Analysis of Causality between Tourism and Economic Growth Based on Computational Econometrics

WANG Liangju
School of Business Administration, Anhui University of Finance and Economics, Bengbu, Anhui, P. R. China
Email: acwlj@163.com

ZHANG Huihui
School of Accounting, Anhui University of Finance and Economics, Bengbu, Anhui, P. R. China
Email:justinwlj@sohu.com

LI Wanlian
School of Business Administration, Anhui University of Finance and Economics, Bengbu, Anhui, P. R. China
Email:justinwlj@163.com

***Abstract*—To investigate the causal relationship between China's domestic tourism and economic growth, this paper performs co-integration analysis and Granger causality test by making use of annual time series data from 1984 to 2009. Co-integration analysis indicates that there are long-term and stable equilibrium relationships between the development of China's domestic tourism and economic growth. The results from the ECM model indicate that there are short-term disequilibrium relationship between the development of China's domestic tourism and economic growth. An adjustment mechanism from short term to long term in the relationship between the development of China's domestic tourism and economic growth can be found in the ECM model. In addition, bidirectional Granger causality between China's domestic tourism and economic growth is demonstrated. The development of China's domestic tourism is the Granger cause of economic growth, China's economic growth is the Granger cause of development of domestic tourism as well. Our findings imply that China may enhance its economic growth by strategically strengthening the tourism industry while not neglecting the other sectors which also promote growth.**

***Index Terms*—economic growth, domestic tourism, co-integration analysis, error correction model, Granger causality test**

I. INTRODUCTION

Tourism is one of the largest and rapid growing sectors in the world. The role of tourism to the economic growth and to the progress of modern societies has become a common awareness in political authorities worldwide. The fact that tourism is an economic activity of primary value and importance for many countries is an accepted fact by most of all. Tourism industry mainly consists of such factors as traveling, sightseeing, accommodation, food, shopping and entertainment. It is an industry with strong comprehensiveness, high industrial relevance and large pull function. Tourism consumption directly stimulates the development of such traditional industries as civil aviation, railway, highway, commerce, food and accommodation. In addition, tourism can also promote the development of such modern service industries as international finance, logistics, information consultation, cultural originality, movie production, entertainment, conferences and exhibitions, and so on. A general consensus has emerged that it not only increases foreign exchange income, but also creates employment opportunities, stimulates the growth of the tourism industry and by virtue of this, triggers overall economic growth. As such, tourism development has become an important target for most governments. The development of tourism industry will contribute to a country's economic growth. [1]. It is now considered as an efficient tool for promoting economic growth of the host country.

Domestic tourism industry is one of the largest in China's three tourism markets. China's domestic tourism industry started from reforming and opening, and has grown rapidly since the 1990s. China's domestic tourist arrivals (DTA) increase to 2.1 billion person times in 2010 from 200 million person times in 1984 with an average annual increasing rate at 9.47 per cent. Meanwhile, China keeps a long-term, rapid and stable growth of economy since reforming and opening. China's Gross Domestic Product (GDP) increases to 40.12 trillion Yuan in 2010 from 720.8 billion Yuan in 1984 with an average annual increasing rate at 9.86 per cent (we have eliminated the effect of inflation by consumption prices). From data above, we can find out by intuition that China's domestic tourism seems to have a same trend of growth with China's economy. There seems to have a high positive correlation between the development of China's domestic tourism and economic growth. To tell

doi:10.4304/jcp.7.9.2152-2159

the true story, it is necessary to perform empirical analysis on the relationship between the development of China's domestic tourism and economic growth.

TABLE I.
DOMESTIC TOURIST ARRIVALS AND GROSS DOMESTIC PRODUCT

Year	DTA(bill)	Real GDP(constant 1978 CNY trill)
1984	0.200	0.601
1987	0.290	0.805
1990	0.280	0.863
1993	0.410	1.294
1996	0.639	1.656
1999	0.719	2.075
2002	0.878	2.776
2005	1.212	3.946
2008	1.712	5.752
2010	2.100	6.935

Source: National Bureau of Statistics of China and National Bureau of Tourism of China. Real GDP in 2010 is preliminary.

The remainder of this paper is organized as follows. In The next section reviews some recent literatures on the tourism-growth. Section 3 discusses the methodology used in this paper. Section 4 explains variables and the data, and presents the empirical results. Section 5 provides a concluding summary and discussion.

II. LITERATURE REVIEW

In recent years, the role of tourism in the economic development of a country has been the focus of studies. There is an increasing and widely accepted belief that tourism can play a fundamental role for developing countries to achieve economic growth and development. This hypothesis is strongly supported by some international organizations such as World Tourism Organization (WTO) and World Travel and Tourism Council (WTTC).

The development of tourism has usually been considered a positive contribution to economic growth. Balaguer and Manuel (2002) examine the role of tourism in the Spanish long-run economic development. The tourist-led growth hypothesis is tested. The results indicate that, at least, during the last three decades economic growth in Spain has been sensible to persistent expansion of international tourism. The increase of this activity has produced multiplier effects over time. External competitively has also been proved in the model to be a fundamental variable for Spanish economic growth in the long run [2]. Dritsakis (2004) examines empirically the tourism impact on the long-run economic growth of Greece by using the causality analysis among real GDP, real effective exchange rate and international tourism earnings. A multivariate autoregressive VAR model is applied for the examined period 1960: I – 2000: IV. Their results of co-integration analysis suggest that there is one co-integrated vector among real GDP, real effective exchange rate and international tourism earnings. Granger causality tests based on error correction models (ECM), have indicated that there is a "strong Granger causal" relation between international tourism earnings and economic growth, there is a "strong causal" relation between real exchange rate and economic growth, while the relation between economic growth and international tourism earnings is simply a "causal relation" and lastly the relation between real exchange rate and international tourism earnings is simply a "causal relation" as well [3]. Brida and Risso (2009) investigate possible causal relationships among tourism expenditure, real exchange rate and economic growth using quarterly data from 1986 to 2007. The results indicate that economic growth in Chile has been sensible to the expansion of international tourism during the last decades. The increase of this activity has produced multiplier effects over time. The empirical results support a tourism-led economic growth [4]. Brida, Barquet and Risso (2010) investigate the causal relations between tourism growth, relative prices and economic expansion for the Trentino-Alto Adige, a region of northeast Italy bordering on Switzerland and Austria. Johansen co-integration analysis shows the existence of one co-integrated vector among real GDP, tourism and relative prices where the corresponding elasticities are positive. Tourism and relative prices are weakly exogenous to real GDP. A variation of the Granger Causality test developed by Toda and Yamamoto is performed to reveal the unidirectional causality from tourism to real GDP. Impulse response analysis shows that a shock in tourism expenditure produces a fast positive effect on growth [5]. Kreishan (2010) examines the causality relations between tourism earnings and economic growth (GDP) for Jordan, using annual data covering the period 1970-2009. Developed time-series techniques are used namely, Augmented Dickey-Fuller (ADF) for unit root, Johanson and Juselius (JJ) for co-integration and Granger causality test for causal relationships. The findings of the study show that there is a positive relationship between tourism development and economic development in the long-run. Moreover, the Granger causality test results reveal the presence of unidirectional causality from tourism earnings to economic growth. The results of this study suggest that government should focus on economic policies to promote international tourism as a potential source of economic growth in Jordan [6]. These analyses above are conducted on a single country basis.

Some other studies focus on the contribution of tourism to the economic growth on several countries and regions. Fayissa, Nsiah and Tadasse (2007) use a panel data of 42 African countries for the years that span from 1995 to 2004 to explore the potential contribution of tourism to economic growth and development within the conventional neoclassical framework. Their results show that receipts from the tourism industry significantly contribute both to the current level of GDP and the economic growth of Sub-Saharan African countries as do investments in physical and human capital [7]. Lee and Chang (2008) apply the new heterogeneous panel co-integration technique to reinvestigate the long-run comovements and causal relationships between tourism

development and economic growth for OECD and nonOECD countries (including those in Asia, Latin America and Sub-Sahara Africa) for the 1990–2002 period. On the global scale, after allowing for the heterogeneous country effect, a co-integrated relationship between GDP and tourism development is substantiated. It is also determined that tourism development has a greater impact on GDP in non-OECD countries than in OECD countries, and when the variable is tourism receipts, the greatest impact is in Sub-Sahara African countries. Additionally, the real effective exchange rate has significant effects on economic growth. Finally, in the long run, the panel causality test shows unidirectional causality relationships from tourism development to economic growth in OECD countries, bidirectional relationships in non-OECD countries, but only weak relationships in Asia [8]. Fayissa, Nsiah and Tadasse (2009) further use a panel data of 17 Latin American countries (LACs) for the years that span from 1995 to 2004 to investigate the impact of the tourism industry on the economic growth and development Latin American countries within the framework of the conventional neoclassical growth model. Their empirical results show that revenues from the tourism industry positively contribute to both the current level of GDP and the economic growth of LACs as do investments in physical and human capital [9].

With the rapid development of China's tourism industry, there are several studies examine the relationship between tourism and economic growth by using China's data. Wu (2003) find that the development of tourism industry has largely promoted China's economic growth [10]. Yang (2006) finds that domestic tourism has little pulling effects on economic growth, but economic growth had significant driving effects on domestic tourism [11]. Both studies directly take regression analysis on non-stationary variables such as domestic tourism income, inbound tourism income and GDP, thus spurious regression may occur.

Chen, Liu and Xu (2006) take a Granger causality test on the relationship between the development of China's tourism industry and economic growth based on the annual time series data from 1985 to 2003.Their study indicate that the development of China's tourism industry has significantly promoting effects on China's economic growth, but China's economic growth has little promoting effects on the development of China's tourism industry [12]. Making use of the data on China's domestic tourism revenue, inbound tourism revenue and GDP from 1985 to 2005, Liu and Wu (2007) find that there are long-term and stable co-integration relationship among domestic tourism, economic growth and inbound tourism. Moreover, they find that there are Granger causalities from economic growth to domestic tourism and inbound tourism [13]. Based on the data of China's inbound revenue per capital, domestic revenue per capital and GDP per capital from 1978 to 2007, Wu, Xie and Quan (2009) investigate the causal relations between tourism growth and economic expansion for China's economy by using Johansen Co-integration test approach and Granger causality test. They conclude that there is a long-term equilibrium between domestic tourism growth and economic expansion. Also, they find out there is not causal relationship between international tourism growth and economic expansion at the national level [14]. China has implemented sampling survey on domestic tourism since 1993. Therefore, the data of domestic tourism revenue after 1993 is incomparable with the data before 1993. In addition, the statistical method on international tourism revenue has changed with the reform in China's foreign exchange management system, and the data of international tourism revenue is also incomparable with previous year. Taking into account that the quality of the sample data has serious defects in these studies above, conclusions drawn from these studies may be wrong.

Some researchers have taken note of that the data of the revenue of China's domestic tourism before 1993 can not compare with the data after 1993. Based on the co-integration theory, Zhang and Liu (2009) analyze the relationship between tourism consumption of residents and economic growth by using of the annual time series data during period from 1994 to 2006. They draw some conclusions as follows: the tourism consumption of urban residents has the co-integration relationship with GDP as well as the added value of the third industry [15]. Based on the data from 1993 to 2007, Liu and Hao (2009) examine whether there are co-integration between domestic tourism, inbound tourism and economic growth in China. The results indicate that both domestic tourism and inbound tourism have co-integration relationship with economic growth [16]. Making use of the data from 1993 to 2009, Zhao and Quan (2011) examine the correlativity between China's domestic tourism consumption and economic growth by a VAR econometric model. They find out that there is a long-term equilibrium relationship between domestic tourism consumption and economic growth through co-integration test, Granger causality test, impulse responses, and variance decomposition. But in short term, the role of domestic tourism consumption enforcing economic growth is less than it of economic growth enforcing domestic tourism consumption. Furthermore, in long term, the role of domestic tourism consumption enforcing economic growth is greater than it of economic growth enforcing domestic tourism consumption. Finally, their paper gives a series of suggestion on the inter-reaction between domestic tourism consumption and economic growth [17]. However, results drawn from these studies are all unreliable due to the sample size being very small.

On the whole, empirical studies on the relationship between tourism revenue and economic growth or more specifically the tourism-led growth hypothesis have been extensively research. Most studies indicate that there is co-integration relationship between tourism and economic growth. However, the direction of the causality remains as yet an unsolved conundrum. Knowing the direction of causality is not just for understanding the process, but it is also vital for designing of appropriate policy. Therefore, examine the validity of tourism-led

growth hypothesis or vice versa has become a pivotal issue for economists as well as the policymakers.

In this paper, we employ the annual time series data on China's economic growth and China's domestic tourist arrivals rather than domestic tourism revenue during period from 1984 to 2009, and examine wether there is long term equilibrium relationship (namely co-integration relationship) between the development of China's domestic tourism and China's economic growth based on co-integration theory. In addition, this paper constructs an error correction model to analysis the short term disequilibrium relationship between the development of China's domestic tourism and economic growth. Finally, we examine whether there is causality between them by performing Granger cause test.

III. METHODOLOGY

Classical regression analysis is based on the hypothesis that the time series data is stationary. However, much time series data is non-stationary. Because the nonstationary time series don't have limited variance and it can't accord with Gauss-Markov Theorem, the Ordinary Least-Squares (OLS) Estimators are inconsistent and then the spurious regression phenomenon may occur [18], thus the incorrect causality can be drawn [19].

Co-integration theory in dynamic econometrics analysis can overcame the deficiency of method mentioned above and deal with nonstationary time series effectively. The general step of co-integration analysis is as following: The first step, we perform a unit root test developed by Dickey and Fuller (1979, 1981) to investigate the stationarity of series whether they are stationary [20, 21]. If they are non-stationary, we should introduce co-integration theory to analysis the relationship between them. On the basis of co-integration test, we employ Granger causality test to examine whether there is causal relationship between these variables. Granger (1988) argues that there is a one-way Granger cause at least if these variables are co-integration [19].

For time series x_t, establish the following model:

$$x_t = \gamma x_{t-1} + \varepsilon_t \quad \text{or} \quad \Delta x_t = \delta x_{t-1} + \varepsilon_t . \quad (1)$$

where Δ denotes the first difference operator and t denotes time period. The residuals ε_t are assumed to be normally distributed, serially uncorrelated, and white noise. δ is defined as $\delta = \gamma - 1$. If δ equals to zero, x_t is nonstationary. That is to say there is a unit root. Construct t statistic

$$t_\delta = \hat{\delta} / s(\hat{\delta}) . \quad (2)$$

which has a *DF* (Dickey-Fuller) distribution. Through estimating model (1), we can arrive at the value of t_δ. If the absolute value of t_δ is larger than the absolute value of critical value at a given significant level, then the hypothesis that the time series is nonstationary will be rejected. This is *DF* test (Dickey-Fuller test), also called unit root test.

Because we can not ensure that ε_t is white noise in *DF* test, the estimated value of δ may be biased. Dickey and Fuller augmented *DF* test in 1979 and 1980, and form augmented *DF* test, namely *ADF* test [22]. *ADF* test and *DF* test have same principle. The general form of *ADF* test is as following:

$$\Delta x_t = a + \beta t + \delta x_{t-1} + \sum_{i=1}^{p} \lambda_i \Delta x_{t-i} + \varepsilon_t . \quad (3)$$

Supposing that a series is nonstationary but its first-order difference is stationary, then we call this series first-order integration, denoted by $I(1)$. If a series is stationary after d-order difference, then the series can be called d-order integration, denoted by $I(d)$.

Supposing that series x_t and y_t are both d-order integration series, if there is a vector $a = (a_1, a_2)$ makes $z_t = a_1 y_t + a_2 x_t$ be $(d-b)$ *-order* integration, that is to say $z_t \sim I(d-b)$, where $d \geq b \geq 0$. Then series x_t and y_t can be called (d,b) co-integration, denoted by $x_t, y_t \sim CI(d,b)$, a is the co-integration vector. Two variables can be co-integration on condition that they are both integration with same order.

If series x_t and y_t are all nonstationary, but they are all d-order integration, then we can judge whether x_t and y_t are co-integration through examining whether the residual μ_t in model (4) is stationary. If μ_t is stationary, then we can consider whether there is a co-integration relationship between x_t and y_t :

$$y_t = b_0 + b_1 x_t + \mu_t . \quad (4)$$

The meaning of co-integration analysis is that it can examine whether there is a long-term equilibrium relationship between variables. If two variables are co-integration, they will not separate far from each other in long term. An impulse can merely give rise them to be apart from each other in short term. In long term, they will resume equilibrium automatically. Engel-Granger two-step test (1987) can be used to verify whether variables are co-integration [23].

Co-integration test can examine whether there is a long-term equilibrium relationship between variables. However, it can not reveal whether there is causality between them. The existence of co-integration implies the existence of Granger causality at least in one direction (Granger, 1988). Granger causality test provides a good method to deal with such problem. We can consider that variable *X* is variable *Y*'s Granger cause if the lagged term of *X* included can significantly improve the accuracy

of the predicted variable *Y*. Construct the following model:

$$y_t = a + \sum_{i=1}^{m} \alpha_i x_{t-i} + \sum_{j=1}^{n} \beta_i y_{t-j} + u_t . \quad (5)$$

where u_t denotes random error which represents omitted factors left out by the deterministic part of the model; α , β are coefficient. Null hypothesis that $H_0 : \alpha_1 = \alpha_2 = \ldots = \alpha_j = 0 \left(j = 1, 2 \ldots, n \right)$ means that X is not Y's Granger cause. If we can not refuse the null hypothesis, then

$$y_t = a + \sum_{j=1}^{n} \beta_i y_{t-j} + u_t . \quad (6)$$

Let *RSS*1 and *RSS2* denote residual sum of squares in model (5) and model (6). Thus, the ratio

$$F = \frac{(RSS\,2 - RSS\,1)/n}{\mathrm{RSS}\,1/(T - m - n - 1)} \quad (7)$$

has an *F* distribution with n and $T - m - n - 1$ degrees of freedom. Where *T* denotes sample size; *m, n* is the lagged length of *Y* and *X*, they are both determined on the rule of *AIC* (Akaike Information Criterion) or *SC* (Schwarz Criterion).

IV. Empirical Results

A. Variables Definition and Data Specification

In this study, we employ the following two indexes to measure the development of China's domestic tourism industry and China's economic growth. (1) The sign *GDP* denotes China's GDP (the unit is 100 billion Yuan), which is used for reflecting the aggregate macro-economy, and its change reflects economic growth. The data of China's GDP is adjusted by constant prices (1978=100) to eliminate the effect of inflation. (2) The sign *DTA* denotes China's domestic tourist arrivals (the unit is 100 million person times), which is considered as a proxy variable of the development of China's domestic tourism. Because the logarithmic transformation does not influence the co-integration relationship between the variables, China's GDP and domestic tourism arrivals are both transformed into natural logarithm form to avoid the obvious problems of heteroscedasticity. The signs *lnGDP* and *lnDTA* respectively denote China's GDP and domestic tourist arrivals after the transformation of natural logarithm.

Because the data of China's domestic tourist arrivals before 1984 is unavailable, this paper covers the sample period from 1984 to 2009. The dataset are collected from The Yearbook of China Statistics and The Yearbook of China Tourism Statistics. The results of descriptive statistical analysis on *lnGDP* and *lnDTA* are reported in tab.2.

The scatter diagram (fig.1) of *lnGDP* and *lnDTA* describe directly the relationship between China's domestic tourism and economic growth. We can find out that both domestic tourist arrivals and GDP has been increasing since 1984 with an exception of 1989. It seems that China's domestic tourism and economic growth keep an appropriately same trend of evolution on the whole. However, further study is necessary to examine whether there is a long-term and stable equilibrium relationship (or co-integration relationship) between the development of China's domestic tourism and China's economic growth.

TABLE II.
DESCRIPTIVE STATISTICS OF VARIABLES

Variable	Obs	Mean	Std. Dev.	Min	Max
GDP	7.276	4.915	2.000	19.020	7.276
DTA	22.696	16.623	6.009	62.815	22.696

B. Unit Root Test

The co-integration relationship between variables is based on that they have same orders of integration. So, we firstly test the stationary of the two series of *lnGDP* and *lnDTA* by unit root test. This paper tests the stationarity of *lnGDP* and *lnDTA* as well as their orders of integration by *ADF* (Augment Dickey-Fuller) test. The lagged order is determined on the rule of *AIC*. This paper employs GPE2 package to perform *ADF* test on the two series of *lnGDP* and *lnDTA* (the results of *ADF* test are reported in tab.3).

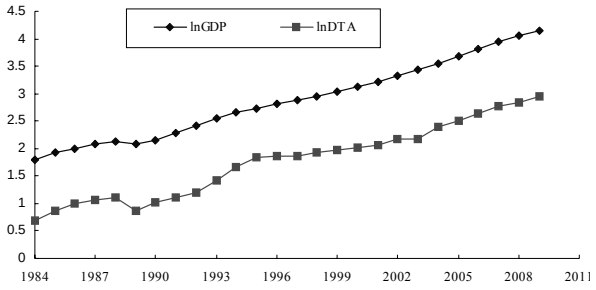

Figure 1.Evolution trend of *lnGDP* and *lnDTA*

The results from unit root test show that *lnGDP* and *lnDTA* are both non-stationary because both *ADF* value exceed the critical value at the significant level of 10 percent. Moreover, each *ADF* value of their first-order difference is less than the critical value at the significant level of 5 percent, which shows that their first-order difference are both stationary, that is to say that *lnGDP* and *lnDTA* are both first-order integration, namely *lnGDP* and *lnDTA* $\sim I(1)$. Thus, we can perform co-integration analysis on the relationship between China's domestic tourism and economic growth.

C. Co-integration Test

The results from unit root test indicate that *lnGDP* and *lnDTA* are both first-order integration series. Then, we will examine whether there is a co-integration relationship between China's domestic tourism and economic growth. We employ the method of *Engel-Granger* two-step test to examine whether there is

TABLE III.
RESULTS OF UNIT UOOT TEST ON VARIABLES (ADF TEST)

Variable	test type (*c, t, p*)	*ADF* value	critical value		
			1%	5%	10%
lnGDp	(c,t,1)	3.074	4.394	3.612	3.243
lnDTA	(c,t,1)	2.501	4.394	3.612	3.243
△*lnGDp*	(c,0,1)	3.009	3.753	2.998	2.639
△*lnDTA*	(c,0,0)	4.289	3.738	2.992	2.636

Note: (1) test type (c, t, p) , where *c* denotes drift term, *t* denotes time trend, *p* denotes lag length ;(2) △ denotes the first difference operator.

a co-integration relationship between *lnGDP* and *lnDTA* [18].

The first step, performing OLS regression on *lnGDP* and *lnDTA*, we have

$$\ln GDP_t = 7.945 + 1.041 \ln DTA_t. \qquad (8)$$

$$(153.626) \quad (38.021)$$

$$R^2 = 0.984 \qquad DW = 0.726$$

DW=0.726 indicates that there is first-order autocorrelation in model (8). By introducing lagged terms into model (8), we will obtain a dynamic distributed lag model (model 9).

$$\ln GDP_t = -0.455 + 0.244 \ln DTA_t - 0.295 \ln DTA_{t-1} + 1.063 \ln GDP_{t-1}. \quad (9)$$

$$(-0.768) \ (3.390) \qquad (-3.965) \qquad (14.194)$$

$$R^2 = 0.998 \quad DW = 1.567 \quad SSE = 0.029$$

$$LM_1 = 0.752 \quad LM_2 = 5.972 \quad ARCH_1 = 1.723$$

The results from LM test on serial correlation show that there is no autocorrelation in model (9). The results of *ARCH* test indicate that there is no heteroscedasticity. Thus, Model (9) can be considered to be the long-term and stable equilibrium relationship (co-integraton relationship) between China's domestic tourism and economic growth.

The second step, we will perform unit root test on residual series $\hat{e}_t$ in model (9) to test whether $\hat{e}_t$ is stationary. The results are reported in tab.4.

The *ADF* value is less than the critical value at the significant level of one percent, as shows the hypothesis that $\hat{e}_t$ is a stationary series can not be rejected. Therefore, we can consider that the residual series $\hat{e}_t$ in model (9) is a stationary series, that is to say $\hat{e}_t \sim I(0)$. Furthermore, the hypothesis that *lnGDP* and *lnDTA* are co-integration can not be rejected. That is to say, *lnGDP* and *lnDTA* are $(1,1)$ co-integration. Model (9) is really the long-term and stable equilibrium relationship between China's domestic tourism and economic growth. The long-term elasticity of *lnGDP* changing to *lnDTA* is 0.810 (this value is arrived at through calculating the expression of $[(0.244-0.295)/(1-1.063)]$), which indicates China's GDP will increase 0.810 percent if China's domestic tourist arrivals increase one percent in the long term.

D. Error Correction Model

Error correction model (*ECM*) is an econometric model with specific form. The general form of *ECM* model is put forward by Davidson, Hendry, Srba and Yeo in 1978, and which can be called *DHSY* model [23]. If two variables are co-integration, the short-term disequilibrium relationship between them can be represented with an *ECM* model (Engle & Granger, 1987). Employing OLS method, we can obtain the following

TABLE IV.
RESULTS OF UNIT ROOT TEST ON RESIDUAL SERIES (*ADF* TEST)

Variable	Test type(*c, t, p)*	*ADF* value	Critical value at 1 percent level
$\hat{e}_t$	(0,0,0)	-4.029	-2.665

ECM model (10) to examine the short-term disequilibrium relationship between China's domestic tourism and economic growth.

$$\ln GDP_t = 0.229 \Delta \ln DTA_t - 0.280 \Delta \ln DTA_{t-1} + 1.500 \Delta \ln GDP_{t-1}$$
$$(4.289) \qquad (-3.767) \qquad (7.754)$$
$$-0.436 \Delta \ln GDP_{t-2} - 1.025 ecm_{t-1}. \quad (10)$$
$$(-3.138) \qquad (-4.313)$$
$$R^2 = 0.737 \quad DW = 1.969 \qquad SSE = 0.023$$
$$LM_1 = 0.540 \qquad ARCH_1 = 0.163$$

where ecm_t (error correction term) can be represented by the formula:

$$ecm_t = \ln GDP_t - 0.244 \ln DTA_t + 0.295 \ln DTA_{t-1} - 1.063 \ln GDP_{t-1} + 0.455. \qquad (11)$$

The relevent statistics indicate that the error correction model can pass significant test. The *ECM* model reveals how the equilibrium error impacts GDP in the short-term. The coefficient of the *ecm* term equals -1.025 (less than zero), which is in accordence with the reverse correction mechanism. The short-term elasticity of *lnY* changing to *lnR* equals to 0.229, which indicates China's GDP will increase 0.229 percent if China's domestic tourist arrivals increase one percent in the short-term.

E. Granger Causality Test

The results from co-integration test show that there is a long-term and stable equilibrium relationship between China's domestic tourism and economic growth. The existence of long-term relationships between China's domestic tourism development and economic growth signifies that both variables are causally related at least in one direction. However, does China's domestic tourism development result in economic growth or vice versa? Then, we test whether there is a causality between China's domestic tourism and economic growth based on the method of Granger causality test (the results of this test are reported in tab.5).

TABLE V.
RESULTS OF GRANGER CAUSALITY TEST

Lags	Null Hypothesis	F-Statistic	Probability
1	*lnDTA* does not Granger Cause *lnGDP*	5.206	0.033
	lnGDP does not Granger Cause *lnDTA*	7.942	0.010

The null hypothesis that *lnDTA* does not Granger Cause *lnGDP* can be rejected at 5 percent significant level. The null hypothesis that *lnGDP* does not Granger Cause *lnDTA* can be rejected at 1 percent significant level. These results indicate that there is a bidirectioanl Granger causality between the development of China's domestic tourism and economic growth. The development of China's domestic tourism is the Granger cause of economic growth. Meanwhile, China's economic growth is also the Granger cause of the development of China's domestic tourism. That is to say, the development of China's domestic tourism can pull China's economic growth and China's economic growth can promote the development of China's domestic tourism.

V. CONCLUDING REMARKS

The main object of this study is to investigate the real relationships between China's domestic tourism and economic growth. This paper arrives at following three conclusions by employing co-integration theory and Granger causality test. First of all, we find out that there is a long-term and stable equilibrium relationship (co-integration relationship) between the development of China's domestic tourism and economic growth. China's GDP will increase 0.810 percent if China's domestic tourist arrivals increase one percent in long term. Secondly, there is a short-term disequilibrium relationship between the development of China's domestic tourism and economic growth. China's GDP will increase 0.229 percent if China's domestic tourist arrivals increase one percent in short term. From the *ECM* model, we can find out that there is an adjustment mechanism from short term to long term in the relationship between the development of China's domestic tourism and economic growth. Thirdly, there is a bidirectional Granger causality between the development of China's domestic tourism and economic growth. The development of China's domestic tourism has significantly contributed to China's economic growth. Meanwhile, China's economic growth has evidently promoted the development of China's domestic tourism.

Policy implication which may be drawn from this study is that China can improve its economic growth performance, not only by investing on the traditional sources of growth such as investment in physical and human capital and trade, but also by strategically harnessing the contribution the tourism industry and improving their governance performance.

Over the past decades of years, many developing and developed countries have considered tourism as an option for sustainable development of their nations. Tourism has emerged from being a relatively small-scale activity into one of the largest industries in the world and a fastest growing global economic sector of the world's economy from the 1960s onwards. The importance of tourism as a contributor to economic growth is so widely accepted that year after year throughout the world a massive investment continues to pour in its development.

At present, China's domestic tourism market has become the largest in the world. China's domestic tourism has been entering a popular stage. Total revenue of China's tourism industry is about 1.57 trillion Yuan in 2010. Thereinto, the revenue from domestic tourism industry is 1.26 trillion Yuan and accounts for 80.25% of the total revenue of China's tourism industry. The development of China's domestic tourism industry can increase China's domestic demand, promote the development of related industries, drive the adjustment of industrial structure, and promote the transformation of economic growth mode. China's tourism industry has played an important role in maintaining a long-term China's economic growth from reforming and opening, expanding China's domestic demand and adjusting China's industrial structure since the international financial crisis.

The prosperity of China's domestic tourism industry has laid a stable groundwork for China's tourism industry being a growth point in China's economy. As well as, the sustaining and stable growth of China's economy can provide a large amount of capital for tourism infrastructure construction in favor of the development of China's domestic tourism. With the continuous, rapid and stable development of China's economy, income of resident rising steadily, leisure time of resident increasing step by step, popular and diversifying demand for tourism products provide a favorable opportunity to the development of China's domestic tourism industry. The sustaining and healthy development of China's economy will keep on driving the development of China's domestic tourism industry.

ACKNOWLEDGMENT

This work was supported in part by sustentation fund to youth college teachers in Anhui province, P.R.China (Grant No.2008jqw059zd). We would like to acknowledge Zhou Mo and Wang Yongpei (they are both economic PhD. candidate of Renming University of China, Beijing, P.R.China) for helpful remarks and suggestions on the original edition of this paper. We also thank the editors and anonymous referees of this journal for constructive comments on the manuscript. Errors and omissions, if any, are strictly our own.

REFERENCES

[1] C-O Oh, "The Contribution of tourism development to economic growth in the Korean economy", *Tourism Management*, vol. 26, No. 1, pp. 39-44, February 2005.
[2] J. Balaguer and C-J. Manuel, "Tourism as a long-run economic growth factor: the Spanish case", *Applied Economics*, vol. 34, No. 7, pp. 877-884, May 2002.
[3] N. Dritsakis, "Tourism as a Long-run Economic Growth Factor: An Empirical Investigation for Greece," *Tourism Economics*, vol. 10, No. 3, pp. 305-316, September 2004.

[4] J. G. Brida and W. A. Risso, "Tourism as a factor of long-run economic growth: an empirical analysis for Chile", *European Journal of Tourism Research*, vol. 2, No. 2, pp.178-185, October 2009.
[5] J. G. Brida, A. Barquet, and W. A. Risso, "Causality between economic growth and tourism expansion: empirical evidence from Trentino-Alto Adige", *An International Multidisciplinary Journal of Tourism*, vol. 5, No. 2, pp. 87-98, Autumn 2010.
[6] F. M. M. Kreishan, "Tourism and economic growth: The case of Jordan", *European Journal of Social. Sciences*, vol. 15, No. 2, pp. 229-234, August, 2010.
[7] B. Fayissa, C. Nsiah, and B. Tadasse, "The impact of tourism on economic growth and development in Africa", Middle Tennessee State University, Department of Economics and Finance, Working Papers, No. 200716, 2007.
[8] C-C. Lee and C-P. Chang, "Tourism development and economic growth: a closer look at panels", *Tourism Management*. Vol. 29, No. 1, pp. 180-192, February 2008.
[9] B. Fayissa, C. Nsiah, and B. Tadasse, "Tourism and Economic Growth in Latin American Countries (LAC): Further Empirical Evidence", Middle Tennessee State University, Department of Economics and Finance, Working Papers, No. 200716, 2009.
[10] Guoxin Wu, "Analysis of coherency between tourism development and economic growth in China", *Journal of Shanghai Institute of Technology*, vol. 3, No. 4, pp. 238-241, December 2003.
[11] Zhiyong Yang, "An Empirical analysis on the interaction effect between tourism consume and economic growth", *Journal of Inner Mongolia Finance and Economics College*, vol. 4, No. 2, pp. 27-30, April 2006.
[12] Youlong Chen, Peilin Liu and Chaojun Xu, "Research on causality between development of tourism and economic growth in China", *Journal of Hengyang Normal University*, vol. 27, No.1, pp. 93-97, February 2006.
[13] Siwei Liu and Zhongcai Wu, "An Empirical Study on Tourism and Economic Growth of China", *Systems Engineering*, vol. 25, No. 9, pp. 60-64, September 2007.
[14] Chunyou Wu, F.Y. Xie and Hua Quan, "Contribution of tourism development to China's economic growth", *Science-Technology and Management*, vol. 11, No. 6, pp. 8-10, November 2009.
[15] Lifeng Zhang and Binde Liu, "Analysis on influence of tourism consumption on economic growth in China", *Technology Economics*, vol. 28, No. 5, pp. 81-85, May 2009.
[16] Yinhui Liu, Suo Hao, "Comparative analysis on the effect of domestic tourism and inbound tourism on economic growth in China", Statistics *and Decision*, vol. 25, No. 14, pp. 120-122, July 2009.
[17] Lei Zhao and Hua Quan, "An Empirical study on relation between domestic tourism consumption and economic growth in China", *On Economic Problems*, vol. 33, No. 4, pp. 32-38, April 2011.
[18] C. W. J. Granger and P. Newbold, "Spurious regressions in econometrics", *Journal of Econometrics*, Vol. 2, No.2, pp. 111-120, July 1974.
[19] Jingshui Sun, *The Tutorial to Econometrics* (2nd Edition). Beijing, China: Tsinghua University Press, 2009.
[20] D. A. Dickey and W. A. Fuller, "Distribution of the estimators for autoregressive time series with a unit root", *Journal of the American Statistical Association*, vol. 74, No. 366, pp. 427-431, June 1979.
[21] D. A. Dickey and W. A. Fuller, "Likelihood ratio statistics for autoregressive time series with a unit root", *Econometrica*, vol. 49, No. 4, pp.1057-1072, June 1981.
[22] Hayashi Fumio, *Econometrics*. Shanghai, China: Shanghai University of Finance and economics Press, 2005.
[23] Tiemei Gao. *Methods of Econometric Analysis and Consturcting Mode*l (2nd Edition). Beijing, China: Tsinghua University Press, 2009.

Wang Liangju is an economic PhD. Candidate of Renming University of China, Beijing, P. R. China. He earned Master's degree of management in Anhui University of Finance and Economics, Bengbu, P.R.China in January 2005. His main field of study is market theory and industry policy, the effect of tourism on economy and New Empirical Industrial Organization (NEIO).

He works in School of Business Administration, Anhui University of Finance and Economics, P.R.China as a lecture from November 2006. He instructs courses such as tourism planning and developing, service management and tourism marketing planning. Currently, his research interest is agglomeration economy and economic growth, the effect of tourism on economy.

Zhang Huihui earned Bachelor's degree of management in Anhui University of Finance and Economics, Bengbu, P.R.China in June 2004. Her field of study is the theory and practice of accounting.

Now, she is a graduate student in School of Accounting, Anhui University of Finance and Economics, P.R.China majoring in accounting. Her research interest is empirical accounting.

Li Wanlian earned Doctor's degree of ecology in East China Normal University, Shanghai, and P.R.China in June 2005. Her field of study is tourism economic effect.

She works in School of Business Administration, Anhui University of Finance and Economics, P.R.China as an associate professor from September 2008. She is a tutor for graduate of tourism management. She instructs courses of tourism planning and developing and tourism psychology. Currently, her research interest is the effect of tourism on economy and the behavior of tourism customer.