SHORT-RUN ANALYSIS OF US TOURIST FLOW TO TAIWAN

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ABSTRACT

For policy making, it is important to realize how economic factors affect US tourists' decision of choosing Taiwan as a destination. This paper tried to estimate the responses of tourist arrival change from US to Taiwan to shocks of changes of US PDI, cost of living, and substitute prices by VAR. The short-run equilibrium adjustment processes are discussed by generalized impulse response. It is found that the response of the tourist arrival change is immediately and significantly positive to itself and the change of the substitute prices. Besides, the price, income, and cross elasticity for tourism demand is inferred all positive, implying the tourism products are attributed to normal and substitute goods.

Keywords: *tourist flow, VAR, generalized impulse response*

INTRODUCTION

The tourism industry is the largest industry in the world with receipts from international tourism expenditure amounting to US$474 billion in 2002 (WTO, 2003a). The tourism industry undeniably possesses the ability as labor-intensive sector to create jobs for relatively unskilled labor, particularly of less developed countries. Tourist spending, as an alternative form of exports, can contribute to the balance of payments through foreign exchange earnings and represent a significant income source for a national economy (Balaguer & Cantavella–Jorda, 2002). In addition, after long-term tourism expansion global consumer trends indicate that most tourists are becoming more discerning in their choice of destinations, meaning less predictable and more spontaneous in terms of their consumption patterns (Burger, 2001). Therefore, analyzing tourism demand deeply is a very important work which all tourism-related business decision makings ultimately rely on.

The focused destination country, Taiwan, is an island country located on the southeast of China, opposing each other across the Taiwan straits, furthermore the neighbor countries,

Japan and Korea at Taiwanese north and Philippine at the south. In short, it is obvious that Taiwan almost locates on the center of the Asia and substantially occupies a significantly geographic and commercial position in Asia. In obeying traditional island economic model, the last five decades have seen sharp economic growth principally based on a great deal of export in Taiwan, and the dramatic growth of Taiwanese GDP appeared over 260 times from 1961 to 2011. Within the course of economic development, the Taiwanese export value mainly contributed by manufacturings has the same ascending tendency with GDP. (The financial database of the Taiwan Economic Journal, TEJ) Recently, especially in the last decade, due to facing immense international competition, principally of manufacturing industries, only original manufacturing export has not been able to provide enough energy to sustain Taiwanese economic growth completely. For stimulating the impotent economy, Taiwan must aggressively make unremitting efforts to carry out an industrial transit such as raising output value of service industry, like tourism. In order to enlarge the output of the tourism industry, many actions have been done by Taiwan government in the ten years such as recently "Tour Taiwan Years 2008-2009: Great Quarterly Tourist Giveaway Program", "the Key-Words marketing", and the "The Best Trip in the World - Taiwan Explorers Wanted" contest. After these promotions taking place, the number of inbound visitors to Taiwan in 2009 increased by 14.3% year-on-year, 29.47% of which came here for sightseeing purposes (Taiwan Tourism Bureau). Particularly, a very important policy that the Taiwan government formally opened the gates to Mainland Chinese tourists was passed and implemented in July 2008, which has contributed to the fact that Taiwanese inbound visitors in 2010 exceeded five millions marking a new record. Overall, the number of tourist arrivals to Taiwan increased year-by-year by about 18 times between 2010 and 1968 along tourism evolution.

In the past, the main origin countries of tourist arrivals to Taiwan were almost Japan, Hong Kong, US, Singapore, South Korea, Thailand, and so on. However, until 2010 China fleetly exceeded all countries as the top one of tourist host countries, due to the open to Chinese tourists which will get more and more important position in Taiwanese tourism. Empirical studies of the correlation between tourism demand and economic conditions of Taiwan have been done by some authors. For example, Kim, Chen, & Jing (2006) and Lee & Chien (2008) both used overall tourist arrivals as a proxy of tourism growth to discuss the relationship between tourism development and macroeconomic growth. Nevertheless, the tourism arrival changes from individual origin counties responding to different macroeconomic conditions have hardly been discussed. In this paper, an individual origin country will be chosen to find out the relationship between its tourism demand and economy, which could be effectively in favor of more detailed policy makings. However, which country is more interested? In the meanwhile China must be the answer through a structure break - the open to Chinese tourists, but lacking enough datasets to do. Except US, all the top origin countries are situated in Asia and close to Taiwan. Although there is not a geographical advantage existing for US tourists

to Taiwan, US has been still a main resource of tourist arrivals to Taiwan for long time, probably due that US and Taiwan continually keep very friendly relationship no matter in economic, cultural, military, political, or educational affairs. Since US owns rare different specialties than other origin countries, we target US as an interested origin country in this research.

This paper is trying to investigate the relationship between international tourist arrivals from US to Taiwan and three economic variables including US personal disposable income (PDI), tourism living cost, and substitute prices. Before verifying the relationship and impact, we firstly must check whether the four variables are stationary or not. By unit root tests, it was found that there were unit roots existing in the two time series of US personal disposable income (PDI) and substitute prices, the degree of integration I(1), whereas tourist arrivals from US to Taiwan and substitute prices are tested as I(0). Tested further, the all four first-differenced variables are stationary. However, as I(1) series does be found, neither a vector autogression (VAR) model with first differences nor a vector error correction model (VECM) can be used. But, it is shown by Engle & Yoo (1987) and Hoffman & Rasche (1996) that an unrestricted VAR is superior to a restricted VECM at short horizons. The unrestricted VAR are adopted with the first differenced data in this paper. And the short-run equilibrium adjustment processes are discussed by the generalized impulse response analysis. It is found that the response of the tourist arrival change is immediately and significantly positive to the impacts of itself and the change of the substitute prices whereas negative sign at the beginning appears to the change of living cost. Therefore, the results in this paper could be inferred that the price elasticity, the income elasticity, and the cross elasticity for tourism demand are all greater than zero, implying the tourism products are attributed to normal and substitute goods.

The remainder of the paper is organized as follows. Section "Literature Reviews" describes recent publications about Taiwan tourism and economic variables, which will provide the rationale for using the chosen research topic and methodology. Section "International Tourist Arrival from Us to Taiwan" describes the tendency and the seasonality of the tourist arrivals from US, Section "The Model, Dataset, and Results" depicts the data, model variables, estimation, and results, while the last section summaries the conclusions.

LITERATURE REVIEWS

The existing literature shows that there were very few published papers in international academic journals concerning the Taiwan's tourism. One of the reasons is that Taiwan has not been regarded as a traditional and famous destination by international tourists which maybe, Europeans for example, can not accurately indicate where Taiwan is, let alone select

Taiwan as a destination. Until 2006 by Kim, Chen, & Jing, a paper concerning the relationship between tourism and economy of Taiwan did not appear. The paper examined the causal relationship between tourism expansion and economic development in Taiwan with the tourist arrival and the GDP variables and indicated a long-run equilibrium relationship and further a bi-directional causality exist between the two factors. However, it could be found just overall tourist arrival but of individual origin countries is concerned. Dritsakis (2004) investigated changes in the long-run demand for tourism to Greece by Germany and Great Britain, which used a number of leading macroeconomic variables, including income in origin countries, tourism prices in Greece, and transportation cost and exchanges rates between the three countries. In the same years, Lim analyzed the seasonal patterns of tourist arrivals from South Korea to Australia, and used econometric time series modeling to quantify the factors affecting the flow of international tourists between Australia and Korea. The paper by Song & Witt (2006) used VAR to forecast tourist flows to Macau from eight major origin countries, suggesting that Macau will face increasing tourism demand by residents from mainland China. Nevertheless, the tourist arrivals to Taiwan from major origin countries still have not been discussed separately in academic papers. In this paper, an important origin country, US, will be chosen to analyze the relationship between Taiwan's tourist arrivals from US and economic factors.

With regard to research about economy and tourism, it is important to verify which economic factor should affect tourism demand closely. Lim (1997) argued that discretionary income should be used as the appropriate measure of income in the demand model. However, this is a subjective variable and the data cannot be easily obtained in practice, while alternative income measures have to be used as a proxy for tourists' discretionary income. Among these alternatives such as GDP, GNP, PDI, and GNI, real personal disposable income (PDI) is the best proxy to be included in the demand models relating to holiday or visiting friends and relatives travel (Kulendran & Witt, 2001; Song et al., 2000; Syriopoulos, 1995), which match the visiting purposes of US tourists to Taiwan. (Song & Witt, 2006) So, the monthly data of real personal disposable income (PDI) is chosen as one of the economic factors in this paper.

In addition to income consideration, price does matter in a demand-supply model. Song & Witt (2006) pointed out that the variable of own price should contain two components for tourism consumption: the cost of living at the destination and the transportation cost to the destination. However, in many studies transportation cost was omitted, by acquiring data difficultly, so transportation costs will not also be considered in this paper. The cost of living is normally measured by the destination consumer price index (CPI) relative to the origin CPI. Another important factor that affects the cost of living in the destination is the exchange rate between the origin and destination country currencies. Qiu & Zhang (1995) and Witt & Witt (1992) used the exchange rate between the destination and origin as well as a separate CPI

variable to account for the cost of tourism, while the majority of the published studies, especially the most recent ones such as Song & Witt (2006), have employed an exchange rate adjusted relative price index between the destination and origin as the own price variable. In this paper, the exchange rate adjusted relative price index is calculated for the variable of living cost.

Another determinant, substitute prices in competitive destinations, has also been proved. There are two kinds of substitute prices: one allows for the substitution between the destination and a competitive destination such as Kim & Song (1998), Song et al. (2000), and Song & Witt (2006). The other calculates the cost of tourism in the destination under consideration relative to a weighted average cost of living in various competing destinations. The weight is the relative market share of each competing destination (Song & Witt, 2003). In this study, the first form is adopted by setting a hot destination, Hong Kong as the single competing destination, because market share ratios of major competing countries are hard to obtain. In addition, Hong Kong region situates very near Taiwan and has the similar tourism and business model. And this substitute index is also adjusted by relevant exchange rates.

INTERNATIONAL TOURIST ARRIVAL FROM US TO TAIWAN

US tourist arrivals have become an important source of the Taiwan inbound tourist market, rising up by about 11% from 1th quarter 2001 to 1th quarter 2011. But compared to Japan or Hong Kong, the growth rate of the tourist arrivals from US to Taiwan is relative small and appeared no obvious time tendency as shown in Figure 1. In addition, the next section shows US tourist arrivals is verified as a stationary series by unit root tests, so it is not easy to increase the US arrivals up by a wide margin. Therefore, the US tourism demand must be concerned more detailed and deeply on short-run analysis for adjusting immediately suitable strategies of tourism agents or governments. In Figure 1, an abrupt shrink is very obvious in 2003 caused by Severe Acute Respiratory Syndrome (SARS) epidemic.

The seasonal patterns of tourist arrivals from US to Taiwan will be discussed. From the quarterly data in Figure 1, it seems to convey a message that tourist arrivals from US to Taiwan display strong seasonal patterns. More seriously, monthly seasonal indices for tourist arrivals are computed to prove the seasonality by using the ratio-to-moving average technique, calculated with the seasonally unadjusted monthly data of tourist arrivals from March 2001 to November 2011, as followed (Lim & McAleer, 2001):

$$P_t = \frac{A_t}{MA_t} \times 100\% \tag{1}$$
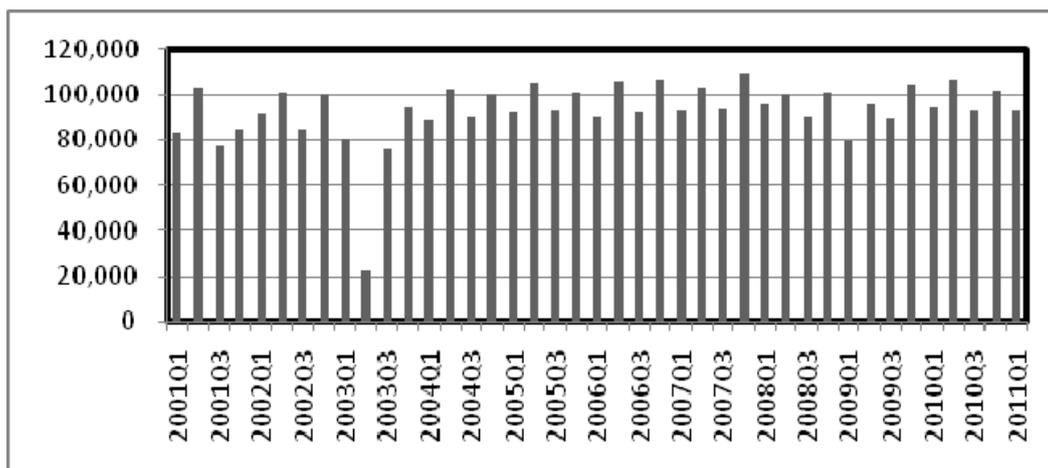
FIGURE 1

Quarterly Tourist Arrival from US

TABLE 1

Seasonal Indices for Tourist Arrival from US

Month	Seasonal indices
January	0.960
Febuary	0.869
March	1.109
April	0.969
May	0.937
June	1.096
July	1.067
August	0.959
September	0.862
October	1.070
November	1.039
December	1.192

where P_t is the ratio-to-moving average, A_t is the tourist arrivals in levels, and MA_t is the moving average. This procedure is intended to eliminate the trend and cyclical components, thereby resulting in a series that contains seasonal movements. During the period, March, June, July, October, November, and December were the high seasons for inbound tourists from US to Taiwan, as seen in Table 1.

THE MODEL, DATASET, AND RESULTS

This paper is trying to understand the relationship between the variable of international tourist arrivals from US to Taiwan and three economic variables including US personal disposable income (PDI), tourism living cost, and substitute prices. Before verifying the relationship and impact, we firstly must check whether the four variables are stationary or not. In the next subsection of unit root tests, it was found that there exist unit roots in the two time series of US PDI and substitute prices, denoted the degree of integration I(1), whereas tourist arrivals and substitute prices are checked as I(0). Tested further, the all four first-differenced model variables are stationary. However, if a I(1) process does be found, it involves estimation of the vector autogression (VAR) model with first differences, otherwise a vector error correction model (VECM) is estimated if cointegration exists. Naka and Tufte (1997) argued that an unrestricted VAR performs better than a VECM. It also been proposed by Engle & Yoo (1987) and Hoffman & Rasche (1996) that an unrestricted VAR is superior to a restricted VECM at short horizons. Therefore, the unrestricted VAR are adopted in this study with the use of first differenced data for short-run analysis. Finally, the short-run equilibrium adjustment processes are discussed by the generalized impulse response analysis.

The monthly data over the period of March 2001 through November 2011 is estimated in this paper. The model variables are the tourist arrival from US, the personal disposable income (PDI) of US, the own price, and the substitute price, selected kinds of proxy variables as following the paper proposed by Song & Witt (2003). The cost of living is deemed as the index variable of own prices in Taiwan normally measured by the Taiwanese consumer price index (CPI) divided by the CPI of US and adjusted by the appropriate exchange rates. The substitute price is measured by the relative CPI of Hong Kong to Taiwan adjusted by the appropriate exchange rate, because Hong Kong is generally regarded as the most major opponent of Taiwan in tourism industries. The data of tourist arrival from US was gotten from Tourism Bureau, Ministry of Transportation and Communications, Republic of China (Taiwan); PDI was gotten from the financial database of Taiwan Economic Journal (TEJ); the cost of living and the substitute prices were calculated with exchange rates and CPI of Taiwan, US, and Hong Kong also gotten from TEJ. Then, the four model variables are all transformed by the use of natural logarithms to ease interpretation of coefficients. Besides, there is a concern of removing important information while adjusting for seasonality, unadjusted data are used.

Unit Root for the Order of Integration

The famous Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests are made use of

verifying whether the time series variable is non-stationary or stationary. All procedures allow for fitted drift in the time series model. The ADF test account for temporally dependent and heterogeneously distributed errors by including lagged innovation sequences in the fitted regression. In contrast, the Phillips and Perron procedure accounts for n.i.i.d. (non-independent and identically distributed) processes using a nonparametric adjustment to the standard Dickey-Fuller (DF) procedure. The results of testing the order of logarithm variables of tourist arrivals from US (LUSTA), the PDI of US (LUSPDI), the cost of living (LUSCL), and the substitute prices (LUSSP) are shown in Table 2. The tests strongly sustain the null hypothesis of non-stationarity for the level variables of the PDI of US (LUSPDI) and the substitute price (LUSSP), and reject ones for the level variables of tourist arrivals from US (LUSTA) and the cost of living (LUSCL). Then, the first differenced series of all four model variables are stationary because those null hypotheses were rejected at 1% level. In short, the variables of tourist arrivals from US (LUSTA) and the cost of living (LUSCL) are significantly belonged to the zero order of integration I(0) whereas the PDI of US (LUSPDI) and the substitute price (LUSSP) are I(1).

TABLE 2
Results of Unit Root Tests

Variables	LUSTA		LUSPDI		LUSCL		LUSSP	
Test method	ADF	PP	ADP	PP	ADF	PP	ADF	PP
Level	-6.27^{***}	-5.56^{***}	-1.28	-0.72	-3.92^{**}	-3.46^{*}	-3.01	-2.59
	(0.00)	(0.00)	(0.6359)	(0.8357)	(0.0141)	(0.0667)	(0.1346)	(0.2859)
First Differenced	-10.8^{***}	-18.7^{***}	-5.91^{***}	-11.19^{***}	-7.73^{***}	-7.69^{***}	-8.29^{***}	-8.24^{***}
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Notes: The optimal lag length determined selected on Akaike Information Criterion (AIC). Numbers without ( ) are the t-statistics for each kind of the unit root tests. Numbers in brackets ( ) are probabilities, p-values. To reject the null hypothesis of having a unit root at different significant levels 1%, 5%, or 10%, which means that a time series is stationary. *** indicates the t-statistics is at the 1% significance level, in the same way, ** and * at the 5% and 10% significance level, respectively.

The unit root test shows that there exist different orders of integration, I(0) and I(1), for the four model variables, which means the approach of conventional regression and unrestricted vector autoregression (VAR) is not avail to use with level variables. When we study with nonstationary time series, the regressions usually produce significant OLS parameter estimates yet, but the residuals are ordinarily nonstationary, thus violating the standard assumption of classical econometrics. This problem is known as spurious regression. The VAR model has the same problem. In addition, Toda and Yamamoto (1995) noted that

conventional asymptotic theory is, in general, not applicable to hypothesis testing in levels VARs if the variables are integrated, I(1). Therefore, following the argument of Naka & Tufte (1997), the unrestricted VAR are adopted with the use of first differenced data for short-run analysis.

Vector Autoregression

On the application of unit root tests in this paper, both the time series of the tourist arrival from US (LUSTA) and the cost of living (LUSCL) are well characterized to be integrated of order zero, denoted I(0) which means stationarity that the mean and the variance of these series are constant through time and the autocovariance of the series is not time varying. However, the time series of the personal disposable income of US (LUSPDI) and the substitute price (LUSSP) are I(1) meaning that past shocks remaining undiluted affects the realizations of the series forever and either series has theoretically an infinite variance and a time-dependent mean. Hence, the unrestricted vector autoregression (VAR) of first differenced data is suited to generate this short-run tourism demand model.

International tourism flows are subject to disruption by a range of events that may occur in the destination itself, in competing destination, origin markets, or in areas may be remote from either. In addition, tourism demand is particularly sensitive to security and health concerns, and the industry is highly susceptible to changes in the international political situation, natural disasters, and epidemics.(Mao, Ding, & Lee, 2010) The hallmark event considered in this paper during the period 2001-2011 is the Severe Acute Respiratory Syndrome (SARS) epidemic as a exogenous dummy variable of external shock, D_SARS_t. Besides, given in above Section, we found the tourist arrival from US to Taiwan had strong seasonal patterns. Therefore, seasonal dummy variables $D_t(i)$ would be added to the VAR model as exogenous variables. The VAR model is performed as:

$$\Delta LUSTA_t = \alpha_1 + \sum_{i=1}^{m} \lambda_1(i)\Delta LUSTA_{t-i} + \sum_{i=1}^{m} \beta_1(i)\Delta LUSPDI_{t-i} + \sum_{i=1}^{m} \gamma_1(i)\Delta LUSCL_{t-i}$$

$$+ \sum_{i=1}^{m} \delta_1(i)\Delta LUSSP_{t-i} + \sum_{i=1}^{n} a_1(i)D_t(i) + b_1 D\_SARS_t + \varepsilon_{t1} \tag{2}$$

$$\Delta USPDI_t = \alpha_2 + \sum_{i=1}^{m} \lambda_2(i)\Delta LUSTA_{t-i} + \sum_{i=1}^{m} \beta_2(i)\Delta LUSPDI_{t-i} + \sum_{i=1}^{m} \gamma_2(i)\Delta LUSCL_{t-i}$$

$$+ \sum_{i=1}^{m} \delta_2(i)\Delta LUSSP_{t-i} + \sum_{i=1}^{n} a_2(i)D_t(i) + b_2 D\_SARS_t + \varepsilon_{t2} \tag{3}$$

$$\Delta LUSCL_t = \alpha_3 + \sum_{i=1}^{m} \lambda_3(i)\Delta LUSTA_{t-i} + \sum_{i=1}^{m} \beta_3(i)\Delta LUSPDI_{t-i} + \sum_{i=1}^{m} \gamma_3(i)\Delta LUSCL_{t-i}$$

$$+ \sum_{i=1}^{m} \delta_3(i)\Delta\text{LUSSP}_{\text{t-i}} + \sum_{i=1}^{n} a_3(i)\text{D}_{\text{t}}(i) + b_3\text{D\_SARS}_{\text{t}} + \varepsilon_{t3} \qquad (4)$$

$$\Delta\text{LUSSP}_{\text{t}} = \alpha_4 + \sum_{i=1}^{m} \lambda_4(i)\Delta\text{LUSTA}_{\text{t-i}} + \sum_{i=1}^{m} \beta_4(i)\Delta\text{LHKGDP}_{\text{t-i}} + \sum_{i=1}^{m} \gamma_4(i)\Delta\text{LHKCL}_{\text{t-i}}$$

$$+ \sum_{i=1}^{m} \delta_4(i)\Delta\text{LHKSP}_{\text{t-i}} + \sum_{i=1}^{n} a_4(i)\text{D}_{\text{t}}(i) + b_4\text{D\_SARS}_{\text{t}} + \varepsilon_{t4} \qquad (5)$$

Where the variables ΔLUSTA, ΔLUSPDI, ΔLUSCL, ΔLUSSP are tested to be stationary (Δ, the first-difference operator), α is a constant, and the residual ε is Gaussian white noise with zero mean and constant variance. $\lambda, \beta, \gamma, \delta$, a, and b are coefficients. D_SARS and D(i) are non-economic dummy variables, where D_SARS denotes to capture the influence of the one-off event of the SARS outbreak in April 2003. $\text{D}_{\text{t}}(i)$ represents seasonal dummy variables used to capture the influence of seasonality. The dummy variable D_SARS and $\text{D}_{\text{t}}(i)$ take the value of 1 during the corresponding quarter on the event date and 0 otherwise. m and n are the numbers of lags and seasons. The number of lags is determined by Akaike Information Crietria (AIC) and Likelihood Ratio (LR) test by which the optimal lag is 2 selected with the lowest value of AIC criteria and the rejection of the null hypothesis in LR at 1% significant level.

Generalized Impulse Response Analysis

An impulse response function measures the time profile of the effect of shocks at a given point on the expected future values of variables for a dynamic system. This study uses analysis of the generalized impulse response functions (Pesaran & Shin, 1998) to analyze the short-run dynamics of the variables. Unlike orthogonalized impulse response functions are unique solution and invariant to the ordering of the variables in VAR. The dynamic response of the change of the tourist arrivals (tourism demand) to innovations in the macroeconomic factors can be traced out by the generalized impulse response analysis. We could see the responses of the change of the tourist arrivals from US (△LUSTA) to the changes of the PDI of US (△LUSPDI), the cost of living (△LUSCL), and the substitute price (△LUSSP) as given in Figure 2, such that the tourism demand function takes the form

$$\triangle\text{LUSTA}_t = f(\triangle\text{LUSPDI}_t, \ \triangle\text{LUSCL}_t, \ \triangle\text{LUSSP}_t) \qquad (6)$$

Response to Generalized One S.D. Innovations ± 2 S.E.
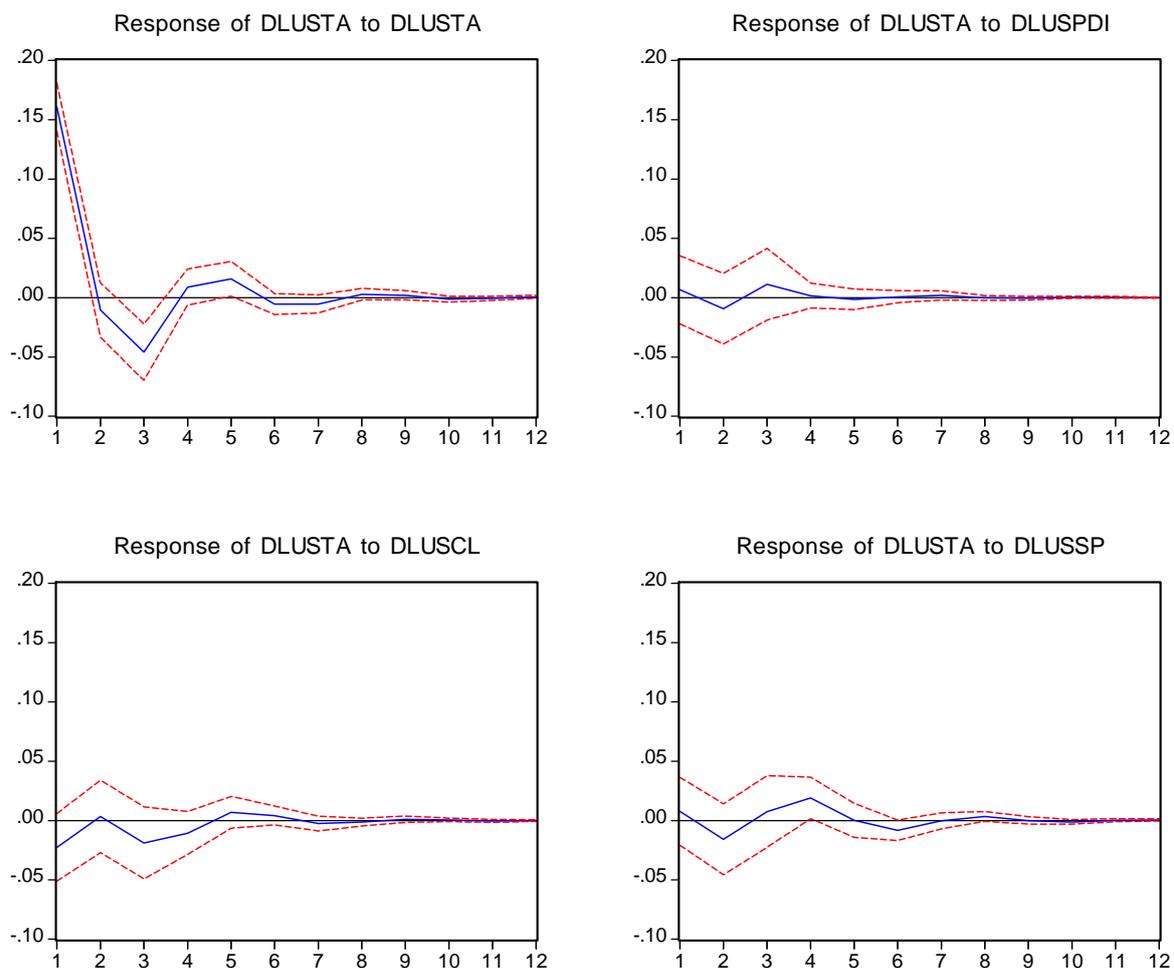
Note: DUSTA, DUSPDI, DUSCL, DUSSP mean △USTA, △USPDI, △USCL, △USSP, respectively.

FIGURE 2

Generalized Impulse Response for Short Run

Runkle (1987) proposed that reporting impulse response functions with standard errors or confidence intervals is equivalent to reporting regression coefficients with t-statistics. Doan & Litterman (1986) argued confidence bands around the mean response can be used for statistical inference. The response is said to be significant at the 95% confidence level when the upper and lower bands show the same sign. (Chen & Kim, 2010) The top-left panel of Figure 2 shows that a shock in the variable itself of the first-differenced tourist arrival from US (△LUSTA) will have a relatively larger impact on the current level of the change of tourist arrival and this impact will gradually die off and disappear after 8 periods (months). This response is clearly positive and significant due that the upper and lower bands exhibit the same sign. In top-right panel of Figure 2, the response of the change of tourist arrival

from US ($\triangle$LUSTA) to a shock in the change of PDI of US ($\triangle$LUSPDI) is positive at the beginning and oscillation immediately carries on within very small range until it disappears at about period 4, seeming not significant at 5% level. Even so, it is found that the overall positive effect is greater than the negative, which implies that the income elasticity of tourism demand is positive and this kind of tourism products belongs to normal goods for short run. The shock in the living cost change ($\triangle$LUSCL) as shown in the bottom-left has a negative impact on tourism demand initially and but the impact of the shock is rare small before dying off. It is obvious that the response is not significant and its negative effect exceeds its positive, being consistent with the basic law of demand for short run. However, the response of the tourism demand change for US ($\triangle$LUSTA) to the shock in the substitute price change ($\triangle$LUSSP) in the bottom-right of Figure 2 is immediately positive and significant, the influence of the shock tends to last about 7 periods, and, evidently, the positive effect part is greater than the negative. The outcome of $\triangle$LUSTA to $\triangle$LUSSP implies that the cross elasticity is greater than zero and, in other word, the tourism products of Taiwan and its opponent Hong Kong are substitute goods for short run.

CONCLUDING REMARKS

The tourism industry may be another major contributing factor to Taiwan's economic growth. The 2002 annual statistics of Tourism (Tourism Bureau of Taiwan, 2003) reported that Taiwan's tourism receipts accounted for 4.2 percent of the gross domestic product (GDP) in 1996. This figure exceeded the contribution of the agricultural sector to GDP, thereby making tourism as one of the major industries in Taiwan (Kim, Chen, & Jang, 2006). Besides, the Taiwan government has aggressively promoted inbound tourism over many years by a lot of policies such as "Tour Taiwan Years 2008-2009", "The Best Trip in the World - Taiwan Explorers Wanted" contest, "The multiplying project of international tourists", and so on. The tourism development not only increases nation income but also diversifies the range of industries, particularly, the industrial diversity can reduce the risk of export-oriented economy if economic recession occurs. Therefore, tourism has played a very important role for Taiwanese future.

Tourism demand analysis is absolutely regarded as a necessity of tourism policy makings. This empirical study is intended to understand how the important economic factors that include the PDI of US, the cost of living, and the substitute price affect the tourist arrivals from an individual origin country, US, by monthly data from 2001 to 2011 for short run. In this period, it is found that the responses of the changes of the tourist arrivals itself ($\triangle$LUSTA to $\triangle$LUSTA) and the tourist arrivals to the substitute price($\triangle$LUSTA to $\triangle$LUSSP) is significantly positive at 95% confident level. Hence, when a tourism-related business makes a policy with regard to US visitors for short-run adjustment, more attention must be

paid on US arrival variation due to the significant response of US arrival to itself. And policy makers must make more efforts on the survey of Taiwanese main competitor "Hong Kong" as well specially focused on its price index and exchange rate with Taiwan, by the significant response to substitute price. In addition, the result of the tourist arrival changes responding to PDI ($\triangle$LUSTA to LUSPDI) implies that the income elasticity of tourism demand is positive and this kind of tourism products belongs to normal goods, meaning the tourist arrival will increase if PDI rises up. The response to the shock in the change of cost of living ($\triangle$LUSCL) verifies the basic law of demand, and, that is to say, the tourist arrival will increase if price falls down. Finally, the outcome of the tourist arrivals to the substitute price ($\triangle$LUSTA to $\triangle$LUSSP) shows that the cross elasticity is greater than zero and, in other word, the tourism products of Taiwan and its opponent Hong Kong are substitute goods. Overall, the short-run equilibrium adjustment process is quite fast.

This study suggests that Taiwanese government and tourism industry must pay more attention to these macroeconomic factors for short-run analysis as making policy decisions especially for US tourists, and regard Hong Kong as a main competing destination for US tourists due that the response to the substitute price change calculated by Hong Kong's CPI is significantly positive. In the future, we hope to compare different important origin countries or regions such as Japan, Hong Kong, Korea, and Singapore to get more detailed information for tourism industry. In addition, Taiwan government have formally opened the gates to Mainland Chinese tourists since July 2008, which has contributed to the fact that Taiwanese inbound visitors in 2010 exceed five millions, so China will also be an important research target we must focus on.

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