An Empirical Analysis of Influential Factors in International Tourism Income in Sichuan Province

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Abstract

Sichuan Province is abundant in tourism resources, a big tourism province. Its tourism income occupies a relatively great rate in the total output value of local area. However, an analysis of the tourism income structure of Sichuan Province, it is found that whether in terms of the total output or the proportion it occupies, the international tourism income lags behind domestic tourism income. In the meanwhile, whether compared with such cosmopolis as Beijing and Shanghai or compared with Jiangsu and Shandong, the international tourism income of Sichuan Province occupies a small rate, which is out of line with the status of big tourism province of Sichuan Province. However, as a primary means for foreign exchange earning in Sichuan Province, the international tourism income has a significance that can not be ignored. Thus, it is necessary to analyze the influential factors that affect the international tourism income of Sichuan Province, take relevant measures to improve the international tourism condition in Sichuan Province, improve the international tourism income and make greater contributions to economic development of foreign exchange earning in Sichuan Province.

Keywords: International tourism income, Influential factor, Regression analysis, Multi-collinearity

1. Introduction

Sichuan Province is a key tourism province in China, with abundant tourism resources and several national-level tourism scenic spots. Its tourism income occupies a large proportion in the three industries and meanwhile, the contribution rate of tourism income to GDP of the area is also gradually rising year by year. However, a general survey of the tourism industry in Sichuan Province, it is discovered that the proportion of domestic tourism income is large and the international tourism income occupies an undesirable proportion and is imbalanced in terms of structure. The tourism industry of Sichuan Province is still open for improvement and the international tourism income is open for increase. However, in order to better enhance and strengthen the tourism industry, to find out the influential factors that affect the international tourism income and improve and perfect hardware facilities and software facilities related with development of the international tourism income is a shortcut to rapidly drive the international tourism industry of Sichuan Province, improve the international tourism income level and strengthen and improve the key status of the tourism industry of Sichuan Province in the national tourism industry.

2. Literature review

Development of the tourism industry means a lot to development of local economy and increase in foreign exchange. Thus, there have been quite a lot of experts who have conducted lots of studies on development of the

tourism industry and expansion of economic development and have offered relevant policies and suggestions. There are also some experts who have made analysis in influential factors that affect the tourism income, and their scope of selection and perspective of analysis differ from each other. Huang Jinhong made a regression analysis mainly from the perspective of influencing the domestic tourism income, explaining influential factors that affect domestic tourism income and provided specific policies and measures to develop and expand the domestic tourism industry on the basis of analyzing these relevant factors (Huang Jinhong, 2008). Ma Aikui et al made an analysis in relevant factors that affect inbound tourism income in China through the principal component analysis method and made a discussion on policies how to improve inbound tourism competitive force on the that basis (Ma Aikui, Cao Ronglin and Guan Beibei, 2008). In addition, Yin Shulu et al also studied the influential factors that affected the inbound tourism income of China. However, different from the research perspective of Ma Aikui et al, they mainly studied the influential factors of inbound tourism from the perspective of the external market of inbound market tourism market and from the perspective of demanders, with a relatively novel research perspective (Yin Shulu and Yang Lixun, 2009). Huang Xiujuan and Zhou Yucui et al studied the inbound tourism and international tourism from the provincial perspective. They mainly took Fujian Province and Hunan Province as the case to analyze influential factors that affect provincial inbound tourism and international tourism and existing problems as well as how to improve and enhance the inbound tourism level by taking consideration of the realistic situation of those provinces (Huang Xiujuan, Zhou Yucui and Xie Jianghong, 2006). Furthermore, Zhou Yanlin took Chongqing as the case and employed the grey correlation analysis to make an analysis of the influential factors that affect the international tourism income and the critical factors among those influential factors, offering policies and suggestions to develop and expand the international tourism income of Chongqing on the basis of analyzing the critical factors (Zhou Yanlin, 2009).

Generally speaking, analysis of the influential factors that affect the tourism income is either from a nationwide scope or from a provincial scope, either employs a regression analysis or employs a principal component analysis and the grey correlation analysis, and is either an analysis of influential factors in domestic tourism income or analysis of influential factors in the international tourism and inbound tourism. However, there are rarely any experts who have made an analysis in the influential factors in the international tourism in Sichuan Province, whether a grey correlation analysis or a regression analysis and a principal component analysis. Therefore, this article is going to make a regression analysis by setting up a regression analysis model, find out which influential factors are relatively obvious and provide policies and suggestions on that basis to rapidly and better develop the tourism industry in Sichuan Province. Meanwhile, development of the international tourism industry is able to accelerate development of post-disaster tourism industry in Sichuan Province, make the tourism industry revive rapidly and post-disaster economy get swiftly recovered and ensure better and fast completion of post-disaster re-construction.

3. Selection of economic variables

The international tourism income is affected by multiple factors, not only influenced by the national politics, but also related with the development level of the national economy and the environmental sanitation condition of the country. Only peaceful and stable political environment can attract foreign tourists to amuse themselves and relax themselves to all areas of the country. Good economic development level, perfect service facility, convenient transportation condition, comfortable accommodation environment, sufficient guest rooms, excellent service level and tourism reception competence are indispensable to the development of the international tourism industry. Of course, the environmental and sanitary condition is also quite important to development of the tourism industry. It can be said that there are various factors that affect the international tourism, among which some are quantitative factors and some are qualitative factors. It is relatively complicated to tackle with quite a lot of factors. In order to make it convenient to tackle with these factors, by referring to research conclusions on relevant literature, we chose the following eight factors to make an analysis in the international tourism income and explained why we had chosen these indexes.

3.1 Number of international tourists

Rapid development of the international tourism industry and large increase of tourism income requires to attract more tourists to take part in the international tourism. The number of international tourists is an important influential factor that affects the development of international tourism industry.

3.2 The total number of international starred hotels

One of the major features of international tourism is that tourists are far away from their home and their tourism course is relatively long. Thus, a large majority of them may choose to have a rest in hotels within the scenic spot and then go out for travelling for a long time. Therefore, in order to satisfy demands of international tourists,

it is required to set up more starred hotels to meet with demands of accommodation and eating of tourists. Thus, international starred hotels ought to be taken into consideration as a factor that affects the international tourism income.

3.3 The total number of scenic spots above the provincial level in Sichuan Province

A large number of tourists who come to Sichuan Province from countries all over the world are attracted by the exquisite scenery and cultural customs, and especially world-class, national-class and provincial tourism scenic spots have more influential power on tourism. Thus, the number of tourism scenic spots above the provincial level can be said to influence, to a large extent, the number of international tourists to Sichuan. Hence, we also take the total number of scenic spots above the provincial level as a factor into the regression equation.

3.4 Full-time wage employees in the tertiary industry in Sichuan Province

Likewise, the driving force of the tourism industry can not only add to the output value of the tertiary industry, but more importantly, it is able to provide more employment posts for more residents. In the past several years, the tertiary industry has been the industry that has been accelerated most rapidly by development of the three industries in terms of employment growth, while the tourism industry can drive the tertiary industry and promote development of relevant industries. Thus, connection of the chains of all industries is closer and different industries are more coordinated and optimized. Thus, the full-time wage employees in the tertiary industry in Sichuan Province is also selected as an influential factor that affects the international tourism income.

3.5 Mileage of highway alignment

Advanced traffic facilities and convenient transportation conditions play an important role in development of the international tourism industry that is beyond all doubt, among which the mileage of highway alignment mainly measures urban transportation condition. Long mileage of highway alignment and more highway lines offers great convenience for daily outing of international tourists, able to enhance and development international tourism industry to a large extent, stimulate development of other relevant industries and improve the international tourism income level.

3.6 Mileage of civil aviation alignment

The traffic tool most frequently used by foreign tourists who travel to China is airplane, so the mileage of civil aviation alignment is an important symbol that measures the international air transportation in a country and a region. In recent years, the civil aviation alignment in Sichuan Province has been put into operation rapidly. Operation of Shuangliu International Airport has brought more convenience for tourism in Sichuan and has attracted more international friends to travel in Sichuan. Hence, expansion and extension of the mileage of civil aviation alignment is an important factor to accelerate development of the international tourism industry.

3.7 Mileage of railway alignment

For the past few years, with more attention of the country on investment in infrastructure, the railway alignments within Sichuan Province have been continuously extended. Railway transportation is not only secure, but also convenient, which brings great convenience for traffic transportation and for travelling of people. Meanwhile, railway transportation has also offered convenience for international tourists to come to travel in Sichuan province. Thus, the importance of railway transportation is brought into continuous prominence and railway transportation is also an important influential factor that affects the international tourism income.

3.8 Per capita GDP

In the past several years, economy of China has been rapidly developed, the living standard of Chinese people has been greatly enhances and the consumption concept has also been greatly changes, which has attracted more international focus. Quite a lot of foreigners are full of curiosity in the development speed of Chinese economy. Tourism of quite a large number of foreign friends in China is, on one hand, to appreciate the exquisite scenery and ancient civilization of China, and, on the other hand, is appealed by the miracle of development of China, which has brought quite a lot of tourists to come to know China and to explore development of China.

4. Model specification

Through the above analysis, in setting up model variables, this article selected the above eight influential factors as explanatory variables: the number of international tourists X_1, the total number of international starred hotels X_2, the total number of scenic spots above the provincial level in Sichuan Province X_3, full-time wage employees in the tertiary industry in Sichuan Province X_4, the mileage of the highway alignment X_5, the

mileage of civil aviation alignment X_6, the mileage of railway alignment X_7 and per capita GDP X_8. These eight indexes respectively refer to economic development level, supporting industries of the international tourism industry and infrastructure of traffic. Thus, the following model is established:

$$Y_t = a_0 + a_1 X_{1t} + a_2 X_{2t} + a_3 X_{3t} + a_4 X_{4t} + a_5 X_{5t} + a_6 X_{6t} + a_7 X_{7t} + a_8 X_{8t}$$

Where, Y_t stands for the international tourism income in Sichuan Province in the tth year, X_1 for the number of international tourists, X_2 for the total number of international starred hotels, X_3 for the total number of scenic spots above the provincial level in Sichuan Province, X_4 for full-time wage employees in the tertiary industry in Sichuan Province, X_5 for the mileage of the highway alignment, X_6 for the mileage of civil aviation alignment, X_7 for the mileage of railway alignment and X_8 stands for per capita GDP.

5. Parameter estimation and test

Data in this model were derived from data of "China Statistical Yearbook" and "Sichuan Statistical Yearbook" from 1990 to 2008. Since Chongqing was under the jurisdiction of Sichuan Province before the year 1996, data between 1990 and 1996 were obtained after deleting data about Chongqing from the total data about Sichuan Province and data between 1997 and 2008 were directly got or calculated from "China Statistical Yearbook" and "Sichuan Statistical Yearbook". Data of some individual years might be lost, and data were obtained by getting the mean value of adjacent five years.

Eviews was employed in the regression calculation, which was more convenient for and easy to process in multiple regression colinearity, self-correlation, heteroscedasticity test and adjustment.

The least square method was used to get the regression result as follows:

Dependent Variable: Y

Method: Least Squares

Date: 01/07/10   Time: 21:25

Sample: 1 19

Included observations: 19

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	282.1226	17.19063	16.41142	0.0000
X2	0.474942	0.704467	0.674186	0.5155
X3	-1.584567	14.26756	-0.111061	0.9138
X4	35.97666	99.05537	0.363197	0.7240
X5	-0.630938	7.496142	-0.084168	0.9346
X6	-255.5637	342.4745	-0.746227	0.4727
X7	-3408.711	4113.465	-0.828671	0.4266
X8	38.32743	105.6361	0.362825	0.7243
C	-1043.026	4395.859	-0.237275	0.8172
R-squared	0.995464	Mean dependent var		15132.59
Adjusted R-squared	0.991835	S.D. dependent var		13982.29
S.E. of regression	1263.417	Akaike info criterion		17.42654
Sum squared resid	15962232	Schwarz criterion		17.87391
Log likelihood	-156.5522	F-statistic		274.3287
Durbin-Watson stat	2.601182	Prob(F-statistic)		0.000000

From the above table, we can find that $\overline{R^2}$ also attains its maximum value, which indicates that fitting of the

model is good. F=274.3287 and P_f =0.000000. Thus, at the significance level of 0.01, the equation is

significant and passes t Test. T Test of the coefficients of X_2, X_4 and X_8 is not significant, and

coefficients of X_3, X_5, X_6 and X_7 are even negative and irrational, so multicollinearity might exist among explanatory variables. In order to verify the multicollinearity, we employed correlation matrix for a test and got the following correlation matrix table:

	X1	X2	X3	X4	X5	X6	X7	X8
	X1	X2	X3	X4	X5	X6	X7	X8
X1	1.000000	0.831264	0.902524	0.778178	0.812870	0.769806	0.439634	0.421454
X2	0.831264	1.000000	0.959662	0.843648	0.891439	0.956963	0.486975	0.581459
X3	0.902524	0.959662	1.000000	0.896485	0.923083	0.890676	0.495003	0.539880
X4	0.778178	0.843648	0.896485	1.000000	0.981878	0.707014	0.709219	0.781034
X5	0.812870	0.891439	0.923083	0.981878	1.000000	0.765658	0.692949	0.755259
X6	0.769806	0.956963	0.890676	0.707014	0.765658	1.000000	0.355416	0.424234
X7	0.439634	0.486975	0.495003	0.709219	0.692949	0.355416	1.000000	0.621159
X8	0.421454	0.581459	0.539880	0.781034	0.755259	0.424234	0.621159	1.000000

Correlation Matrix

From the above table, it can be found that, correlation coefficients of X_1 and X_3, X_2 and X_3, and X_3

and X_5 are large, and correlation coefficients of X_4 and X_5, X_6 and X_2 are also large. Besides, correlation coefficients of other variables are large. Thus, serious multicollinearity exists between these explanatory variables

In order for the model estimation to be accurate and to be more applied in practice, we employed Frish synthesis

analysis to calculate regression of Y to X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, one by one. We chose those explanatory variables into the model that were significant in test, rational in all items of indexes and made

the value of $\overline{R^2}$ the maximum and employed the same method on this basis to gradually add other relevant variables.

From the result of regression of Y to X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, respectively, the result of

regression of Y to X_1 was the most ideal, with the maximum value of $\overline{R^2}$, and both t Test and F Test passed the test. The calculation process was as below:

Dependent Variable: Y

Method: Least Squares

Date: 12/26/09   Time: 12:47

Sample: 1 19

Included observations: 19

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	302.2621	6.789891	44.51648	0.0000
C	-819.8490	470.1923	-1.743646	0.0993
R-squared	0.991495	Mean dependent var		15132.59
Adjusted R-squared	0.990994	S.D. dependent var		13982.29
S.E. of regression	1326.902	Akaike info criterion		17.31838
Sum squared resid	29931383	Schwarz criterion		17.41780
Log likelihood	-162.5246	F-statistic		1981.717
Durbin-Watson stat	1.724431	Prob(F-statistic)		0.000000

Hence, in the regression model, we firstly retained the explanatory variable X_1, and made regression

respectively to X_2、X_3、X_4、X_5、X_6、X_7、X_8. Then by adding X_8, we got $\overline{R^2}$ =0.993584, and the t

Test and F Test were both significant. F =0.993584, passing the test. The result is shown as follows:

Dependent Variable: Y

Method: Least Squares

Date: 01/07/10   Time: 21:53

Sample: 1 19

Included observations: 19

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	294.7943	6.319872	46.64560	0.0000
X8	98.54973	35.14948	2.803733	0.0127
C	-2363.467	678.6945	-3.482373	0.0031
R-squared	0.994297	Mean dependent var		15132.59
Adjusted R-squared	0.993584	S.D. dependent var		13982.29
S.E. of regression	1120.005	Akaike info criterion		17.02399
Sum squared resid	20070567	Schwarz criterion		17.17311
Log likelihood	-158.7279	F-statistic		1394.683
Durbin-Watson stat	2.211070	Prob(F-statistic)		0.000000

On the basis of retaining X_1 and X_8, we further made regression to remaining X_2, X_3, X_4, X_5, X_6

and X_7. When we added X_3, we got $\overline{R^2}$ =0.993924. F Test and t Test were both significant, so X_3 should

be retained. By repeating regression one by one, finally the several variables could not be added into the model. Hence, in this model, all the remaining explanatory variables could not be selected and should be deleted from the model. After deleting all these variables, the ultimate model equation after being corrected should be as below:

$$Y = -2098.654 + 278.7588\,X_1 + 77.47434\,X_8 + 4.291629\,X_3$$

$$R^2 = 0.994937, \quad \overline{R^2} = 0.993924, \text{ F}=982.4912, \text{ DW}=2.476845$$

Then, an autocorrelation test was conducted on this model. When the number of samples was 19 and the number of explanatory variables was 2, the significance level was 0.01. We got d_l =0.93 and d_u =1.13 after looking into DW. However, 2.476845 is larger than 0.93 and 1.13, and approximates to 2. Thus, it can be said that, autocorrelation almost didn't exist at all, and there was no need to add to the space of sample. Thus, this model was the ultimate model to be selected.

6. Conclusions and suggestions

Through the above analysis of regression equation, it can be known, when the number of international tourists increased by 10,000, the international tourism income would increase by 2, 787588 million US dollars; when per capita GDP increased by 1 US dollar, the international tourism income would increase by 0.7747434 million US dollars; when the scenic spots above the provincial level was increased by one, the international tourism income would increase by 42,916.29 US dollars. Thus, this model could better fit the condition of the international tourism income in Sichuan Province in the last 19 years. Of course, as a result of difficulty in data collection and unconformity of statistic units, statistic data about Chongqing and Sichuan Province before the year 1996 were mixed together and needed to be calculated respectively. Hence, error might exist in processing of data.

Of course, through analysis of the model, we came to know that the number of the international tourists, per capita GDP and the total number of scenic spots above the provincial level were the major factors that affected the international tourism income. Thus, in order to adjust the tourism industrial structure of Sichuan Province and promote rapid development of international tourism industry in Sichuan Province, we need to pay attention to the following several aspects:

Firstly, it is necessary to strengthen vigor of propaganda of the tourism industry in Sichuan Province to enable more foreign friends to come to know Sichuan, to love Sichuan and to be willing to appreciate the exquisite natural scenery of Sichuan. It is necessary to improve the employment quality and service of employees in the tourism industry and better serve international tourists. In the meanwhile, it is a must to coordinate cooperation among catering industry, post and telecommunications industry, accommodation industry, retail industry and entertainment industry, etc, to enable development of the international tourism industry to be coordinated with development of those industries, bring mutual benefit and reciprocity and better promote local economic construction. It is also required to attract and retain more international tourists to come to travel in Sichuan Province and consume in Sichuan Province to promote local economic growth and increase income of farmers.

Secondly, only if we continue to speed up economic development and the process of open-door to the outside world and improve the income of residents, can we appeal more tourists to take part in the international tourism, enable Sichuan to be better integrated in the reform and opening up and make Sichuan become an international tourism city.

Thirdly, it is required to pay attention to development tourism products and development of scenic spots above the provincial level, continue to increase the number of tourism scenic spots and enhance the service level and reception capacity, and attempt to strive for more, newer and better tourist attractions.

Without doubt, improvement of the traffic conditions has a positive effect on improvement of the international tourism condition. Then, it is necessary to accelerate development of the international tourism airline that occupies an important significance in development of the international tourism and, simultaneously, continue to initiate high-speed rails and express trains and urban traffic conditions. Development of the international tourism airline, the high-speed rail and express train brings great convenience for outing of human being. Especially, development of the Golden Week of the May Day and Golden Week of the National Day has enables more

tourists to take the flight and the high-speed rail to come to travel in Sichuan. Hence, in order to continue to accelerate development of the international tourism industry in Sichuan Province and improve the tourism income, it is necessary to open more and more flexible tourism international flights and high-speed railways and provide more convenience for foreign friends who come to travel in Sichuan to make their trip more relaxed.

At the same time, it might be possible that other factors influence the international tourism income, which has not been listed one by one in the regression analysis in this article. An increase in variables might increase the degree of freedom and require more samples, which then might require for more and better data processing methods. By all means, in the research to be conducted in the future, we will conduct further research on the international tourism income in Sichuan Province, with the expectation of proposing more thorough regression equation and offer reference for those departments concerned to develop and accelerate the international tourism.

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