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MODELING TOURISM EMPLOYMENT GROWTH – AN APPLICATION IN MAINLAND CHINA

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ABSTRACT

This paper constructed a tourism employment model built on classical labor economic model (Pissarides, 1990). The model revealed that the tourism employment does not always increase accordingly with the growth of tourism economy. To test the propositions, an empiric test using a 17-year time series data was performed through a VAR model. The results indicated that tourism employment in China was mainly driven by the development of tourism-related industries. The result also showed that the progress of technology imposes a slight negative effect on the tourism employment in China.

Key Words: tourism employment, production function, growth model, VAR model

INTRODUCTION

Background

China's economy has been growing rapidly for the past three decades, with over 8% annual increase in GDP (caixun.com, 2009). The rapid growth of GDP, however, has not brought in corresponding with employment growth since the 1990s (Chang, 2005). At the same time, China's population also increased dramatically (CHINA POPIN, 2009). In 2002, the surplus labor force in the rural area reached 150 million (Rong, 2003). In addition, the state owned enterprise reform have released another 14 million surplus labor force and technology has also advanced rapidly. Researchers have been aware of technology's "Creative Destruction" effect on employment growth for a long time (Schumpeter, 1934; Saint-Paul, 1992). This adds new pressure on China's macro economy. Therefore, China is now facing a greater challenge in employment than ever before.

Tourism has been recognized as an industry that can effectively absorb surplus labors (Walter, 1957; Laurence, 1980). Since 1978, tourism in China has been developed rapidly (Zhang, 1989) and tourism has become the largest sector in the service industry (Zhao & Chen, 2006; China National Tourism Administration, CNTA, 2007). It weighs 32% of the whole service industry now, and will account for 4.5% of the GDP by the year 2010 (CNTA, 2007). Historically, tourism has been identified as an important foreign exchange generator. As its development, more and more people start to realize the potential of using tourism to solve China's labor surplus challenge (Ireland, 1993; Ross, 1992; Shi, 2003). The World Tourism Organization (WTO) predicted that China will become the No. 1 destination in the world by 2020 (WTO, 2001). This describes a bright future of China's tourism industry.

Although tourism has been well recognized as an effective mean of absorbing labor force, in order to utilize this, we need to know the employment growth pattern of tourism in China. Does the growth of China's tourism industry positively related to the growth of tourism employment? What factors determines tourism industry and employment growth in China? Which factors are more important? To find these answers is of critical significance, because with the largest population in the world, China is now facing the strongest pressure brought by labor surplus than ever before. In this situation, a model describing the growth pattern of tourism employment in China would be very useful. It can be used to predict the needs of labor forces in tourism industry.

LITERATURE REVIEW

Tourism Employment

In 1998, the Tourism Division of Asia-Pacific Economic Cooperation (APEC) and the World Travel and Tourism Council (WTTC) jointly issued "The Economic Impact of Travel & Tourism Development in the APEC Region 2000" (WTTC/APEC, 1998). In accordance with System of National Account (SNA), this report used Tourism Satellite Account (TSA) for the first time. It divided the tourism employment system into four parts. The first part is the direct tourism employment. It includes the service positions where workers provide services to the tourists directly, such as the airline companies, hotels, taxis and car rental companies, restaurants, stores and recreation places, etc. The second part is indirect tourism employment which provides assistance to the tourism industry, such as airlines food suppliers, laundry services, wholesalers, and finance service providers, etc. The third part is the direct employment in the tourism supplier's industries. These include the government agency, capital product manufacturer, the construction industry, and tourism product export industry, etc. The fourth part is the indirect employment in tourism supplier's industries. These industries provide productive materials to the supplies of the tourism industry.

Since this paper concentrates mainly on the employment impetus in the tourism industry, only the first part of tourism employment studied. In this way, tourism employment in this study can be measured by number of employees or positions in the tourism industry. This is also consistent with the method used by Chinese Annual Tourism Statistic conducted by the Department of China Tourism Administration.

Tourism Economy Growth

The tourism economy growth (tourism GDP) is measured by the added value in tourism industry. Tourism added value refers to the resident units' ultimate output in a certain period (usually in a year), which includes the added value produced by the resident units and the transferred value from the fixed assets (Li and Li, 1999). The tourism GDP includes directly added value, indirectly added value and total added value. This study employed the method provided by Tourism Satellite Account to measure Tourism GDP.

Relationship between Tourism Development and Tourism Employment

Generally speaking, the development of tourism economy has a stimulating effect on tourism employment (Holloway, 1994). However, it is not always the situation. There are four reasons. First of all, when we say employment, we usually refer to full-time jobs. So if we do not count the increase in temporary or part-time jobs, this may lead to different conclusions. For example, China tourism industry in the 1980s created many jobs, while most of them are temporary or part-time jobs. The full time employment growth rate, however, was slow (Parsons, 1987). Secondly, the seasonal fluctuation of tourism industry limited the growth of tourism employment (Ashworth, 1999). Thirdly, the expanding of high-end tourism market made the tourism economy and tourism employment imbalanced (Authors & Aguilar, 2002). Fourthly, in developing countries, the imbalance between inbound and outbound tourism also limits the growth in tourism employment (Nicolino & Scott, 2001).

Many researchers have tried to describe the relationship between tourism employment and tourism economy, and have established several models. Mathias and Camero (1979) firstly described tourism development stages from the perspective of the industry growth, employment volume, impact factors and psychological effect. Gladson (1994) studied tourism employment in the context of macroeconomic environment. Tina (1999) proposed a model in the context of industrialized countries. Samantha and Sreekumar and Govindan (2002) tested sudden events' influence on tourism employment. Two obvious flaws are discovered in these studies. First, there is lack of a precise mathematic function in these models. Second, there is no systematic analysis in the momentum of tourism employment growth. These flaws make it difficult to evaluate the quality of tourism employment, and also make it difficult to predict the demand and supply of tourism development.

Factors Influence Tourism Employment Growth

Although there are many established employment models in other industries, few researchers have attempted to model the employment growth patterns for tourism industry, (Kahn and Morimune, 1979; Hamilton and Stewart, 1980; Chaudhuri, 1982; Pissarides, 1990; Danley et al, 1992; Huiskamp, 1992; Irmen, 1997; Fabio, 2004; Wilson et al; Barbara, 2007). Among the very few studies on tourism employment, Prem, Jonathan and Michael (2008) examined the

Tourism Related Employment (TRE) through the application of spatial econometric techniques. However, this study only focused on geographical and environmental factors influencing tourism employment. It did not examine the interactive relationship between tourism economy and tourism employment. The authors of this study believe that besides factors that have been taken into account by previous studies, there are additional factors need to be considered. Considering the specific situations in China tourism industry, the following factors may be appropriate to be included in a model.

Tourism technology level

Office automation, management information system, and database-driven marketing are a few examples of the major manifestations of the technology application and advancement in tourism industry (Gamble, 1988; Jenkins, 1995). All of these innovations are depended on the fixed capital formation. Although not all the fixed capital formation is associated with the enhancement of a company's technology level, its change over time can reflect technology change.

Tourism employment multiplier

Tourism employment multiplier refers to the increased number of full-time occupations brought by a unit of consumption in tourism (including the direct, indirect and induced consumption) (Pomery et al, 1988). Tourism employment multiplier can be determined as follows: (1) determine the employment volume needed for a unit of output in the tourism related industry; (2) compute the increased output in tourism related industries caused by tourism consumption; (3) calculate the employment volume provided by the increase of tourism consumption in tourism related industries; (4) sum them, and then divide by the consumption volume of the tourism-directly-influenced industries to get the employment multiplier; and, (5) calculate the tourism integrated employment multiplier through the tourism-directly-influenced multiplier.

Environment pressure caused by the tourism production and consumption

The process of tourism production and consumption influence the environment. However, there is still no standard measurement for the environment pressure created by tourism industry. Researchers proposed that environment pressure created by tourism has positive correlation with tourist arrivals (Fiona, 1999; Huybers and Bennett, 2000).

Theoretical Model

Pissarides (1990) proposed a model on the relationship between tourism economy and environment pressure in the context of neoclassic economics. Using his model, tourism production function can be expressed as follows:

$$y_t = A_t (zx)^\alpha \quad (1)$$

Where, y_t represents the per-capita outcome of tourism economy at time t , and A_t is the technical parameter of tourism; x is the amount of intermediate products (Romer, 1986) in tourism; z represents the pressure that the tourism production and consumption put on the nature environment, and α is the output elasticity of intermediate product.

This model may be appropriate to be applied in our study. Because, 1) Pissarides' Model is specially designed for and applied in the service industry economy; 2) this model replaces the static approach with dynamic approach. This makes it more realistic in describing tourism employment seasonality; and, 3) the model takes environmental pressure factor into account besides including other tourism economy related common determinant factors. This is an advantage compared with the TRE framework proposed by Prem, Jonathan and Michael (2008).

After considering the additional factors that may influence tourism employment growth in China, this study proposed the following hypothesized model based on Pissarides (1990)'s work. The proposed model has three elements which determine tourism employment growth. These elements include Technology, the Correlation between Tourism and its Related Industries, and the Environment Pressure. The proposed model is as follows:

$$w^* = m(1, v) \left[\ln MP_x^M - \frac{(\alpha + \rho) \ln p_\varepsilon + \alpha g_t}{\ln A_0^\rho \zeta^\alpha} \right] / g \quad (2)$$

Where, w^* is tourism “natural employment rate”, namely employment rate consistent with natural unemployment rate of tourism industry (Hall and Lilien, 1979); ζ represents the environment pressure per-capita generated by production and consumption in tourism; The speed of the worker looking for the vacant position is $m(1, v)$: here, 1 represents the total number of labor force who are looking for jobs, v represents the number of vacant positions- according to experiences, m is increasing function of v (Pissarides,1990); MP_x^M is the marginal output of intermediate products at the highest price; g is the equilibrium growth rate of output of intermediate product in tourism, and g_t is the exogenous growth rate of technology in tourism; α and ρ are parameters of production function; p_ε is the price of intermediate product in tourism; A_0 is technology level of tourism at beginning when $t = 0$.

Three propositions are generated from above proposed model:

Proposition 1: When the technical level of tourism is low and multiplier effect on tourism is weak. There will be a negative relationship between tourism economy growth and tourism employment growth. However, increased environmental pressure will enhance tourism employment.

Proposition 2: Technological advancement in tourism will facilitate tourism employment by providing new career opportunities, and will reduce the effect of “Creative Destruction” on tourism.

Proposition 3: Tourism economy growth and tourism employment growth are positively related when a complementary relationship between tourism and its related industries is presented.

To summarize, tourism economy can positively affect tourism employment in three ways. Firstly, the growth of tourism can enhance tourism technology. This process can create many career opportunities. The created jobs can help to reduce the effect of “Creative Destruction”. This is a “sustainable” effect for tourism employment growth. Secondly, the strong employment complementary relationship between tourism and its related industries will stimulate the tourism demand. However, this was largely relied on the inter-dependability between tourism and its related industries. As a result, tourism economy and tourism employment could grow simultaneously. Thirdly, environmental pressure will extend the scale of tourism industry, which leads to increased tourism employment in a larger scale. This could be used as short-term strategy. However, it is not sustainable in nature, considering the potential negative impacts to environment.

METHODOLOGY

Data

A 17-year time series data (1988-2004) of China tourism economy development was used to test the hypothesized model.

Table1 The data of China’s tourism employment and its decisive variables

Year	Direct Tourism Employment(E) (1N10,000)	GDP of Tourism Industry (Y) (million RMB)	Increased Original Fixed Assets of Tourism (T) (billion RMB)	Tourism Employment Multiplier (R)	Domestic Tourists (D) (1N10,000)
1988	10315.9	31.78	390.2	3.17	2200
1989	11,503.50	36.74	429.36	3.35	24000
1990	11,653.80	43.26	466.2	2.93	28000
1991	13,108.70	53.30	498.23	3.35	30000
1992	12,852.70	58.96	508.5	3.16	33000
1993	13,263.30	75.18	726.95	3.27	41000
1994	14,022.20	110.83	982.95	3.2	52400

1995	15,049.50	143.23	1251.67	3.54	62900
1996	14,290.70	170.97	1546.5	3.22	63900
1997	14,650.50	191.52	2147.9	3.25	64400
1998	14,851.70	202.76	2574.2	3.32	69400
1999	15,055.20	219.03	3805.5	3.3	71900
2000	15,319.60	240.62	6473.62	3.42	74400
2001	15,186.50	256.40	7791.91	3.5	78400
2002	15,176.20	273.89	8123.36	4.06	87800
2003	13,766.30	273.93	8439.22	4.07	8700
2004	14,063.60	312.86	8723.25	4.09	92300

Source: China Tourism Administration, 1988-2004 *RMB: Chinese Currency - Yuan

Positive Model

Ordinary least squares (OLS) method is used to test the relationship between China's tourism GDP (Y) and tourism employment (E). The model is as follows:

$$Y = \alpha_0 + \alpha_1 E + \mu$$

First of all, the ADF (Augmented Dickey-Fuller) test is used in order to identify the long-term equilibrium among the technology level (T), employment correlation degree (R), and environment pressure (D). This test aims to check the stability of the regression series. To eliminate the serial correlation, and to examine the elasticity of the dependent variable, the method of third maximum lag period test is used without taking account of any intercept terms or asymptotic terms in the test equation. The result shows that the original series and the first order difference series are not stationary. Therefore, the method of ADF test is used again to test the second order difference of original series (Table 2).

Table2 ADF test of the regression variables

Variables	ADF	Sig. Level	Critical Value	Durbin-Watson Test Value
LnE	-2.353533	5%	-1.9755	1.851420
LnT	-1.613934	5%	-1.9755	2.017162
LnR	-2.099728	5%	-1.9755	1.968425
lnD	-0.969258	5%	-1.9755	1.991623

In order to find long term relationship of the variables under non co-integrated relation, the VAR (Vector Auto-Regression) model is used to screen the variables and its lag variables. It should be noted that all the variables are endogenous, the constants are exogenous and the endogenous variables lag two periods. The VAR Model is as follows:

$$\ln E = \beta_0 + \beta_1 \ln E(-1) + \beta_2 \ln T + \beta_3 \ln R + \beta_4 \ln D + \beta_5 \ln R(-1) + \beta_6 \ln T(-2) + \mu$$

Where, E is Direct Tourism Employment; T is Increased Original Fixed Assets of Tourism and R represents Tourism Employment Multiplier; D stands for Domestic Tourists. As the data is in the form of time series, then R(-1) means 1 term lag of R and T(-2) means 2 term lag of T. μ is the statistic error. ADF test is used to test if the proposed model fits the actual situation by checking the stability of the regression series. And VAR model was set up to find the real relationship between tourism employment and its determinants.

FINDINGS AND DISCUSSIONS

Relationship between China Tourism Economy and Employment

The OLS result of the relationship between China's tourism GDP (Y) of tourism and tourism employment (E) is presented in Table2. A regression equation is generated from the analysis as follows:

$$Y = -532.936 + 0.050208E$$

Figure1 shows the fitting relationship. The residuals are basically stable, and the level of the fitness is acceptable.

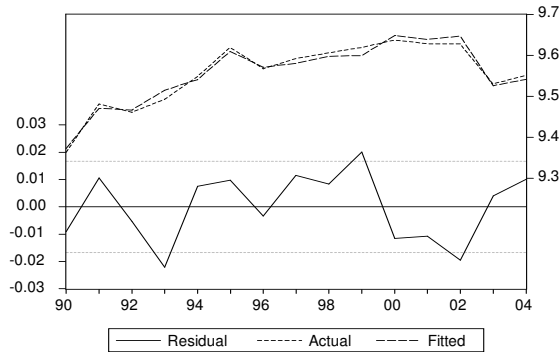


Figure1. Fitness of the residual variables

The regression result demonstrates that China tourism industry employment is positively correlated with the tourism economy. But the granger test shows there is no cause-effect relationship between the two (see table 3). It means that the development of tourism employment is not caused directly by the growth of tourism economy.

Table 3 Granger test of tourism GDP and tourism employment

Null Hypothesis	F	Probability Value
E is Y's granger cause	1.47874	0.27378
E is not Y's granger cause	1.27829	0.32036

Tourism Employment Growth and its Determinants

The long-term equilibrium among the technique level (T), employment correlation degree (R), and environment pressure (D) is estimated by the VAR model. The results are shown in Table 4.

Table 4 VAR estimation results

	LnE(-1)	LnE(-2)	LnR(-1)	LnR(-2)	LnT(-1)	LnT(-2)	LnD(-1)	LnD(-2)
β	0.99682	-0.313248	-0.547919	0.42913	0.088930	-0.078958	-0.021593	0.02162
S.E.	0.462	0.40540	0.18359	0.330	0.06249	0.06637	0.02320	0.019
t	2.16*	-0.77	-2.98*	1.30	1.42	-1.19	-0.93	1.12

* Sig<0.05

Results on Table 4 indicates that LnE(-2), LnR(-2),LnT(-1),LnT(-2),LnND(-1) and LnD(-2) are not significant at $p \leq 0.05$, and they should be eliminated from the model. The VAR model is an autoregressive (AR) model based on the OLS method. The above results show that the lag variable and the residual variable are correlated. So, we estimated the residual variables in the OLS method (the results are presented in Table 5). After adjusting, R^2 increases to 95.4%, the D.W. value reaches 1.8, Akaike information criterion and Schwarz information criterion are at minimum. These changes indicate that the fitness of the equation is good and the residual test is fine (see Figure 1).

Table 5 OSL estimate result of the VAR model's residual variables

Variables	Coefficient	Standard Error	t value	p value
Constant	4.163994	0.857429	4.856371	0.0013
LnE1	0.523674	0.094769	5.525822	0.0006
LnT	0.076175	0.030636	2.486457	0.0377
LnR	0.387755	0.102652	3.777367	0.0054
LnD	0.027960	0.008907	3.138943	0.0138
LnR(-1)	-0.299634	0.098286	-3.048599	0.0159
LnT(-2)	-0.083293	0.034987	-2.380704	0.0445

Thus, the short-term equation of tourism employment can be gained from VAR results:

$$\text{LnE} = 4.163994094 + 0.5236744688\text{LnE}(-1) + 0.07617515967\text{LnT} + 0.3877548695\text{LnR} + 0.02795982782\text{LnD} - 0.2996339239\text{LnR}(-1) - 0.083293217\text{LnT}(-2)$$

Given that tourism employment is stable in the long term, namely $\text{LnE}(-1) = \text{LnE}$, $\text{LnR}(-1) = \text{LnR}$ and $\text{LnT}(-2) = \text{LnT}$ in the long run, a long-term equilibrium equation of tourism employment can be obtained from above equation as follows:

$$\text{LnE} = 8.7424 - 0.0149\text{LnT} + 0.1852\text{LnR} + 0.05879\text{LnD} \quad (3)$$

Three conclusions can be generated from Eq. (3) as follows.

The growth of China tourism employment is driven by the employment multiplier among industries related tourism. Based on Eq. (3), 1% of increase in the Tourism Employment Multiplier would lead to about 0.19% increase in the tourism employment. And this factor is the most influential and important factor among the three factors.

The above result reveals that tourism industry in China is the industry with high integrity and is closely related with other industries. Tourism product has big employment complementary effect on many other industries such as real estate, household applicants and education industry. Therefore, Proposition 3 is supported.

The advancement of tourism technology has slightly negative effect on the tourism employment growth. The elasticity of technology to tourism employment is -0.0149 . It reflects that the “Creative Destruction” effect is obvious in the China tourism industry, since the technical advancement is a substitution of the manpower. All of these imply that the technology advancement in China tourism industry lacks real creativity or tourism-specific features. Therefore, Proposition 2 is not supported, which means that the career-providing effect of the new technology cannot overcome the “Creative Destruction” effect.

Increased pressure to the environment can facilitate tourism development. According to the results of the regression equation, the elasticity of environment pressure is 0.05, which means if the tourist arrivals increase by 1%, the employment would increase by 0.05%.

CONCLUSION

Based on the assumption of classical theory on labor economy, this paper takes into account the special characteristic of tourism industry and the relationship between tourism economy growth and the tourism employment. A model is proposed based on the tourism production function. Three propositions on the relationship between tourism economy and tourism employment and environmental pressure are tested. The results showed that tourism technology level, employment correlation between the tourism industry and its related industries, and the environment pressure caused by tourist arrivals are the major determinants of tourism employment growth. In addition, this study used time series data to test the validity of the model in both short term and long term. This could be considered as major contributions of this study.

The results show that tourism employment in China is driven by the related industries. The China tourism economy and tourism employment grow is at the same pace. Moreover, the results indicate that the improvement of technology has a weak negative effect on the China tourism employment.

In conclusion, in order to maximize tourism industry’s ability in absorbing labor surplus, the cooperation between tourism industry and its related industries should be encouraged and enhanced. This type of cooperation should be developed and enhanced between tourism and transportation, finance services, real estate, and other related industries. In this way, the development of tourism industry could create more employment opportunities. Furthermore, proactive and innovative approaches of adopting advanced technology into tourism industry are needed in order to eliminate the “Creative Destruction” effect of technology to employment growth.

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