cointegration test

I. INTRODUCTION

AFTER achieving its independence in 1957, Malaysian economy was dominated by primary commodity sector such as rubber, palm oil, tin and petroleum. Continual growth in this sector was also the catalyst to drastic development in manufacturing sector in the early 1990s and this sector has been the backbone of Malaysian economy in the last two decades. Despite the large contribution from the commodity sector, in the early 1980s the government started to look into tourism as a new potential industry that can be developed.

With the help of government incentives and financial assistance, for nearly a decade the tourism industry has become the country second largest income earner after the manufacturing sector. The number of tourists has consistently increased from approximately 7.5 million in 1999 to 16 million in 2004 and 22 million in 2008. Various strategies have been put forward by the Tourism Ministry on fully realizing the tourism potential as an important source of economic growth. These include ensuring sustainable tourist development, enhancing development of innovative tourism products and services, and ensuring comfort, safety and well-being of the tourists. The industry is expected to grow at an annual rate of more than 8% towards 2010 with the number of tourists are expected to increase to 25 million.

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Like other industries, the growth of tourism sector is influenced by many factors that include those related to government such as diplomatic and policies, factors attributed by private sector such as retail services offered by travel agents, travel insurance and transport services, as well as intangible factors such as image, lifestyle and cultural attractiveness of the destination.

The aim of this paper is to determine the existence of both long-run and short-run relationships between the number of tourist arrivals in Malaysia from three European countries; France, Germany and the Netherlands. The rest of the paper is structured as follows. Section 2 reviews the relevant literature. Section 3 describes the data utilized for the analysis while Section 4 outlines the methodology used. Section 5 presents the empirical results and their interpretations. Section 6 provides the concluding remarks to the paper.

II. LITERATURE REVIEW

Given the growing importance of tourism industry in many countries, there have been a large number of literatures investigating the possible factors affecting the demand of tourism industry. Early studies on tourism demand in the 1960s through to 1980s have employed ordinary least squares methods and these include the pioneering works by Guthrie [1], Gray [2], Kwack [3] and Witt [4]. However, the OLS which is a static analysis usually suffers from violation of a few of classical linear regression model, particularly autocorrelation as observations in time series data that are normally used in the analysis are dependent. Furthermore, as pointed out by Phillips [5], OLS model estimation based on non-stationary data can lead to a serious problem of spurious regression, having unreliable estimated parameters as well as producing invalid inferences based on t-test and F-test.

As differencing the data variables lead to lost of information, a few of the studies in the 1980s that included Leob [6], Uysal and Crompton [7], Witt and Martin [8] and Martin and Witt [9] have employed Cochrane-Orcutt procedures to correct for the presence of autocorrelation. The disadvantage of this technique is that it only allows for estimation of short-run relationship between the dependent and independent variables. Many studies in the 1990s and in the first decade of this century have considered the cointegration methodology, following the development of cointegration test for single-equation model by Engle and Granger [10] and for multivariate cointegration framework

based on vector autoregression (VAR) model by Johansen and Juselius [11] have allowed for the estimation of long-run relationship using non-stationary variables. The relationship is not spurious provided there exist a linear combination of the non-stationary series, called disequilibrium error that will be stationary. Studies in the early of this decade employing the cointegration test have included Kulendran and Wilson [12], Kulendran and Witt [13]-[14], Lim and McAleer [15], Webber [16] and Daniel and Ramos [17].

Salman [18] used cointegration analysis to estimate long-run relationship of tourist arrivals to Sweden from the USA, UK, Germany, Denmark and Norway. The study considered the influence of income, price, exchange rate and consumer price index as well as the impact of Chernobyl nuclear accident and 1991 Gulf War on the number of tourist arrivals. While the financial factors did not indicate significant effect, the estimated model did not provide statistically significant impact of the Chernobyl nuclear accident and the 1991 Gulf War on the international tourism demand. Narayan [19] and Katafono and Gounder [20] have estimated the demand for tourism in Fiji. The latter study found that tourism demand is positively related with income of tourists from major trading partners and is surprisingly positively related to relative prices. While political coups in 1987 and 2000 are expectedly found to be major deterrent, major cyclones did not have significant effects to the tourism demand.

Both Ouerfelli [21] and Choyakh [22] have investigated tourism demand in Tunisia by the European tourists. The results show that income of tourists in origin countries is the most significant factor in determining the number of night spent in Tunisian hotels. The studies found that relative price does not play important role in attracting tourists but the tourism demand is negatively affected by prices at competing destinations. Unlike Salman [18], these studies showed that the tourism demand is vulnerable to the Gulf War 1991, in addition to terrorist attack in the town of Djerba in 2002 and 1986 economic recession.

Studies by Toh et al. [23] and Dougan [24] examined at the Japanese demand for tourism in Singapore and Guam respectively. While both studies found evidence for significant impact of income, only the former study showed that Japanese tourists are sensitive to changes in the relative price. As expected, tourism demand is found to have a positive effect from depreciation of the local currency and from the repeat factor. Similar to other studies, both studies found the 1991 Gulf War to have a short-term significant negative impact on the Japanese tourism demand. The estimated model also captured a negative impact of the September 11 terrorist attack in 2001 and occurrence of earthquake and typhoon. Finally, Toh et al. [23] found that the Japanese tourists are not deterred by the 1970s oil crises as well as the 1997-1998 Asian Financial Crisis.

III. DATA

This study uses monthly data for the period starting from January 1999 to September 2008. Availability of the data does not allow the analysis to include the period of Asian Financial Crisis in 1997 and 1998. Following many previous studies (examples include Witt and Martin [8], Crouch [25], Li et al. [26] and Song and Witt [27]), tourism demand is measured by the number of tourist arrivals from the origin country (TA). As tourists from France, Germany and the Netherlands constitute more than 50% of the total number tourists from the European Community (EC) countries, a weighted average of the number of tourists from the three countries are used for the study.

The so-called independent variables in this study consist of relative prices (CPI), exchange rates (EXR), transportation cost (TC) and relative prices at substitute destination (SUBThP). In this study, the relative price is calculated as the ratio between the consumer price index (CPI) in Malaysia and the corresponding index at country of origin. Similar to Ouerfelli [21], The CPI for the European countries is calculated as the tourists-weighted average of the CPI in France, Germany and the Netherlands. Due to difficulty in obtaining tourism data in Singapore and Indonesia, Thailand is chosen as the substitute holiday destination for European tourists. Thus, the relative price at substitute destination is defined as the ratio between CPI in Thailand and the tourists-weighted CPI of the region of origin.

Unlike many studies that have used air fares between country of origin and destination country, this study follows Munoz [28] by utilizing the price of crude oil represented by the spot price of Texas Intermediate crude oil. Exchange rate is represented by the nominal value of the currency at destination country relative to the currency at origin country. All the data are expressed in logarithms to capture multiplicative effects of the selected determinants.

IV. METHODOLOGY

To investigate the long-term relationship between the number of tourist arrivals (TA) and the $(k - 1)$ selected determinants, cointegration analysis will be conducted based on vector autoregressive (VAR) model for a set of k -variables:

$$Y_t = \Pi_0 + \Pi_1 Y_{t-1} + \dots + \Pi_p Y_{t-p} + U_t$$

where $Y_t = [TA \text{ CPI } EXR \text{ TC } SUBTP]^T$, Π is a $(k \times k)$ matrix of parameters and $U_t \sim NID(0, \Sigma)$.

Cointegration analysis is usually preceded by testing for unit roots in each of the variables to determine the order of integration. The presence of unit root can be tested by using an augmented Dickey-Fuller (ADF) test based on the following regression:

$$Z_t - Z_{t-1} = \Delta Z_t = \alpha + B_0 Z_{t-1} + \lambda T + \sum_{i=1}^p \beta_i \Delta Z_{t-i}$$

The null and alternative hypotheses of a unit root in the variable are usually written as follows:

$$H_0 : \beta_0 = 0 \quad \text{vs.} \quad H_1 : \beta < 0$$

The test is often conducted with and without a deterministic trend, T . An optimal number of lagged first differences included to remove serial correlation in the residuals are made based on certain lag length criteria such as the Akaike Information Criterion (AIC) (Akaike [29]) and Schwarz Bayesian Criterion (SBC) (Schwarz [30]). However, following Chong and Goh [31] the unit root test can be conducted at a few selected lags to ensure the results are robust to lag lengths.

The two most widely used tests to investigate if long-run relationship exists among the selected variables are the Engle-Granger [10] two-step residual regression approach and the Johansen and Juselius [11] maximum likelihood estimation approach. As there is a possibility of having more than one cointegration relationship, this study employs the later approach which is based on the VAR model as below:

$$Z_t = A_0 + A_1 Z_{t-1} + \dots + A_p Z_{t-p} + \varepsilon_t$$

where ε_t is a vector of innovations. The VAR model above can be rewritten as the following Vector Error Correction (VEC) model:

$$\Delta Z_t = A_0 + \sum_{i=1}^{p-1} \Gamma_i \Delta Z_{t-i} + \Pi Z_{t-1} + \varepsilon_t$$

The VEC model has the advantage that while allowing for short-run deviations, the model restricts the long-run behavior of the variables to converge to their cointegrating relations. The long-run relationship can be evaluated by the rank of the Π matrix. The long-run cointegrating relationship exists if the rank $r < k$ and such that there exist $(k \times r)$ matrices α and β satisfying $\Pi = \alpha\beta$ and that $\beta^T Z_t$ is stationary. Each column of β represents the cointegrating vector while elements of α are known as the short-term adjustment coefficients or the error correction term.

The number of cointegrating vectors governing the long-run relationship among the variables is determined by using two test statistics developed by Johansen and Juselius (1990) known as the trace test and maximal eigenvalue test. The test statistics are computed as:

$$\lambda_{\text{trace}} = -n \sum_{i=r+1}^k \ln(1 - \lambda_i) \quad \text{and} \quad \lambda_{\text{max}} = -n \ln(1 - \lambda_{r+1})$$

where n is the number of effective observations and λ_i is the estimated eigenvalue of the Π matrix. The trace statistic tests the null hypothesis of at most r cointegrating vectors against a general alternative while the maximal eigenvalue

statistic tests the null hypothesis of r cointegrating vectors against the alternative of $(r + 1)$ vectors.

The VEC model above can also be used to test for short-run dynamics among the variables. The short-run Granger causality between two variables, i and j is tested through the following null hypothesis:

$$H_0 : \Gamma_1^{ij} = \Gamma_2^{ij} = \dots = \Gamma_{p-1}^{ij} = 0 \quad \text{vs.} \\ H_1 : \text{at least one } \Gamma_p^{ij} \neq 0$$

where Γ_p^{ij} is the (i,j) element of Γ_p coefficient. Rejection of the null hypothesis implies that variable j Granger causes variable i in the short run.

V. EMPIRICAL RESULTS

Table I presents the results of ADF and KPSS tests for the variables concerned. With the exception of TA at lag 1, the calculated statistics for all the variables are significant at 5% level, rejecting the null hypothesis of stationary and thus implying that none of the variables is stationary. Tabulated statistics also show that with the exceptions of TA and TC the results of ADF test at first difference are sensitive to choice of lag length. For the variable CPI, EXR and SUBTP, the null hypothesis of unit root is rejected at lag one but is still accepted at lag twelve. Despite disparity of the results, rejection of the null hypothesis at lag one provide evidence that all the variables are integrated of the same order one, I(1).

TABLE I
 ADF AND KPSS TESTS FOR UNIT ROOT

Variable	Lag	ADF		KPSS	
		Level	1st diff.	Level	1st diff.
TA	1	3.834**	-8.864**	0.332**	0.012
	6	-2.224	-5.133**	0.190**	0.028
	12	-0.250	-3.880**	0.166**	0.074
CPI	1	0.637	-7.678**	1.035**	0.074
	6	0.928	-2.07	0.376**	0.098
	12	0.340	-0.15	0.238**	0.101
EXR	1	-0.816	-7.346**	0.527**	0.173**
	6	-0.584	-3.675**	0.172**	0.198**
	12	-1.248	-2.175	0.107	0.163**
SUBTP	1	0.249	-7.029**	1.248**	0.032
	6	0.573	-3.825**	0.402**	0.046
	12	0.122	-1.746	0.244**	0.058
TC	1	-1.571	-7.682**	0.536**	0.082
	6	-0.392	-3.846**	0.187**	0.084
	12	0.093	-3.374**	0.128*	0.078

As all the variables have been concluded to be non-stationary and integrated of the same order, there exists a possibility that these variables may also be cointegrated if there is one or more linear combination among them that is stationary. The results in Table II show that the null hypothesis of no cointegration is rejected for both the trace

and maximum eigenvalue tests suggesting the existence of long-run relationship between the number of tourist arrivals from the selected European countries and the selected determinants of tourism demand. Further analysis shows the trace test provides evidence of two cointegrating vectors while the maximum eigenvalue test provides evidence of three cointegrating vectors.

TABLE II
 JJ COINTEGRATION TEST

Null	Eigenvalue	Trace		Max-Eigen	
		Statistic	Critical values	Statistic	Critical value
$r = 0$	0.315	109.54**	69.82	43.52**	33.88
$r \leq 1$	0.276	66.02**	47.86	37.10**	27.58
$r \leq 2$	0.177	28.91	29.80	22.46**	21.13
$r \leq 3$	0.043	6.45	15.49	5.06	14.26
$r \leq 4$	0.012	1.39	3.84	1.40	3.84

Using the first cointegrating vector and normalizing with respect to the coefficient of TA, the long-run demand relationship for European tourists to Malaysia is given as follows:

$$LTA = 49.88 LCPI + 15.47 LEXR - 9.13 LTC + 72.73 LSUBTP + 18.14$$

The signs of long-run coefficients for EXR, TC and SUBTP are consistent with economic theory while the positive coefficient of CPI does not support economic theory. In the long-run, a 1% depreciation of the local currency, the Ringgit, will lead to 15.5% increase in the number of tourist arrivals from the three European countries. As expected, increases in the transportation cost as measured by world oil price will lead to a fall in the number of tourist arrivals.

The results also show that as the relative prices between Thailand and the three European countries increases it will lead to an increase in the number of European tourists arriving in Malaysia. The finding suggests that as consumer prices in Thailand increases at higher rate as compared to the increases in the European countries, European tourists would prefer to travel to an alternative destination in the region, in this case is Malaysia. The positive long-run coefficient of CPI suggests that increasing consumer prices in Malaysia relative to those in the European countries will reduce the number of tourist arrivals. Note however, this positive coefficient is statistically not significant even at 10% level and therefore the negative impact should not be of any concern to tourism institutions and policymakers in Malaysia.

Table III shows the estimates of the VEC model while Table IV shows the results of Granger causality test. It can be seen that both of the error correction terms for TA are significant at 5% level. The negative sign of the terms indicate that the number of tourist arrivals from the European countries to Malaysia react and adjusts to any short-term shocks to the long-run equilibrium level. The results show that all the four variables do not have significant Granger causality on the

number of tourist arrivals. The findings suggest that short-term changes on any of the four selected variables do not have significant impact on the number of tourist arrivals from the European countries to Malaysia. Perhaps, other factors such gross income and political stability play more important short-term role in determining the demand of foreign tourists.

TABLE III
 VECTOR ERROR CORRECTION MODEL ESTIMATES

Regressor	Coefficient	Std.error	t-stat
C	0.002	0.028	0.070
DTA_{t-1}	0.151	0.099	1.520
$DCPI_{t-1}$	2.862	5.266	0.540
$DEXR_{t-1}$	-0.224	1.002	-0.220
DTC_{t-1}	0.284	0.372	0.760
$DSUBTP_{t-1}$	-3.370	5.193	-0.650
$ECT1_{t-1}$	-0.485	0.091	-5.280
$ECT2_{t-1}$	-2.116	0.787	-2.690

TABLE IV
 GRANGER CAUSALITY TEST

Independent t variable	Dependent variable(F-stat)				
	TA	CPI	EXR	TC	SUBTP
TA		0.04	2.32	0.70	1.71
CPI	0.30		0.36	2.20	7.97**
EXR	0.05	2.01		0.43	1.59
TC	0.58	0.56	0.00		2.60
SUBTP	0.42	0.43	0.95	4.47**	
$ECT1_{t-1}$	-0.485**	-0.005**	-0.001	-0.007	0.001
$ECT2_{t-1}$	-2.116**	-0.063**	-0.158**	0.569**	-0.049**

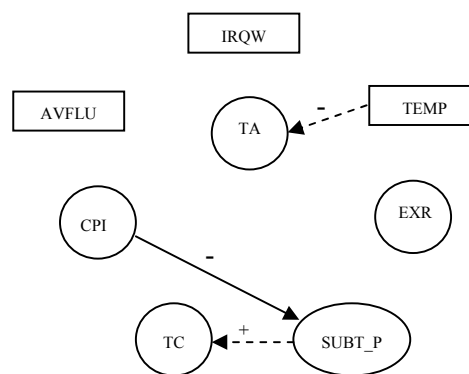


Fig. 1 Short-term causality and impact of exogenous variables

Similar procedures were employed to investigate the impact of instability in Iraq, during the period between March 2003 and May 2005, following invasion by the US, the outbreak of Avian Flu during the period between December 2003 and November 2006, as well as the variation of temperature in the three selected European countries. The results in Table V once again provide evidence for the existence of a long-run relationship for European demand for tourism in Malaysia. Similar to previous analysis, accommodating for short-term deviation, the estimates from the VEC model in Table VI

which are depicted by Figure 1 show that changes in the number of tourist arrivals from the three European countries do not react to short-term changes in all the selected variables.

The results also show that in the short-run, the US invasion in Iraq and the outbreak of Avian Flu did not have the expected negative impact on the number of European tourist arrivals in Malaysia. In contrary but very much expected, temperature variation in the European cities has a negative impact on the number of tourist arrivals. Decrease in the temperature during the winter months would encourage the European to travel abroad and seek for warmer places such as Malaysia and other tropical countries. However, the influx of European tourists to Malaysia is short lifted as temperature starts to increase during the summer months.

TABLE V
COINTEGRATION TEST WITH EXOGENEOUS VARIABLES

Null	Eigenvalue	Trace		Max-Eigen	
		Statistic	Critical values	Statistic	Critical value
$r = 0$	0.323	129.66**	69.82	44.94**	33.88
$r \leq 1$	0.307	84.72**	47.86	42.25**	27.58
$r \leq 2$	0.194	42.47**	29.80	24.90**	21.13
$r \leq 3$	0.135	17.57**	15.49	16.68**	14.26
$r \leq 4$	0.008	0.89	3.84	0.88	3.84

TABLE VI
VECM ESTIMATES WITH EXOGENEOUS VARIABLES

Regressor	Coefficient	Std.error	t-stat
C	0.054512	0.064	0.86
DTA _{t-1}	0.131	0.098	1.34
DCPI _{t-1}	-4.179	6.297	-0.66
DEXR _{t-1}	-0.701	1.019	-0.69
DTC _{t-1}	0.375	0.379	0.99
DSUBTP _{t-1}	4.767	6.206	0.77
AVFLU	0.051	0.085	0.6
IRQWAR	0.057	0.128	0.45
TEMP	-0.008	0.004	-1.93
ECT1 _{t-1}	-0.551	0.094	-5.83
ECT2 _{t-1}	7.718	4.903	1.57
ECT3 _{t-1}	-0.380	0.417	-0.91
ECT4 _{t-1}	0.203	0.145	1.4

VI. SUMMARY AND CONCLUDING REMARKS

Malaysia has an enormous potential for development in the tourism industry due to its cultural attraction provided by multi-racial societies and natural beauty. Its political stability has also been a huge factor in making it one of the fastest growing tourism industries in Asia. This paper aims at examining and understanding the demand of Malaysian tourism by the European. The Johansen cointegration analysis and Granger causality test are employed to model the long-run and short-term demand from three European countries; Germany, France and the Netherlands.

The results from the study reveal the presence of long-run relationship between the number of tourist arrivals and the

selected defining variables; relative price level, exchange rates, transportation cost and relative price level with respect to the chosen substitute destination of Thailand. Confirming the expectation of economic theory, the number of tourist arrivals is positively associated with the weakening of the local currency and negatively associated with the increase of transportation cost. In the long-run, neighbouring Thailand is found to be a complementary destination to Malaysia. While traditionally the price level in Malaysia has been much lower as compared to those in the European countries, greater increase in the price level in Malaysia in recent years does not deter the European tourists from visiting Malaysia.

Even though the error correction term is found to be significant in the VEC model, none of the selected economic variables is found to have a short-term impact on the tourism demand by the European. Perhaps, Malaysian tourism demand is largely affected by other factors in the short term. As indicated by analysis involving one-off event and dummy variables, demand of Malaysian tourism is significantly dependent on the temperature at the European continent. As expected, the outbreak of Avian Flu did not have a significant setback on the number of European tourist arrivals in Malaysia.

The findings of this study should be useful for government departments, institutions and bodies related to tourism industry in Malaysia. Since local price level and the value of local currency play important roles in attracting foreign tourists, maintaining low rate of inflation as well as keeping the ringgit at reasonable value relative to the stronger currencies such as the euro and the US dollar should be the primary importance of the Malaysian government. In addition, the complementary role of Thailand as tourist destination should encourage tourist agencies in Malaysia to work closely to those agencies in Thailand in developing joint touring programs. The Malaysian government through its Malaysia Tourism Board should also encourage European travel agencies to promote Malaysia and Thailand as a joint holiday destination.

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