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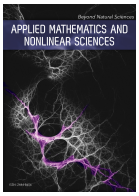

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Research on relationship between tourism income and economic growth based on meta-analysis

Yong Qin[1], Yuyan Luo[1,2,†], Yuqing Zhao[1], Jin Zhang[1]

[1]College of Management Science, Chengdu University of Technology, 1#, Dongsanlu, Erxianqiao, Chengdu 610059, China.

[2]Post-doctorate R & D Base of Management Science and Engineering, Chengdu University of Technology, 1#, Dongsanlu, Erxianqiao, Chengdu 610059, China.

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Abstract

In recent years, with the rapid growth of Chinese economy, the domestic tourism industry has gradually formed. Many scholars on the relationship between the tourism income and economic growth has carried on the empirical research and the most found that tourism income promote economic growth. The study uses the method of meta-analysis to study the relationship between tourism income and economic growth in major cities, and then analyzes the relationship between domestic tourism income and economic growth. Through literature retrieval, extract contains 409 sample sizes 21 valid documents, it is found that the tourism income and economic growth significantly correlated, analyzing the relation between the two different methods and no significant influence on the relation between regional differences. This study provides a way to promote economic growth.

Keywords: Tourism income; Economic growth; Meta-analysis
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1 Introduction

Since the reform and opening up in 1978, China's economy has developed rapidly and the proportion of the tertiary industry in the national economy has increased. As an important part of the tertiary industry, the income of tourism has also become the focus of economic development [1]. With the rapid development of tourism, tourism has gradually become an important symbol of the economy, culture and people's living standards of a country or region. The relationship between tourism development and economic growth has also increasingly

†Corresponding author.
Email address: luoyuyan13@mail.cdut.edu.cn

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attracted the attention of scholars at home and abroad [2]. In recent years, with the increase of empirical research on tourism income and economic growth, further studies on the relationship between the two have become more important. Zhang et al. (2016) used data from 1996 to 2015 based on the STR model of Anhui. Research has been conducted on the relationship between provincial tourism income and economic growth. Research shows that the relationship between tourism income and economic growth is linear and non-linear [3]; Yin et al. (2012) have conducted empirical research on tourism income and economic growth in different regions. The study found that there is a positive correlation between the two [4]- [5]; Zheng et al. (2015) conducted an empirical research on the relationship between tourism income and economic growth in Hainan Province. Research shows that tourism income has a positive contribution to economic development. The impact on economic growth has persistence [6]. Based on the Granger Causality Test, Wu et al. (2014) conducted an empirical research on the relationship between China's tourism income and economic growth and showed that: GDP is the reason that affects domestic tourism income, but domestic tourism income has little effect on GDP [7]. As a quantitative literature research method, meta-analysis is quite different from the traditional literature review. Meta-analysis is a literature review of higher-level logical forms. It uses the original research results as a unit, and the design is more rigorous. It emphasizes a comprehensive literature search on relevant research, and has a clear criterion for document inclusion and exclusion, systematically considering the impact of the study's objects, methods, and measurement indicators on the results of the analysis was rigorously evaluated and the results were quantitatively combined [8]. In this paper, combining the latest research results in various regions, a meta-analysis of the general relationship between tourism income and economic growth was conducted to explore the relationship between domestic tourism income and economic growth and analyze and test analysis methods, regional differences, etc. In order to reveal the reasons for differences between different research results [9].

2 Theoretical basis and research hypothesis

2.1 Relation between tourism income and economic growth

Tourism income is one of the important indicators for measuring economic activity. It can also directly reflect the regional economic performance [10]. To a certain extent, the increase in tourism income can promote economic development and promote economic growth. The more tourism income, the more obvious the economic growth is. Hou and Lang (2016) conducted an empirical research on the relationship between Zhangjiajie's tourism income and economic growth based on the grey relational degree and found that tourism and economic growth in Zhangjiajie City have strong synchronicity [10]. Deng and Li (2017) study on the relationship between the two found that the two existed Long-term equilibrium relationship [11]. In an empirical research of the impact of tourism income on the regional economy, Xing and Ma (2011) found that there was a long-term equilibrium co-integration relationship between tourism income and regional GDP in Yan'an [12]. Most empirical researches show that the relationship between tourism income and economic growth is positively related. For example, Ren and Mu (2012)'s empirical analysis of the relationship between tourism income and economic growth in Xi'an shows that tourism income has a positive effect on economic growth [13]; Zheng et al. (2015) found that in the empirical analysis of the relationship between tourism income and economic growth in Hainan Province positive correlations [6]; Liu (2017) also found positive correlations between Jiangsu Province's tourism income and economic growth [14]. Based on the above analysis, the following assumptions are made:

H1: Tourism income is positively related to economic growth.

2.2 Adjustment of related factors

Because the relationship between tourism income and economic growth has certain differences in different studies and there is instability, this is probably due to the adjustment of other variables. Therefore, based on

the preliminary analysis of the existing data, this paper examines the main factors regulating the relationship between tourism and economic growth from the aspects of analysis methods and regional differences.

1) Method for analyzing the relationship between tourism income and economic growth.

Scholars used different analysis methods in their research. Because there are differences in the theoretical basis and test forms of each analysis method, it will affect the research results. Wang Xiangyu and others examined the relationship between inbound tourism and local economic growth in Anhui Province through co-integration tests, Granger causality tests, and other studies. The study showed that for every 1% increase in foreign exchange income from international tourism, the total GDP in Anhui Province increased by 0.481 percentage points [4]. Hou and Lang (2016) used the grey relational degree theory to find that the correlation degree between tourism income and GDP was 0.75 [10]; Zhang (2013) used regression analysis to study the relationship between inbound tourism development and economic growth in Hunan Province and discovered that the correlation between the two was 0.841 [15]. Studies have mainly focused on cointegration analysis and regression analysis in the analysis of the relation between tourism income and economic growth, but there are also gray relational theories. Therefore, the analysis method is used as a regulatory variable to explore the extent to which the relationship between tourism income and economic growth is affected by analytical methods. It is important to explore whether there is a better analysis method and which analysis method to use. For this reason, this article attempts to test the following hypotheses through meta-analysis:

H2: The analysis method has a regulatory effect on the relationship between tourism income and economic growth.

2) Regional differences.

The analysis of the relationship between domestic tourism income and economic growth should be addressed in both developed and underdeveloped regions. The differences in tourism income between the two regions, as well as the different developments in the tourism industry, are bound to affect the results of the study. Baru R. et al. (2007) found empirically that there is a non-linear relationship between tourism income and economic growth, and there are large differences between different regions [16]; Liu and Qiu (2011) found that the correlation coefficient between tourism income and economic growth in Chongqing is 0.464 [17]; Zhang 2009 found that the correlation coefficient between Shanghai's tourism income and economic growth is as high as 0.930 [18]. Generally speaking, the economic level of developed regions is very different from that of underdeveloped regions. The degree of tourism development in developed regions is different from that of underdeveloped regions. Therefore, there is bound to be some differences on the relationship between tourism income and economic growth. For this reason, this article uses meta-analysis to test the following hypotheses:

H3: Regional differences have a regulatory effect on the relationship between tourism income and economic growth.

3 Research methods

3.1 Data sources

Meta-analysis data comes from published papers and working papers [1]- [2], [4]- [6], [10]- [12], [15], [17]- [28]. This study conducted a comprehensive search of relevant Chinese and English literature. English literature retrieval mainly through databases such as EBSCO, Elsevier Science Direct, Emerald, PROQUST, JSTOR, Web of Knowledge, Springer, SAGE, Wi-ley and Google Scholar; Chinese literature collection uses CNKI database, Chinese Social Science Citation Index (CSSCI), Wei Pu Chinese technology Journal and Wan Fang Data Retrieval System. The English literature search was conducted with the title of tourism income, economic growth, empirical study/research, meta-analysis, keywords, abstracts, and subject terms. The Chinese literature search included literature on tourism income, economic growth, empirical research, and meta-analysis, and then from the searched documents, we select articles that have a correlation between them, and then select empirical research papers from them. In order to ensure that the most comprehensive documents can be collected, for

documents that cannot be directly obtained, the documents are obtained through email document transmission.

The time span of the latest research literature retrieved in each city searched 2009-2017. The literature selection criteria are: (1) The literature discusses the relationship between tourism and economic development. (2) The data is complete. The literature clearly reports the correlation coefficient (the coefficient value meets the requirements) or the T value, F value, etc. that can be converted into the correlation coefficient. (3) The sample size is clear. The results showed that the foreign language documents did not meet the requirements of the papers. The Chinese search found 21 papers that met the requirements, mainly including academic journals (18 papers) and master's thesis papers (3 papers).

3.2 Data encoding

All the independent samples in the sample literature were coded to calculate the effect value as a unit. If the literature reports the correlation coefficient between tourism income and economic growth, these correlation coefficients are taken as the correlation effect value. The coding objects mainly include author information, publication time, sample size, the analysis method of the relationship between the two, and the degree of development of the region. To ensure the accuracy of the data, the literature is mainly independently coded by several graduate students who are familiar with meta-analysis. After the results are compared, where there are inconsistencies, decided by the relevant professional teachers, and finally form the coding results.

3.3 Statistical analysis

The statistical tool used in this study was the Comprehensive Meta Analysis software, version CMA 2.0. CMA 2.0 software can be used for statistical analysis to obtain the results of random effects model analysis and fixed effect model analysis. The two use different components in calculating weights. The fixed effect model uses variation weights in the study, and the random effects model uses research internal and inter-study variation calculation weights. Generally, the appropriate analysis method is selected based on the results of homogeneity test. When the effect value detected is heterogeneous, the random effect model analysis method should be selected. Because the random effects model takes into account not only intra- and inter- study variation but also the average of the effect distribution, it can also prevent underestimating the weight of small sample studies or overestimating the weights of large samples, resulting in greater confidence intervals and thus the formation of more conservative and reliable conclusions [9].

4 Research result

In this study, funnel maps are used to reflect the distribution of effect values of tourism income and economic growth. Then the homogeneity test of relevant research results is performed.

Then the random effect model is used to calculate the point estimate of the correlation coefficient. Finally, the grouping tests the adjustment of the relevant variables.

4.1 Effect value distribution and homogeneity test

Figure 1 shows the distribution of effect values of the relation between tourism income and economic growth. The horizontal axis is the transformed Fisher's Z effect value, and the vertical axis is the standard deviation of the Fisher's Z effect. As can be seen from the figure, the studies on each map are located above the funnel map and are concentrated around the mean effect value. Few studies are distributed at the bottom of the funnel plot. This indicates that the possibility of publication bias in meta-analysis is very small.

The results of the homogeneity test are shown in Table 1. Among them, Q-value and significance test reflect the degree of heterogeneity of each effect value. For example, each effect value is heterogeneous, indicating that it is not suitable to use the fixed-effect model analysis method; I-squared indicates to what extent the observed variation is due to the true difference in effect values; Tau-squared indicates how much variation between studies

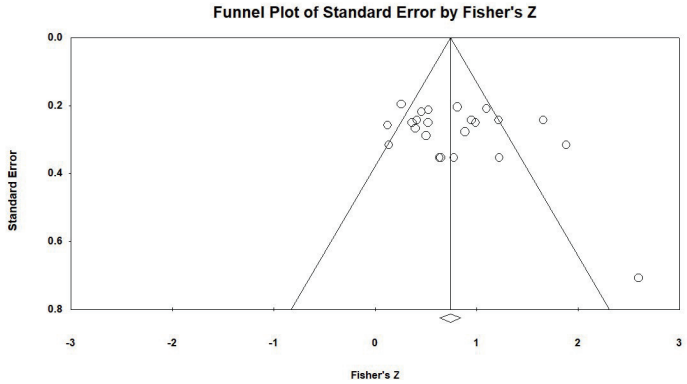

Fig. 1 Distribution funnel value of the relationship between tourism revenue and economic growth

Table 1 Effect value homogeneity test results (Q statistics)

Tourism	Model	Number studies	Heterogeneity				Tau-squared			
			Q-value	df(Q)	P-value	I-squared	Tau-squared	Standard error	variance	Tau
Tourism income	Random	23	70.715	22	<0.001	68.889	0.151	0.068	0.005	0.388

can be used to calculate weights. The effect homogeneity test results showed that the Q value was 70.715 ($p<0.001$) indicating that there was heterogeneity among the literature, which may be due to sample differences, measurement differences, etc.; the value of I-squared was 68.889, this means that 68.889% of observed variation is due to true differences in effect values, 31.111% of observed variations are due to random errors, and the value of Tau-squared is 0.151, indicating that 15.1% of variation between studies can be used to calculate weights. The homogeneity test results shown in Table 1 indicate that the correlation between tourism income and economic growth is in the selected there is heterogeneity.

When the effect value is heterogeneous, there are usually two methods of processing: Firstly, delete the extreme effect values until the homogeneity and then perform the fixed effect model analysis; Secondly, use the random effects model that takes into account the variation within and between studies. This study draws on existing research practices and uses a random effects model analysis method [9].

4.2 Main effect test results

Through data coding, a total of 23 studies (N=409) in the meta-analysis literature reported the correlation coefficient between tourism income and economic growth (see Table 2). The results of the random effects model analysis show that the overall correlation between tourism income and economic growth is 0.647 ($p<0.001$). The meta-analysis results show that there is a significant correlation between tourism income and economic growth, and it is a positive correlation. Therefore, Hypothesis 1 is supported.

4.3 Regulatory effect test results

1) Regulation effect of analytical method.

Literature analysis found that there are 15 studies (N=318) by using co-integration analysis, 7 studies (N=75) by using regression analysis and 1 study (N=16) by using grey correlation theory to test the relationship between tourism income and economic growth.

Table 2 The random effect model analysis of tourism revenue and economic growth

Tourism	Model	Number studies	Sample size	Effect size and 95% interval			Test of null(2-Tail)	
				Point estimate	Upper limit	Lower limit	Z-value	P-value
Tourism income	Random	23	409	0.647	0.747	0.519	7.730	<0.001

Table 3 The regulation effect of analytical method between tourism income and economic growth

Tourism	Homogeneity analysis			Analytical method	Number studies	Sample size	Effect size and 95% interval			Test of null(2-Tail)	
	Q-value	df(Q)	P-value				Point estimate	Upper limit	Lower limit	Z-value	P-value
Tourism income	1.636	2	0.441	co-integration analysis	15	318	0.597	0.716	0.444	6.377	<0.001
				regression analysis	7	75	0.775	0.917	0.458	3.765	<0.001
				grey correlation theory	1	16	0.71	0.892	0.331	3.199	<0.001

Table 4 The regulation effect of regional difference between tourism income and economic growth

Tourism	Homogeneity analysis			Regional difference	Number studies	Sample size	Effect size and 95% interval			Test of null(2-Tail)	
	Q-value	df(Q)	P-value				Point estimate	Upper limit	Lower limit	Z-value	P-value
Tourism income	0	1	0.991	developed	16	318	0.643	0.765	0.478	6.141	<0.001
				undeveloped	7	91	0.645	0.79	0.43	4.909	<0.001

A random effects meta-analysis model shows that the analysis method has no significant influence on the relationship between tourism income and economic growth. As shown in table 3, on the analysis of the relationship between tourism income and economic growth, the correlation coefficient by using regression analysis is the larger than the other methods such as co-integration analysis. Hypothesis 2 is not supported.

2) Adjustment function of regional differences.

Related research sample mainly comes from developed areas and underdeveloped areas and the difference of region may affect the relationship between the tourism income and economic growth. The results show that regional differences have no significant impact on the correlation coefficient.

5 Discussion and conclusion

In this paper, the relationship between tourism income and economic growth in major big cities is analyzed. The study covers 21 Chinese literatures, 23 studies and 409 samples in total. The results show that: (1) tourism income is positively related to economic growth; (2) the analysis method and regional differences have no significant influence on the relationship between tourism income and economic growth.

5.1 Discussion of research results

1) Relationship between tourism income and economic growth.

The study finds that there is a significant correlation between tourism income and economic growth, with correlation coefficient of 0.647 ($p<0.001$). Tourism income is one of the important measures of economic activity, which can directly reflect the economic performance of the region. With the increase of tourism income, the economic growth has been promoted. At present, people's living standards have been improved, people have capital to travel, and tourism income has increased. Tourism has gradually become an important symbol of the economic, cultural and people's living standards of a country or region, and it's obvious that the increase in tourism income has contributed to economic growth.

2) Function of the related regulation variables.

From the results of meta-analysis, the analysis method has no significant influence on the relationship between tourism income and economic growth. It can be seen that different analysis methods have no obvious effect on the relationship between tourism income and economic growth, and the three methods have certain similarity to some extent in the research.

The results show that regional difference has no significant influence on the relationship between the two. It is possible that tourism in underdeveloped areas does not account for a large proportion of regional economy, tourism revenue is less, and economic growth is not obvious. The facts are just the opposite in developed areas. Therefore, the relationship between the tourism income and economic growth is not very different. This may be the place where the regional difference is not obvious to the adjustment of the two.

3) Analysis of publication bias.

Publication bias is an important issue to be considered in meta-analysis. In general, the results of published papers are more likely to be significant, therefore published articles may exaggerate the real correlation between

the variables, but not published papers may be able to provide a more accurate estimate. In order to reduce the effect of publication bias, a meta-analysis should take into account all available research as far as possible, especially not officially published in the journal of research (such as doctoral dissertation, master thesis, conference papers, in the review paper, etc.). Such meta-analysis results are representative.

In general, the publication bias of the study can be observed by the safety number and funnel plot. For example, Rothstein et al. believe that when the safety factor is less than 5K+10 (K represents the number of studies), the impact of publication bias requires vigilance. From the point of this study, the output of a meta-analysis results show that the relationship in tourism income and economic growth, the loss of safety coefficient was 1123, or 49 for each observation to find an unpublished study, to make the result was not significant. In addition, from the distribution of effect values in funnel plots, the probability of publication bias in this study is very small. In conclusion, there is no publication bias in this study.

5.2 Research deficiencies and prospects

In this paper, the relationship between tourism revenue and economic growth is tested by means of meta-analysis, and the influence of multiple adjustment variables on their relationship is analyzed and tested. But there are also some deficiencies. Firstly, in this paper, this study selected the conducted empirical research of all provinces, because the research defects, not all provinces adopt empirical research, so did not include all provinces in China: an empirical study of relationship between tourism income and economic growth. The analysis of the relationship between tourism income and economic growth in some provinces may lead to biased results. Secondly, because of the method of meta-analysis, this paper does not include empirical research on the correlation between the two. That is all, in the selection of literature, there are still some studies with less sample size, which may also influence the results to a certain extent.

In general, this study is based on the relationship between tourism income and economic growth in various regions, and analyzes the positive correlation between tourism revenue and economic growth in China at the present stage. Therefore, to further promote the economic growth of our country, we can increase tourism income and promote economic growth from the aspect of tourism development. For more scientific conclusions, more empirical research is needed. This research also provides a theoretical basis for promoting economic growth.

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