Asian Journal of Humanities and Social Studies (ISSN: 2321 – 2799)
Volume 03 – Issue 03, June 2015

The Determinants of Tourism Demand by Mainland China in Taiwan

Yu-Wei Lan[1*], Dan Lin[2], Lu Lin[3]

[1]Corresponding author, Associate Professor, Department of Finance and Banking, Takming University of Science and Technology, No.56, Sec.1, Huanshan Rd., Neihu District, Taipei, Taiwan;

[2]Assistant Professor, Department of Finance and Banking, Takming University of Science and Technology, No.56, Sec.1, Huanshan Rd., Neihu District, Taipei, Taiwan

[3]Assistant Professor, Department of Public Finance and Taxation, Takming University of Science and Technology, No.56, Sec.1, Huanshan Rd., Neihu District, Taipei, Taiwan

[*]*Corresponding author's email: ywlan [AT] takming.edu.tw*

ABSTRACT−*Mainland China is the most important source of tourism for Taiwan in recent years. The purpose of this paper is to investigate the changes in the long-run demand for tourism in Taiwan by Mainland China. Monthly data from these two countries for the period between January 2001 and June 2014 are employed. Johansen maximum likelihood procedure is used in the cointegration analysis and error correction model to test the Mainland China tourism demand for Taiwan. The result indicates that the income in the origin country (that is, Mainland China), transportation costs in Taiwan, cross-strait trade and exchanges rates between these two countries are key determinants of tourism demand by Mainland China.*

Keywords--- Tourism demand; Cointegration analysis; Error correction model

1. INTRODUCTION

Taiwan is renowned for its culture and natural scenery, and is the ideal choice of tourism destination by people in Mainland China and among the overseas Chinese community. Therefore, creating a friendly tourism environment, developing the market and cultivating talents in the tourism industry are the priorities for increasing a country's competitiveness. However, political factors have a significant impact on Taiwan's tourism industry. In 1969, the Taiwan government proposed a Tourism Development Act, indicating the importance of tourism industry in Taiwan's economic development. In 1979, the citizens of Taiwan were allowed to travel overseas for tourism reasons. In 1987, the Taiwan government allowed its citizens to visit their relatives in China. In 2001, people in Mainland China were allowed to conduct tourist travels in Taiwan. In 2008, Taiwan government allowed charter flights between Taiwan and China and opened up for citizens of China to visit Taiwan. In 2009, the two countries had cross-strait direct flights. In 2011, Taiwan government further allowed independent travelers from three cities of Mainland China, including Beijing, Shanghai and Xiamen. According to the statistics reported by National Immigration Agency, in 2011 approximately 30,000 people came to Taiwan. In 2012, the Taiwan government opened up independent travelers from another ten cities in China including Tianjin. The number of independent travels increased sharply by more than six times to 190,000 people. On 28 June 2013, 13 more cities were allowed to travel independently to Taiwan. The Cross-Strait Tourism Exchange Association announced a fifth batch of mainland pilot cities whose residents will be allowed to travel independently to Taiwan, increasing the total number of opened cities to 47. As of the end of February 2015, mainland residents had made 2,186,400 independent trips to Taiwan, up 125.8% YOY from 1.179 million such visits and accounting 37% of all visits to Taiwan.

Tourism travel is one of the fast developing industries in Taiwan. According to the Tourism Bureau report, the number of tourists in Taiwan reached the first million of people in 1976. Taiwan received a record 9.91 million visitors in 2014, up 23.6% from the 8.01 million arrivals the year before. Tourism was the purpose of 72% of the visits and over 90% of the 8.97 million visitors came from other Asian Countries, up 25.7% from the year before and representing the sixth consecutive year of double-digit growth. Arrivals from the mainland accounted for 3.99 million, the biggest share and a significant gain of 38.7% over the year before.

The tourism industry has an increasing importance to Taiwan's economic development. According to the Global Competitiveness Report in 2014, the competitiveness of Taiwan's tourism receipts ranked 28. The ratio of tourism receipts to GDP increased from 2.38% in 2013 to 2.46% in 2014, which was at an all-time-high since 1995. Hence, how to grab the investment opportunities during this time is an important issue. Specifically, this study analyzes the factors that influence tourism demand by Mainland China in Taiwan and estimates the tourist numbers in order to provide references for relevant policy makers. The organization of this paper is as follows. The literature review is provided in Section 2. In Section 3, we discuss the Johansen cointegration test and estimation methods. Descriptions of the data and the results are provided in Section 4 and 5, respectively. A conclusion is provided in Section 6.

2. LITERATURE REVIEW

Previous research suggested that the determinants of international tourism demand included the following. First, income, which was the most commonly used factor and was found to be a significant variable. The basic economic theory suggested that other things being equal when the income of the origin country increased, the tourism demand for the destination country would increase. Studies by Hui and Yuen (1996), Lee (1996) and Webber (2001) all showed support for this argument and suggested that personal consumption or income and GNP were normal good. On the other hand, Crouch (2000) and Vogt and Wittayakorn (1998) did not find significant results. Chadee and Mieczkowski (1987) even found evidence of inferior good.

Secondly, price of the goods and tourism costs. Martin and Witt (1988) found that when the prices of tourism goods and services in the destination country were higher, the international tourism demand became lower. However, as this data was more difficult to obtain, Akis (1998) and Lee (1996) used consumer price index (CPI) as a proxy. However, Qu and Lam (1997) did not find the negative relationship. Covington et al. (1994) also showed that the increase in travel costs would restrain tourism demand.

Thirdly, exchange rates. Witt and Witt (1992) found that a strong volatility in exchange rate had a greater impact on tourism demand than the price of goods. When the currency of destination country deflated relative to the origin country, more tourists would be attracted by the destination country. Webber (2001) also provided support for this phenomenon. Fourthly, trading volume. Kulendran and Wilson (2000) pointed out that the causal relationship between trading volume and tourism was a recent hot issue. Katircioglu (2009) adopted Granger causality test and found that because of business travels, trades were the cause for tourism demand. Shan and Wilson (2001) also showed that international tourism demand would lead to exports and imports as tourism allowed people in different areas to meet and get to know each other.

Previous studies on tourism demand had mostly adopted a univariate model using tourism receipts (or expenditures) and total incoming tourists. Some research used goods price and exchange rate to calculate effective exchange rate. Some considered competitive destinations and transportation costs without dealing with the estimation period. As a result, different tourism demand model gave rise to varying income elasticity. For example, using US expenditures, Gray (1966) reported an estimation result of 5.13 while Jud et al. (1974) reported 2.58. When the incoming tourists were used as a dependent variable, the former study obtained an estimation result of -0.03 and the latter obtained a result of -2.38. Overall, as the real income and tourism industry of developing countries tended to grow at a similar pace, the demand of income elasticity was higher. In contrast, the relative price and exchange rate varied from countries to countries, this could lead to varying results.

Sinclair (1998) pointed out that using a univariate model could suffer from the following drawbacks: (1) lacking microeconomic theory to backup; (2) ignoring the cross-period relationship between tourism expenditures and income or between relative price and exchange rates; (3) very few discussions on relative price and exchange rate as independent variables; (4) uncertainty about whether transportation costs should be included; (5) most research did not have statistical tests. Johnson et al. (1990) suggested that many studies ignored the lagging effect from the lagged period and putting the same weight to significant and insignificant coefficients, causing biases in the estimation and errors in the model. Therefore, this study adopts Hendry's (1983) model and uses Johansen's (1988) cointegration tests and an error correction model (ECM) to test if the price index affects tourism demand in Taiwan. This model can overcome the drawbacks (2), (3) and (5) listed above and increase the reliability of results.

Accordingly, this study obtained data from the monthly tourism report of the Tourism Bureau and Taiwan Economic Journal (TEJ) database to examine if the following variables, including income ($lincome_t$), goods price ($lcost_t$), exchange rates ($lrate_t$) and trading volume ($ltrade_t$) have an effect on tourism demand by Mainland China ($lvisit_t$). Following Song and Witt's (2000) model, this study adopts a VECM model as outlined below:

$$lvisit_t = \alpha + \beta lrate_t + \gamma ltrade_t + \theta l\cos t_t + \delta lincome_t + \varepsilon_t \quad (1)$$

The testable hypotheses include the following. (1) As the income of tourists from China increases, their purchasing power also increases. Hence, it is expected to be positively related with tourism demand. (2) As the exchange rate increases (that is, the New Taiwan Dollar devalues), the purchasing power of tourists from China increases. Hence, it is expected to be positively related with tourism demand. (3) As the prices of Taiwan goods increase, less tourists from China will visit Taiwan. Thus, it is expected to be negatively associated with tourism demand. (4) As the trades between Taiwan and China become more frequent, there will be more business travelers. Thus, it is expected to be positively related with tourism demand.

3. JOHANSEN COINTEGRATION TEST AND ESTIMATION METHODS

This study adopts vector autoregression (VAR) model, Granger causality test and Johansen cointegration to test the effect of exchange rates, import/export trade volume, income and tourists consumption on tourism demand by Mainland China in Taiwan for the period January 2001 to June 2014 (that is, a total of 162 months).

3.1 VAR Model

Using the vector autoregression (VAR) model can ensure that all variables in the model have the causal relationship and can avoid the recognition problem in traditional simultaneous structural equations (Sims et al., 1990). All variables in the model are lagged variables of itself and other variables. Extending the single variable autoregression to multi-variable vector autoregression can solve the exogenous variable problem as all variables become endogenous. They can be used to predict a relevant time series system and the dynamic impact on this system by random noises.

The three variables in the program trading are y_{1t}, y_{2t}, y_{3t} (where y_{1t} is the price of stock symbol 2707; y_{2t} is the price of stock symbol 2700; and y_{3t} is the price of stock symbol 0061). Variable in time t is formed by the variable in the prior time period k and error term. For example, VAR(1) (i.e., k = 1) is as shown below:

$$\begin{aligned} y_{1t} &= m_1 + a_{11}y_{1,t\text{-}1} + a_{12}y_{2,t\text{-}1} + a_{13}y_{3,t\text{-}1} + \varepsilon_{1t} \\ y_{2t} &= m_2 + a_{21}y_{1,t\text{-}1} + a_{22}y_{2,t\text{-}1} + a_{23}y_{3,t\text{-}1} + \varepsilon_{2t} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(2)} \\ y_{3t} &= m_3 + a_{31}y_{1,t\text{-}1} + a_{32}y_{2,t\text{-}1} + a_{33}y_{3,t\text{-}1} + \varepsilon_{3t} \end{aligned}$$

where $E(\varepsilon_t) = 0, \forall t,\ E(\varepsilon_t \varepsilon_s^{'}) = \{\begin{matrix} \Omega, s = t \\ 0, s \neq t \end{matrix},\ \Omega = E(\varepsilon_t \varepsilon_t^{'}),$ the error term ε_{it} is white noise. m is the constant; a is the coefficient; Ω is a positive definite variance and covariance matrix. That is, the error term ε_{it} can be correlated in the same period but not with the lagging period or the variables in the right-hand side of the equation. From here, we can conduct the causality test.

3.2 Johansen Cointegration Test and Error Correction Model

As the economic theory has not yet concluded the causality relationship between tourism and economic development, Granger (1969, 1988) causality test can be used to determine such relationship. That is, by testing if the coefficients of current y series and the past values of x series have causal relationship, we are in essence examining if the past values of x can explain the present values of y. In other words, if adding a lagged value of x can increase the degree of explanation, or the correlation coefficient of x and y are statistically significant, we can conclude that y is Granger caused by x.

However, while the economic variables in time series model may exist a long-run equilibrium, in a short period of time, such equilibrium may not exist. The error in one period may be corrected in the next period. This suggests that the cointegration between variables is related to equilibrium adjustment and error correction. According to Granger Representation Theorem of Engle and Granger, when a long-run cointegration relationship exists in time series, there must exist a vector error correction model (VECM) between the time series. Therefore, series with VECM must have cointegration relationships. The two-stage cointegration test proposed by Engle and Granger (1987) cannot effectively deal with multivariate cointegration test. One important function of VAR is that it can test the long-run dynamic relationship between variables using a VAR conditioned on the cointegration relationship. Later, Johansen (1988, 1991) propose a multivariate VAR(P) cointegration test:

$$Y_t = C + \Pi_1 Y_{t-1} + \Pi_2 Y_{t-2} + \ldots + \Pi_p Y_{t-p} + U_t \qquad \ldots\ldots\ldots\ldots\ldots(3)$$

where $Y_t = (y_{1t} \ldots y_{nt})^{'}$ with the assumption $Y_t \sim I(1)$. After adjustments, VAR(P) in model (2) can be represented as:

$$\Delta Y_t = C + \Gamma_1 \Delta Y_{t-1} + \Gamma_2 Y_{t-2} + \ldots + \Gamma_{p-1} \Delta Y_{t-p+1} + \Omega Y_{t-p} + U \qquad \ldots\ldots\ldots\ldots\ldots(4)$$

where $\Gamma_i = -I + \Pi_1 + \ldots + \Pi_i,\ i = 1 \ldots p,$, $\Omega = -I + \Pi_1 + \ldots + \Pi_p$

All terms in model (4) are stationary except for ΩY_{t-p}. Hence, same as VAR(1), reducing the matrix Ω before vector Y_{t-p} can be used to test the cointegration relationship between variables. If the rank of coefficient matrix Ω is $rk\Omega = r < n$, there exist vectors α and β $(n \times r)$ with rank r. Therefore, $\Omega = \alpha\beta'$ and $\beta' Y_{t-p}$ is stationary with $\beta' Y_{t-p} \sim I(0)$. β is a cointegrated variable matrix reflecting the long-run relationship between variables. α is an adjusted coefficient matrix reflecting the short-run adjustments in variables between this period and last period's disequilibrium. Johansen cointegration test can be carried out in two ways. First, the trace test which can be calculated as follows:

$$LR_r = -T * \sum_{i=r+1}^{n} Ln(1-\lambda_i) \text{ ....(5)}$$

where λ_i is the eigenvalue of a matrix produced during the calculation.

Secondly, the maximum eigenvalue test, which is calculated as follows:

$$LR_{\max} = -T * Ln(1-\lambda_r) \text{ ....(6)}$$

where λ_i is the largest eigenvalue. Based on the characteristics of the time series (that is, whether there is a trend or second order), cointegration equation and VAR model can derive five possible situations. They can then all use Johansen cointegration likelihood ratio (LR) to conduct the tests.

4. DATA

This study examines the causal relationship between tourism demand by Mainland China in Taiwan and factors, including the income of Chinese tourists, price index, exchange rate and trading volume for the period between January 2001 and June 2014. The monthly data used include: (1) the total number of Chinese tourists in Taiwan (*lvisit*) (including travel for the purposes of tourism, business, study and visiting relatives), which is obtained from the monthly tourism report of Tourism Bureau; (2) cross-strait trades in US dollars (*ltrade*) (including exports and imports), which is obtained from TEJ[1]; (3) the price index in Taiwan (*lcost*), which is based on the transportation service costs index of Consumer Price Index (CPI), obtained from the Directorate-General of Budget, Accounting and Statistics; (4) the (interbank daily average) exchange rates between Taiwan and China (*lrate*), which is calculated using cross exchange rate (NTD / RMB) and obtained from TEJ; (5) the income of Chinese tourists (*lincome*), which is obtained from TEJ and is measured by the average income of people in Tianjin and Xiamen, the two earliest cities that were allowed to travel to Taiwan. However, after 2007, only quarterly data are available. Therefore, the interpolation method is used to derive average monthly RMB income. In order to ensure stationary series, all the above data are log transformed and the estimated coefficients become a measure of elasticity between variables.

5. EMPIRICAL RESULTS AND ANALYSIS

5.1.1 Unit Root Test

As the data of this study are time series, we adopt ADF (Augmented Dickey-Fuller) to test if the variables influencing tourism demand, including exchange rates (*lrate*), trading volume (*ltrade*), goods price (*lcost*) and number of Chinese tourists (*lvisit*), have unit roots. The results show that at level, most variables accept the null hypothesis; that is, the time series are not stationary. After taking the first difference, the null hypotheses are rejected at the 1% level for most variables. Therefore, I(1) is treated as a stationary series (as shown in Table 01) and can be proceeded with VAR test where the lagging period is determined by AIC (Akaike Information Criteria) and Johansen cointegration test. Note that the smaller the AIC the better.

Table 01: Unit root test of factors influencing tourism demand by Mainland China

Variables / Model	Level		First difference	
	Intercept	Intercept and Trend	Intercept	Intercept and Trend
lvisit	0.0155(2)	-2.4707(2)	-13.4225(1) *	-13.4657(1) *
lincome	-1.0640(1)	-3.0088(1)	-8.1071 (2) *	-8.0829(2) *
lrate	-1.5080(1)	-2.4357(1)	-10.4772(0) *	-10.4474(0)*
lcost	-2.0745(0)	-2.3726(0)	-12.3818(0) *	-12.3541(0)*
ltrade	-2.6548(1)**	-2.3629(1)	-19.3027(0)*	-19.4958(0)*

Note: The test is based on Mackinnon (1991). *，**，*** represents the significance at the 1%, 5% and 10% level. ( )

1 Excluding Hong Kong.

represents the lagging period. *lvisit* is the number of Chinese tourists, *ltrade* is the cross-strait trading volume, *lcost* is the Taiwan goods price, and *lrate* is the exchange rate between Taiwan and China.

5.1.2 Lagged VAR Test

To ensure that the error terms of time series are not autocorrelated, the choice of lagging period is important. Therefore, we use unconditional VAR to determine the lagging period. We find that FPE and AIC accept the null hypothesis that the coefficient of VAR(3) is zero (as shown in Table 02).

Table 02: VAR model of tourism demand for testing the best lagging period

Lag	LogL	LR	FPE	AIC	SC	HQ
0	325.2682	NA	1.07e-08	-4.159327	-4.060725	-4.119275
1	1283.360	1841.528	5.87e-14	-16.27741	-15.68579*	-16.03709
2	1328.183	83.24269	4.54e-14	-16.53485	-15.45022	-16.09428
3	1369.829	74.63765	3.67e-14*	-16.75103*	-15.17339	-16.11019*
4	1385.739	27.48179	4.15e-14	-16.63298	-14.56233	-15.79189
5	1402.640	28.09489	4.64e-14	-16.52780	-13.96413	-15.48644
6	1428.632	41.51872*	4.64e-14	-16.54067	-13.48400	-15.29906

5.1.3 Estimation Results of VAR Model

The VAR model of tourism demand by Mainland China is estimated as follows:

$$ly_t = \begin{bmatrix} 1.032 & -0.181 & 1.987 & -6.190 & -0.081 \\ 0.037 & 1.179 & -0.184 & -1.609 & 0.525 \\ 0.007 & 0.012 & 1.080 & -0.179 & -0.012 \\ -0.003 & 0.005 & -0.022 & 0.878 & 0.003 \\ 0.155 & -0.036 & -0.246 & 0.569 & 0.454 \end{bmatrix} * ly_{t-1} + \begin{bmatrix} -0.523 & 0.085 & 0.460 & 8.452 & -0.064 \\ 0.105 & -0.051 & 2.567 & -3.863 & -0.122 \\ -0.007 & -0.006 & -0.192 & 0.030 & 0.007 \\ 0.004 & -0.002 & 0.017 & -0.173 & -0.002 \\ -0.199 & -0.087 & -1.585 & 5.870 & 0.382 \end{bmatrix} * ly_{t-2}$$

$$\begin{bmatrix} 0.402 & 0.084 & -1.293 & -3.741 & 0.184 \\ -0.112 & -0.238 & -1.606 & 7.086 & -0.268 \\ 0.003 & 0 & -0.021 & 0.265 & 0.002 \\ -0.004 & 0 & 0.002 & 0.166 & 0 \\ 0.052 & 0.114 & 1.919 & -7.096 & 0.117 \end{bmatrix} * ly_{t-3} + \begin{bmatrix} 5.603 \\ -0.053 \\ -0.377 \\ 0.614 \\ 3.628 \end{bmatrix}$$

where $ly = \left[lvisit \quad lincome \quad lrate \quad l\cos t \quad ltrade\right]'$, and some coefficients are significant. This suggests that there may exist causal relationships between variables.

5.1.4 Johansen Cointegration Test

To use Johansen cointegration test for examining if an equilibrium relationship exists between variables, the first task is to decide the lagging period. As the cointegration test of VAR model is based on unconditional VAR, the lagging period uses the first difference of the variables in unconditional VAR. Hence, the estimation is lagged two periods.

By comparing the results of five different hypotheses on trends, this study chooses model 4, which has the minimum AIC and confirms that the series has a linear trend and the cointegration model consists of intercept and trend. Johansen cointegration test results are presented in Table 03, which shows eigenvalue, trace statistic and maximum-eigenvalue statistic. Results that are significant at the 5% level are marked with a *; that is, the null hypothesis is rejected. The model is found to have a cointegration relationship.

Table 03: Johansen cointegration test results of tourism demand by Mainland China

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Max-Eigen Statistic
None *	0.228827	101.9807	41.31492
At most 1	0.129454	60.66578	22.04285

5.1.5 Error Correction Model of Tourism Demand by Mainland China

By choosing the cointegration model with the minimum AIC (that is, model 4), we proceed with an error correction model estimation. The following then shows the estimation results of error correction model for the tourism demand by Mainland China in Taiwan:

$$
\begin{aligned}
Lvisit = 1306.650 &- \underset{(-5.3041)}{0.3462}\, t + \underset{(2.9687)}{4.4064}\, lincome + \underset{(1.8056)}{34.7231}\, lrate \\
&- \underset{(-5.9155)}{324.5884}\, lcost + \underset{(4.4568)}{8.9734}\, ltrade
\end{aligned}
$$

The results show that in the long-run, income, exchange rates and trading volume are positively related to the number of Chinese tourists. Goods price and the number of Chinese tourists are negatively related. The results are consistent with the hypotheses. In other words, when the income of Chinese tourists increases and the RMB appreciates, the wealth of Chinese tourists rises. Therefore, they are more likely to visit Taiwan and consume in Taiwan. Also, as the cross-strait trades increase, there will be more business travelers. In contrast, if the prices of goods in Taiwan increase, Chinese tourists will be less willing to visit Taiwan. As for the effect in the short-run, the error correction estimated coefficient of goods price in the tourism demand model is negative and significant (-5.73). In addition, the income of Chinese tourists lagging one period and the number of Chinese tourists are negatively correlated. The number of Chinese tourists lagging one period and trading volume are significantly positively related. The exchange rates lagging two periods and trading volume are significantly negatively related. The goods price lagging two periods and the income of Chinese tourists are significantly negatively related. The trading volume lagging one and two periods are significantly positively related to the income of Chinese tourists. The results show short-term transitory relationship[2].

5.1.6 Granger Causality Test of VECM

This study then conducts Granger causality test of VECM estimations. The results show that income and exchange rates are the Granger cause of the number of Chinese tourists. Trading volume is the Granger cause of income. The number of Chinese tourists, goods price and exchange rates are Granger cause of trading volume (as shown in Table 04).

Table 04: Granger causality test of VECM

Granger cause /Granger results	lvisit	lincome	lrate	lcost	ltrade
lvisit		6.5623 0.0376**	6.5121 0.0385**	2.8122 0.2451	3.4918 0.1745
lincome	4.0645 0.1310		3.2802 0.1940	4.3749 0.1122	21.2094 0
lrate	1.3570 0.5074	6.1530 0.0461**		0.6432 0.7250	0.7037 0.7034
lcost	3.3337 0.1888	1.1987 0.5492	0.3222 0.8512		0.5406 0.7631
ltrade	7.4611 0.0240**	3.1672 0.2052	6.6216 0.0365**	5.2395 0.0728**	

Note: The numbers represent F-value (above) and P-value (below).

5.2 VECM Estimation for the Period 2008.07-2014.06

Based on the long-run dynamic estimation of VECM model for the period January 2001 to June 2014, the results show that the mean absolute percentage error (MAPE) over the next six months will be as high as 24.7%[3]. This shows that there may exist structural changes in the time series of tourism demand by Mainland China. Hence, this study uses July 2008, on which day Chinese citizens were allowed to visit Taiwan, as the event date. The results show that there exists a regime change in July 2008 in terms of the number of Chinese tourists in Taiwan.

---

2 *Due to page limit, the coefficients of short-term effect are not reported.*

3 *Due to page limit, the long-run dynamic estimation for the period 200807~201406 and VAR model estimates are not reported.*

Table 05: Chow's breakpoint test

F-statistic	90.69382	Prob. F(4,154)	0.0000
Log likelihood ratio	196.1262	Prob. Chi-Square(4)	0.0000
Wald Statistic	362.7753	Prob. Chi-Square(4)	0.0000

Then, based on the rule of choosing minimum AIC for the tourism demand cointegration model (for the period 200807~201406), we a conduct error correction model using model 3 and lag two periods. The estimation results are presented as follows:

$$Lvisit_{-1} = \underset{(6.1129)}{2.1570^{*}\ lincome_{-1}} - \underset{(-1.3565)}{7.0270\ lrate_{-1}} - \underset{(-1.0933)}{9.5260\ lcost_{-1}} \underset{(-1.3060)}{-1.0951_{-1}\ ltrade_{-1}} + 62.9131$$

Overall, the results show that in the long-run, income and the number of Chinese tourists are significantly positively related (6.1129), consistent with the hypothesis. That is, when the income of Chinese tourists increases, their wealth increases, enhancing their consumption willingness in Taiwan and brining more tourists to Taiwan. In contrast, other variables (including, trading volume, exchange rates and goods price) do not have a significant impact on tourism demand. Only income is the most important determining factor.

6. CONCLUSION AND POLICY IMPLICATIONS

This study examines the impact on tourism industry when Chinese tourists were allowed in Taiwan in 2001. This study first utilizes tourism data and error correction model to test the effect of four variables on Chinese tourists. The results show that in a long-run equilibrium, the income of Chinese tourists and the number of Chinese tourists in Taiwan are positively related. The elasticity is significant at 4.40. That is for every 1% increase in the income of Chinese tourists, the number of Chinese tourists in Taiwan will increase by 4.4%. The exchange rates and cross-strait trading also show significant positive relationship, with elasticity of 34.72 and 8.97, respectively. In contrast, the price index in Taiwan and the number of Chinese tourists are negatively associated (-324.58). The evidence is consistent with economic theories and supports our four hypotheses.

Also, the Granger causality test of VECM estimation results show that income and exchange rates are the Granger cause of tourism demand. Trading volume is the Granger cause of income. Tourism demand, price index and exchange rates are the Granger cause of trading volume. Moreover, based on the Chow's breakpoint test, this study shows that allowing Chinese tourists in Taiwan leads to structural changes and has significant effects on the tourism industry. The results reveal that the factor, "income of Chinese tourists", is essential to the model of Chinese tourism demand. Our results differ from previous studies' as the attributes of Chinese tourists have changed. Although the number of visitors from Mainland China to Taiwan is much lower than the number of Taiwanese visiting Mainland China (1:40), it is still noteworthy that most of the visitors from Mainland China to Taiwan are high profile people such as scientists, technology leaders, journalists, actors, scholars, and athletes (Guo, Kim, Timothy, & Wang, 2006). However, for new tourists, Erin et al. (2011) indicate that the travel agents' quote for daily cost of Chinese tourists to Taiwan is around US$30-45 in recent years. This can be explained by the fact that the Taiwan government has set a tourism quota for Chinese tourists from Mainland China per year and this leads to economic rent for travel agents who get the quota. The results also suggest that income is the main concern of Chinese tourists in recent travels. Thus, how to upgrade the tourism quality in Taiwan is the most important issue for the Taiwan government. Future research can study how the factors influencing tourism demand affect the investment strategy.

7. REFERENCES

[1] Akis, S., "A compact econometric model of tourism demand for Turkey", Tourism Management, vol. 19, no. 1, pp. 99-102, 1998.

[2] Chadee, D., & Mieczkowski, Z., "An empirical analysis of the effects of the exchange rate on Canadian tourism", Journal of Travel Research, vol. 26, no. 1, pp. 13-17, 1987.

[3] Crouch, G.I., "Guidelines for the study of international tourism demand using regression analysis", In J.R.B. Ritchie & C.R. Goeldner (Eds.). Travel, tourism and hospitality research: A handbook for managers and researchers (pp. 583-596). New York: John Wiley & Sons Inc., 2000.

[4] Covington, B., Thunberg, E.M. & Jauregui, C., "International demand for the U.S. as a travel destination", Journal of Travel & Tourism Marketing, vol. 3, no. 4, pp. 39-50, 1994.

[5] Dickey, D.A., & Fuller, W.A., "Likelihood ratio statistics for autoregressive time series with a unit", Econometrica, 49, pp. 1062-1063, 1981.

[6] Engle, R., & Granger, C.W.J., "Co-intergration and error correction: representation, estimation and testing",

Econometrica, 55, pp. 251-276, 1987.

[7] Erin, H. K., & You, D. D., "The impact of the Relaxation of visits by mainland China tourists to Taiwan on stock returns and financial performance: the case of listed tourism industry firms", Journal of Economics and Management, vol. 7, no. 2, pp. 257-283, 2011.

[8] Granger, C.W.J., "Investigating causal relations by econometric model and cross-spectral methods", Econometrica, 37, pp. 24-36, 1969.

[9] Granger, C.W.J., "Some recent development in the concept of causality", Journal of Econometrics, 39, pp. 199-211, 1988.

[10] Gray, H.P., "The demand for international travel by the United States and Canada", International Economic Review, vol. 7, no. 1, pp. 83-92, 1966.

[11] Guo, Y., Kim, S. S., Timothy D. J., & Wang, K. C., "Tourism and reconciliation between Mainland China and Taiwan", Tourism Management, 27, pp. 997-1005, 2006.

[12] Hendry, D.F., "Econometric modelling: The consumption function in retrospect", Scottish Journal of Political Economy, 30, pp. 193-220, 1983.

[13] Hui, T.K., & Yuen, C.C., "The effects of exchange rate, income, and habit on Japanese travel to Canada", Journal of Travel & Tourism Marketing, vol. 5, no.3, pp. 265-275, 1996.

[14] Jud, G.D., & Joseph. H., "International demand for Latin American tourism", Growth and Change, 5, pp. 25-31, 1974.

[15] Johansen, S., "Statistical analysis of cointegration Vectors", Journal of Economic Dynamics and Control, 12, pp. 231-254, 1988.

[16] Johansen, S., "Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models",. Econometrica, vol. 59, no.6, pp. 1551-1580, 1991.

[17] Johansen, S., & Juselius, K., "Maximum likelihood estimation and inference on cointegration with applications to demand for money", Oxford Bulletin of Economics and Statistics, vol. 52, no.2, pp. 169-210, 1990.

[18] Katircioglu, S., "Tourism, trade and growth: the case of Cyprus", Applied Economics, 41, pp. 2741-2750, 2009.

[19] Kulendran, N., & Wilson, K., "Is there a relationship between international trade and international travel?", Applied Economics, 32, pp. 1001-1009, 2000.

[20] Lee, C.K., "Major determinants of international tourism demand for South Korean: Inclusion of marketing variable", In: D.R. Fesenmaier, J.T. O'Leary, & M. Uysal (Eds.). Recent advances in tourism marketing research (pp. 101-118). New York: The Haworth Press Inc., 1996.

[21] Martin, C.A., & Witt, S.F., "Substitute prices in models of tourism demand", Annals of Tourism Research. Vol. 15, no. 2, pp. 255-268, 1988.

[22] Nofsinger, J., & Sias, R.W., "Herding and feedback trading by institutional and individual investor", Journal of Finance, vol. 54, no. 6, pp. 2263-2295, 1999.

[23] Qu, H., & Lam, S., "A travel demand model for Mainland Chinese tourists to Hong Kong", Tourism Management, vol. 18, no. 8, pp. 593-597, 1997.

[24] Scharfstein, D.S., & Stein, J.C., "Herd behavior and investment", American Economic Review, vol. 80, no. 3, pp. 465-479, 1990.

[25] Sims, C.A., Stock, J.H., & Watson, M.W., "Inference in linear time series models with some unit roots", Econometrica, 40, pp. 161-182, 1990.

[26] Shan, J.Z., & Wilson, K., "Causality between international trade and tourism: the empirical evidence from China", Applied Economics Letters, 5, pp. 234-238, 2001.

[27] Sinclair, T., "Tourism and economic development: a survey", Journal of Development Studies, vol. 34, no. 5, pp. 1-51, 1998.

[28] Song, H., & Witt, S.F., Tourism demand modelling and forecasting: modern econometric approaches. Oxford: Pergamon, 2000.

[29] Vogt, M., & Wittayakorn, C., "Determinants of the demand for Thailand's export of tourism", Applied Economics, 30, pp. 711-715, 1998.

[30] Webber, A., "Exchange rate volatility and cointegration in tourism demand", Journal of Travel Research, vol. 39, no. 2, pp. 398-405, 2001.

[31] Williams, L., Long-term secrets to short-term trading. New York: John Wiley & Sons Inc., 1999.

[32] Witt, S.F., & Witt, C.A., Modeling and forecasting demand in tourism. San Diego: Academic Press Inc., 1992.