Study on the Non-linear Effect of Tourism Industry Agglomeration on Economic Growth in China——Based on Inter-provincial Panel Data

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Objectives: There are few studies on the non-linear effect of tourism industry agglomeration on economic growth. Based on this, this paper uses the panel data of provinces in 2007-2017 to analyze the spatial characteristics of China's tourism industry agglomeration, and uses the threshold regression model to analyze the role of China's tourism industry agglomeration in promoting economic growth. The results show that: China's tourism industry shows obvious characteristics of spatial agglomeration. The provinces with high degree of industrial agglomeration are mainly Beijing, Shanghai, Yunnan, Guangdong, Guizhou, Sichuan and Shanxi; The non-linear effect of China's tourism industry agglomeration on economic growth is significant. When the level of economic development is less than the threshold value of 10.552, tourism industry agglomeration promotes economic growth. When the level of economic development is greater than the threshold value of 10.552, the impact of tourism industry agglomeration on economic growth is negative. Williamson hypothesis of China's tourism industry agglomeration is established.

INTRODUCTION

Development of the tourism industry has become an important breakthrough in China to adapt to consumption demand, adjust the industrial structure (Sui Jianli, Liu Biying, 2017)[1]and sustain continuous economic growth (Li Shushu et al., 2017).[2] Accompanied by the increasing development progress of the tourism industry, the spatial agglomeration of the tourism industry will be an inevitable development trend to improve the level of competitiveness and economic development of the tourism industry

(Ni Xiangli et al., 2018).[3] In accordance with the theory of industry agglomeration, on the one hand, tourism industry agglomeration can enhance regional economic competitiveness by enhancing the overall production efficiency of industries through integrating natural advantages and endowments, and on the other hand, the famous Williamson Hypothesis states that spatial agglomeration has a promoting effect on economic growth in the early stage of development, but it will gradually disappear and even begin to change into a negative impact when the economy reaches a certain income level. Therefore, we can't help asking questions. What is the level of

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agglomeration of China's tourism industry development at present? Has the current economic growth been promoted or inhibited? The answers to these questions can clarify the relationship between China's tourism industry agglomeration and economic growth, which is conducive to promoting the coordinated development of tourism industry agglomeration and the overall economy, and can also provide certain theoretical and factual basis for the formulation of relevant tourism industry development policies in all regions.

REVIEW OF RESEARCH

Industry Aggregation Theory, derived from Marshall's book of Principles of Economics, accompanied by the development of tourism industries worldwide, is widely used in studies and practices of tourism industries in various countries. Overseas research on tourism industry agglomeration mainly focuses on evaluation of competitiveness of tourism industry agglomeration, impact of tourism industry agglomeration on enterprise performance, and promotion of tourism industry agglomeration to economic growth.

Sara (2003) believed that agglomeration development of tourism industry can effectively improve industrial competitiveness.[4]Kalnins A (2001) pointed out in his study that tourism industry agglomeration can enhance business performance.[5] Brulhart M (2008) pointed out in his study that tourism industry agglomeration can significantly improve labor productivity and thus promote regional economic growth.[6] In recent years, some scholars have begun to explore the role of tourism industry agglomeration on economic growth from the perspective of space. For example, Majewska et al. (2015) determined and measured the "inter-regional" effect of space agglomeration in Polish tourism industry and found that the impact of space spillover effect on tourism economic growth and tourism industry agglomeration is diversified.[7]

By contrast, domestic scholars focus their research on empirical analysis and case study. In terms of current situation of tourism industry

agglomeration: Deng Hongbing et al. (2007) pointed out that China's tourism industry has obvious spatial agglomeration characteristics and the development of tourism industry cluster is necessary in China.[8] Guo Wei (2008) considered that the agglomeration degree of tourism industry in China has obvious gradient distribution in the east, middle and west, which is mainly caused by the difference in initial resource endowment.[9]

In terms of impact of tourism industry agglomeration on economic growth: Bing Zhenhua (2010) measured regional tourism industry agglomeration in the Yangtze River Delta and found that it is highly related to regional economic development, while industries with an upward trend of agglomeration will promote economic growth to a greater extent.[10] Liu Jia and Yu Shuixian (2013) inspected the relationship between tourism industry agglomeration and economic growth in China and concluded that tourism industry agglomeration plays a significant role in economic growth, especially in the underdeveloped central and Western regions.[11] Liu Jia et al. (2013) based on the perspective of spatial econometrics found that tourism industry agglomeration has a significant positive effect on regional industrial economic growth and shows a strong spatial spillover effect, which has obvious local characteristics.[12] Wang Zhaofeng (2019) found that there is a long-term co-integration relationship between tourism industry agglomeration and economic growth in Changsha-Zhuzhou-Xiangtan urban agglomeration, and there is a one-way causal relationship between tourism industry agglomeration and economic growth.[13]

In terms of the impact of tourism industry agglomeration on economic growth efficiency (TFP): Guo Yue et al. (2015) made an empirical study using provincial panel data from 2005 to 2012 in China, and concluded that industrial agglomeration can effectively promote the improvement of TFP, mainly the improvement of technical efficiency.[14] Zhang Guanghai et al. (2016) found that agglomeration impact of Chinese tourism industry has significant impact on TFP by constructing SVAR model.[15] Li Shushu et al. (2017) selected 31 provinces in China from 2005 to 2014 as samples to study with fixed-effect model, and concluded that tourism industry agglomeration has a positive impact on TFP and a positive promotion on the improvement of technical efficiency and scale efficiency of tourism industry.[16]

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It is found that domestic scholars have made a lot of exploratory analysis on the relationship between tourism industry agglomeration and economic growth, which has certain guiding significance for the overall development of China's tourism industry. On the whole, however, few papers have discussed the non-linear effects of tourism industry agglomeration and economic growth. According to Williamson hypothesis, the impact of tourism industry agglomeration on economic growth is periodic, so the research on non-linear effect can provide guidance for formulating more precise tourism industry development policies and provide practical reference for a more detailed understanding of China's tourism industry agglomeration and its role in economic growth.

MODEL, VARIABLES AND DATA DESCRIPTION

I. Model Design

In this paper, the influence of tourism industry agglomeration on the nonlinear effect of economic growth is studied with the reference to the panel threshold regression model proposed by Hansen (1999) to build a threshold regression model between economic growth and tourism industry agglomeration to analyze the relationship between tourism industry agglomeration and economic growth.[17] In this study, the threshold effect means that there are several inflection points (critical values) for the relevant indicators in the process of the impact of tourism industry agglomeration on economic growth, crossing which the economic growth will change to varying degrees, and such inflection point is the threshold value. The impact of threshold variables in different stages on the explaining variables is used to highlight the nonlinear relationship between the explaining variables and the interpreted variables to internalize the exogenous variables, expressed as follows:

$Y_{it} = \alpha_i + \beta_1 X_{it} + \beta_2 Z_{it} \times I(q_{it} \leq \eta_1) + \beta_3 Z_{it} \times I(q_{it} > \eta_1) + \mu_{it}$ (1)

Where,

Y= explained variable;

X=other control variables;

i, t= the region and time, respectively;

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α_i, β_1, β_2 and β_3=the parameters to be evaluated;

Z=an explaining variable with a threshold variable;

q=threshold variable (it can be explaining variable itself, or other independent variables);

$I(.)$ =indicative function, if the expression in parentheses is true, the value is 1, otherwise it is 0.

η_1= threshold value;

μ_{it}= random disturbance term, and $\mu_{it} \sim N(0, \sigma^2)$.

Formula (1) represents the panel threshold model with a threshold value. Similarly, the double panel threshold model is as follows:

$Y_{it} = \alpha_i + \beta_1 X_{it} + \beta_2 Z_{it} \times I(q_{it} \leq \eta_1) + \beta_3 Z_{it} \times I(\eta_1 < q_{it} \leq \eta_2) + \beta_4 Z_{it} \times (q_{it} > \eta_2) + \mu_{it}$ (2)

In formula (2), η_1 and η_2 are two threshold variable values, and other expressions are the same as formula (1). Similarly, a triple threshold model, a quadruple threshold model, and the like can be set.

Based on this idea, in order to more comprehensively reflect the non-linear effect of tourism industry agglomeration on economic development in various provinces and cities, the important factors that affect economic growth are introduced, and the lag phase of the explaining variables is included in the explained variables. Considering the influence of the lag of variables on the model and eliminating the influence of dimensions, the following dynamic panel threshold model is constructed by performing logarithmic processing on the exponentially increasing variables.

The single dynamic threshold model is expressed as follows:

$\ln pgdp_{it} = \alpha + \beta_0 \ln pgdp_{i,t-1} + \beta_1 lq_{it} + \beta_2 \ln rd_{it} + \beta_3 L_{it} + \beta_4 \ln K_{it} + \beta_5 open_{it} + \varphi_1 \ln pgdp_{it} \times I(C < \eta) + \varphi_2 \ln pgdp_{it} \times I(C > \eta) + \mu_{it}$ (3)

Where,

$pgdp_{i,t}$ = explained variable, representing the per capita GDP for i provinces in time t;

$pgdp_{i,t-1}$= the explained variable in the next period;

lq_{it}=core explaining variable, indicating the degree of agglomeration of tourism industry in province I in the period of t, measured by location entropy;

rd_{it} , L_{it} , K_{it} , $open_{it}$ =a group of control variables, representing the R&D expenditure, human capital, capital stock and openness to the outside world of i provinces in time t;

$I(.)$= indicative function;

C= the threshold variable for this threshold model, where the logarithm of the interpreted variable's per capita gross domestic product (lngdp) is used as the

threshold variable.

η=specific threshold value;

μ_{it} =random disturbance term, in the normal distribution of zero mean, zero variance and zero covariance.

The dual dynamic threshold model is expressed as follows:

$\ln \text{pgdp}_{it} = \alpha + \beta_0 \ln \text{pgdp}_{i,t-1} + \beta_1 \text{lq}_{it} + \beta_2 \ln \text{rd}_{it} + \beta_3 L_{it} + \beta_4 \ln K_{it} + \beta_5 \text{open}_{it} + \varphi_1 \ln \text{pgdp}_{it} \times I(C < \eta_1) + \varphi_2 \ln \text{pgdp}_{it} \times I(\eta_1 < C \leq \eta_2) + \varphi_3 \ln \text{pgdp}_{it} \times I(C > \eta_2) + \mu_{it}$ (4)

Where,

η_1 , η_2 =two threshold variable values; other variables are expressed as above. Similarly, a panel threshold model with multiple thresholds can be set by analogy.

Description of variables and data

Explained variable

According to Neoclassical Growth Theory, capital, labor and technology play a decisive role in economic growth. In this study, tourism industry agglomeration is regarded as a new factor of production, and its nonlinear effect on economic growth is studied. The real GDP per capita (after deducting the impact of inflation) is used to measure the economic development level of a certain region. Specifically, based on the nominal GDP in 2007, the income from its price index offset is taken as a logarithm to get the explained variable lnpgdp.

Core explaining variable

The core explaining variable, the index of tourism industry agglomeration degree is mainly measured by location entropy, industry concentration, Gini coefficient, Herfindahl Hirschmann index, H index, E-G index and CRn index at home and abroad. In this paper, the location entropy index is selected, and the results can be used for panel data analysis. According to the research of Guo Yue et al. (2015)[14], the location entropy index lq_{it} in the t period of the i -th province is calculated as follows:

$$\text{lq}_{it} = \frac{\text{income}_{it}/\text{gdp}_{it}}{\text{income}_t/\text{gdp}_{it}} \quad (5)$$

Where,

income_{it}= the tourism income of each province in each period;

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lq_{it} can be used to measure the share of tourism industry in this region in China. $\text{lq}_{it}>1$ indicates that the industrial agglomeration trend in this area is obvious, and the larger lq_{it} means the higher the agglomeration degree.

III.Control variables

In this paper, the R&D expenditure (rd), human capital (l), capital stock (k), and opening to the outside world (open) of each province in China are selected to characterize. According to the research of Zhang Jun et al. (2004)[18], the capital stock in the base period is calculated by dividing the actual investment in fixed assets in 2007 by 10%, and the process is as follows.

$K_t = (1 - \delta_{it})K_{i,t-1} + I_{it}$ (6)

In formula (6), the depreciation rate δ=9.6%, and I refers to the actual investment in fixed assets of the whole society in each province calculated by the perpetual inventory method.

With reference to the research of Chen Gang and Li Shu (2011)[19], the human capital is measured by the index of the average length of education of the employees, and the process is as follows.

Per capita years of education = (illiterate or poorly literate population ×2 years+population with primary school education ×6 years+ population with junior high school education ×9 years+population with high school education ×12 years+ population with college education or above ×16 years) ÷ population aged 6 years and above.   (7)

The ratio of total import and export trade to GDP (Open) is used to calculate the degree of opening to the outside world. Considering the availability and continuity of the data, the related data of 29 provinces (municipalities and autonomous regions) in China from 2007 to 2017 are selected in this study excluding Hainan Province and the Tibet Autonomous Region whose related data are missing, and Hong Kong, Macao and Taiwan whose data are not available. The data are from China Statistical Yearbook, China Tourism Statistical Yearbook and statistical yearbooks of various provinces (municipalities and autonomous regions) from 2008 to 2018.

EMPIRICAL ANALYSIS
The Measurement of Tourism Industry Agglomeration and Analysis of Its Characteristics

The agglomeration index of tourism industry is obtained according to the formula of the location

entropy index. In order to better observe the agglomeration characteristics of China's tourism industry in various provinces, the calculation results are visualized. Limited to the space, only the spatial distribution of China's tourism industry location entropy index in 2007, 2010, 2013 and 2017 is shown here.

Fig. 1 Spatial distribution of tourism industry agglomeration characteristics of provinces in China
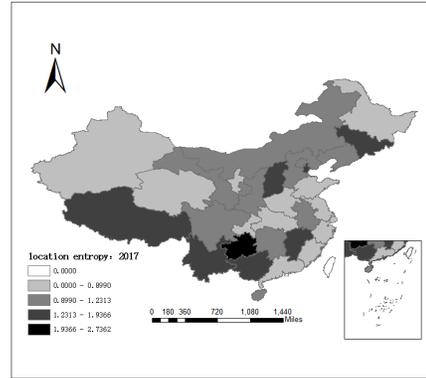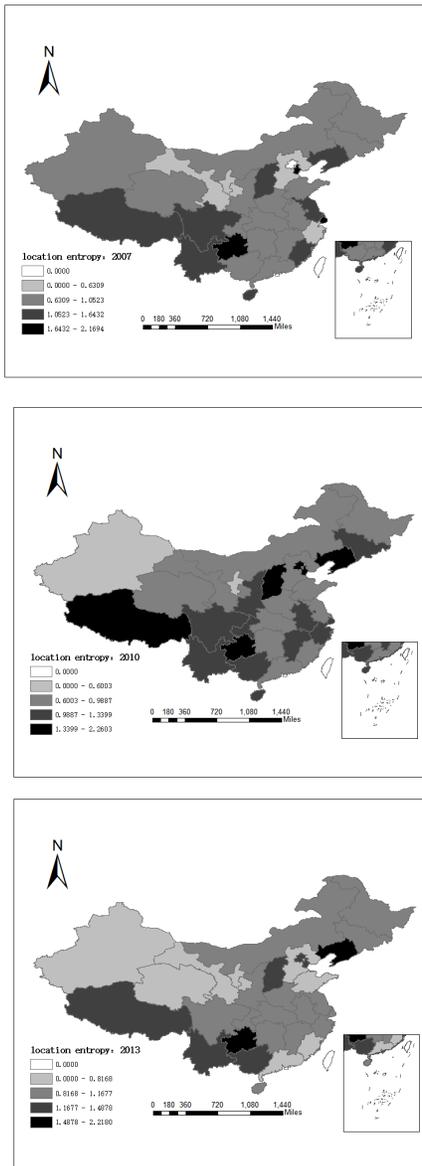

Fig. 1 shows that China's tourism industry has shown a tendency of agglomeration as a whole, and the location Entropy Index of tourism industry in all provinces fluctuates upwards and downwards at 1. It is found through calculation that during the period of 2007-2017, the average value of location entropic index of national tourism industry reaches above 1, which indicates that the agglomeration characteristics of Chinese tourism industry are obvious and worth further exploration, which is also consistent with the conclusions of some existing studies. For example, Yang Yong (2010) measured the spatial Gini coefficient, industrial regional agglomeration coefficient and regional common agglomeration coefficient to prove that the agglomeration of China's tourism industry is an objective phenomenon.[20] Wang Kai et al. (2013) measured with Gini coefficient and E-G index, indicating that there is spatial agglomeration in tourism but to a lesser extent.[21]

On the whole, China's tourism industry shows an industrial agglomeration trend in both time and spatial distribution, but with great differences among regions: Beijing, Shanghai, Yunnan, Guangdong, Guizhou, Sichuan and Shanxi have obvious industrial agglomeration trends ($lq_{it} > 1$); Tianjin, Hebei, Jilin, Heilongjiang, Henan, Inner Mongolia and other places have a low degree of industrial agglomeration ($lq_{it} < 0.5$). Next, the impact of China's tourism industry agglomeration on economic growth will be further explored.

Test of the threshold effect of tourism industry agglomeration on economic growth

Zhao Lei and Mao Runze (2013)[22] and Zhao Lei and Fang Cheng (2017)[23] pointed out in their research that the hypothesis of tourism-oriented economic

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growth is real in China, and the development of tourism industry has a nonlinear effect which has different effects on regional economic growth due to different levels of regional economic development. In this paper, the focus is on the non-linear impact of tourism industry agglomeration on economic growth. According to Shen Tiyan et al. (2012)[24], the scale returns of output density will be different with different levels of economic development. Therefore, the level of economic development will also be studied in this paper as the threshold variable. In order to determine the number of thresholds, the models of single threshold, double threshold and triple threshold are estimated respectively, and the results obtained by the third estimation are shown in Table 1.

Table 1
Test of the Threshold Effect of Tourism Industry Agglomeration on Economic Growth

Threshold variables	F value	P value	Threshold value	95% confidence interval
Single threshold	425.64***	0.000	10.552	[10.514, 10.765]
Double threshold	-181.75	0.960	10.304	[10.287, 10.399]
Triple threshold	-60.67	0.130	9.334	[9.330, 9.345]

Note.

P value and critical value are the results of repeated sampling by Bootstrap for 500 times. * * *, * *, * represent significance at the level of 1%, 5% and 10%, respectively. The same below.

Table 1 shows that only a single threshold effect is highly significant, indicating that China's tourism industry agglomeration has only one threshold value (10.552) for regional economic growth. Based on this, referring to the research of Huang Baofeng et al. (2019)[25], according to the threshold value of economic development level lnpgdp of 10.552, the sample is divided into two parts for threshold estimation, and OLS estimation is carried out on the data, so as to compare with the regression results without threshold regression effect. The results are shown in Table 2.

Table 2
Model Estimation Results

Variables	OLS regression	Threshold regression	
		Coefficients	*Coefficients*
		$Lnpgdp \leq 10.552$	$Lnpgdp > 10.552$
lnpgdp	0.55071***	0.3208***	0.0659***
	(-0.0808)	(0.0059)	(0.0152)
lnq	-0.0391**	0.0144*	-0.0167
	(-0.0155)	(0.0081)	(0.0371)
lnrd	0.000543	0.0101***	0.0056*
	(-0.0032)	(0.0023)	(0.0029)
lnL	0.0283**	-0.0072	0.0445*
	(0.0124)	(0.0089)	(0.0239)
lnK	-0.0286	0.0168**	-0.0550
	(0.0206)	(0.0070)	(0.0493)
open	0.0038	-0.0129	0.0047
	(0.0060)	(0.0113)	(0.0032)
con	10.1328***	9.3521***	11.2244***
	(0.3208)	(0.1278)	(0.9278)
Observed value	290	274	45
R^2	0.2514	0.8468	0.6454

Table 2 shows that the R^2 coefficient of the sub-sample regression under the threshold effect is higher than that of OLS regression, which verifies the rationality of the selection of the threshold regression

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model, so the non-linear effect of tourism industry agglomeration on economic growth is mainly analyzed here.

First, the results confirm the different effects of tourism industry agglomeration on economic growth in China. When the level of economic development is less than the threshold value of 10.552, agglomeration promotes economic growth, because agglomeration is the key to the rapid development of tourism industry before market saturation, and the scope economy brought by agglomeration can enable some related enterprises to further gather to form industrial clusters, which can effectively reduce transportation and other costs, strengthen the sharing of standardized knowledge, technology and other resources, and drive economic development with innovation. When the level of economic development is greater than the threshold value of 10.552, the impact of tourism industry agglomeration on economic growth is negative, mainly because the development model of tourism industry which has an important contribution to economic development is relatively mature when the economic development reaches a certain level. At this time, the increase in competition cost brought by agglomeration will cause diseconomies of scale, i.e. the crowding effect caused by too large agglomeration scale will increase the development cost instead, which also confirms Williamson hypothesis. The same is true of the impact of capital stock on economic growth.

Secondly, the results of threshold estimation prove that $lnpgdp$ with one-stage lag has a positive impact on economic growth, both of which are significant at the level of 1%. When the level of economic growth is lower than the threshold, $lnpgdp$ with one-stage lag has a greater role in promoting economic growth, because China's economy is gradually changing from rough growth to high-quality development, which determines that the current development pays more attention to the quality of development rather than just the speed of development. Therefore, when the economic growth rate reaches the threshold, the growth pace will gradually slow down. When the level of economic development is less than the threshold, the coefficient of R&D

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investment ($lnrd$) is 0.0101, and the coefficient after being greater than the threshold is 0.0056, indicating that the R&D investment and economic growth have an inverted U-shaped curve.

Finally, when the level of economic development is less than the threshold, the coefficients of human capital and opening to the outside world are -0.0072 and -0.0129, respectively, which are not significant. After exceeding the threshold, the coefficients are 0.0445 and 0.0047, respectively. Thus it is clear that in the process of economic development, with the continuous optimization of regional factors endowment such as human capital and openness to the outside world, the scale benefits brought by economic growth will be better than before the optimal allocation of input factors.

CONCLUSIONS AND ENLIGHTENMENT

Currently, there are few studies on the role of tourism industry agglomeration in promoting economic growth. According to Williamson hypothesis, tourism industry agglomeration has a significant role in promoting economic growth in the early stage of development, but it will gradually slow down with the change of development stage, and even has an inhibitory effect. Based on this, this paper uses the panel data of 29 provinces (Hainan and Tibet are eliminated due to lack of data) from 2007 to 2017 to analyze the spatial characteristics of China's tourism industry agglomeration, and uses the threshold regression model to analyze the role of China's tourism industry agglomeration in promoting economic growth. The results show that:

First, China's tourism industry shows obvious characteristics of spatial agglomeration. The provinces with high degree of industrial agglomeration are mainly Beijing, Shanghai, Yunnan, Guangdong, Guizhou, Sichuan and Shanxi ($lq_{it}>1$), and those with low degree of industrial agglomeration include Tianjin, Hebei, Jilin, Heilongjiang, Henan, Inner Mongolia etc.($lq_{it}<0.5$).

Secondly, the non-linear effect of China's tourism industry agglomeration on economic growth is significant. When the level of economic development is less than the threshold value of 10.552, tourism industry agglomeration promotes economic growth; and when the level of economic development is greater than the threshold value of 10.552, the impact of tourism

industry agglomeration on economic growth is negative. Williamson hypothesis of China's tourism industry agglomeration is established.

To sum up, the enlightenments are as follows: As the non-linear effect of China's tourism industry agglomeration on economic growth exists objectively, regions with economic level before the threshold should tend to promote the agglomeration of tourism industry, and regions with economic level lagging behind the threshold should pay attention to the optimization and adjustment of tourism industry structure. Specifically: In the central and western regions, attention should be paid to the improvement of tourism infrastructure such as transportation, the optimization of the allocation of tourism resources, and the strengthening of tourism investment, so as to promote the further development and agglomeration of the tourism industry. In the economically developed eastern region, it is necessary to evacuate the crowding effect of tourism centers, pay attention to the technological inclusion in the tourism industry, adjust the structure of the tourism industry, and exert the scale effect of tourism industry agglomeration. In addition, agglomeration centers and peripheral regions should not only give play to their agglomeration advantages, but also pay attention to the development of regional comparative advantages, control the level of industrial agglomeration within a reasonable range through diversified development of tourism industry, form a reasonable diversified industrial structure, and create conditions for inter-regional economic ties and industrial cooperation.

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Conflicts of Interest Disclosure Statement

The authors declare no conflict of interest in the authorship or publication of this work. The authors declare no sponsored financial sources by any organization related to tobacco production for the undertaken study.

References

1. Sui Jianli, Liu Biying. Nonlinear time-varying causal relationship between China's tourism development and macroeconomic growth - based on a non-linear Markov regional transfer causal model, *Economic Management.* 2017, 560 (8): 24-41.
2. Li Shushu, Xing Fumin, Zhang Lingling. The impact of tourism industry agglomeration on the efficiency of regional tourism industry ,*World geography research.* 2017, 26 (3): 134-146.
3. Ni Xiangli, Lyu Wanqing, Zhang Dong. Empirical study on agglomeration development of tourism industry based on location Entropy based on a case study of Yunnan , *Journal of Guangxi University (Philosophy and Social Science Edition).* 2018, 40 (4): 55-60.
4. Sara N. Tourism clustering and innovation paths to economic growth and development , *Oestersund: Sweden European Tourism Research Institute, Mid-Sweden University,* 2003: 81.
5. Kalnins A. and Chun W and Agglomeration Effects and Performance: A Test of the Texas Lodging Industry, *Strategic Management Journal.* 2001(22) : 969- 988.
6. Brulhart M, Mathys N A.. Sectoral Agglomeration Effectsina Panel of European Regions, *Regional Science andUrban Economics,* 2008, 38(4): 348-362.
7. Majewska J. Inter-regional Agglomeration Effects inTourism in Poland, *Tourism Geographies,* 2015, (17) : 408-436
8. Deng Hongbing, Liu Fen, and Zhuang Jun. Spatial Agglomeration and Clustering Development of Tourism Industry in China , *Resources and Environment in The Yangtze Basin,* 2007 (03): 289-292.
9. Guo Wei, He Yuanyuan. Regional Agglomeration, Convergence and Employment Difference of Tourism Industry: Based on the Description of Provincial Panel , *Tourism Tribune,* 2008,23 (03): 29-36.
10. Bing Zhenhua, Gao Jun. The level of regional tourism industry agglomeration in the Yangtze River Delta, *Tourism Science,* 2010, 24 (01): 86-94.
11. Liu Jia, Yu Shuixian. The Relationship between China's Tourism Industry Agglomeration and Regional Economic Growth , *Tourism Research,* 2013,5(04):1-10.
12. Liu Jia, Zhao Jinjin, Zhang Guanghai. Spatial Econometric Analysis of the Relationship between China's Tourism Industry Agglomeration and Tourism Economic Growth , *Economic Geography,* 2013, 33 (04): 186-192.

\

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13. Wang Zhaofeng. Coupling Evolution Characteristics and Mechanisms of Tourist Industry Agglomeration and Economic Growth in Urban Agglomerations Based on a Case Study of Changsha-Zhuzhou-Xiangtan City Group, *Enterprise Economy,* 2019,38 (12): 5-13+2.

14. Guo Yue, Zhong Tingyong, An Ye. Impact of Industry Agglomeration on Total Factor Productivity of Tourism Industry --- Empirical Study Based on Provincial Panel Data of China's Tourism Industry, *Tourism Tribune,* 2015, 30 (05): 14-22.

15. Zhang Guanghai, Wang Lixin. The relationship between tourism industry agglomeration and total factor productivity in China, *Business Studies,* 2016, (11): 186-192.

16. Li Shushu, Xing Fumin, Zhang Lingling. The impact of tourism industry agglomeration on the efficiency of regional tourism industry --- Empirical analysis based on interprovincial panel data of China , *World Regional Studies*, 2017,26 (03): 134-146

17. Bruce E. Hansen. Threshold effects in non-dynamic panels: Estimation, testing, and inference, *Journal of Econometrics*,1999,93(2).

18. Zhang Jun, Wu Guiying, Zhang Jipeng. Estimate of Provincial Material Capital Stock in China: 1952-2000, *Economic Research Journal,* 2004 (10): 35-44.

19. Chen Gang, Li Shu, Lyu Huijuan. Corruption in China and Income Inequality of Urban Residents - Decomposition Analysis Based on Income Source , *Research of Institutional Economics,* 2011 (04): 90-114.

20. Yang Yong. Empirical Study on the Change Trend of Regional Agglomeration of Tourism Industry in China , *Tourism Tribune*, 2010, 25 (10): 37-42.

21. Wang Kai, Yi Jing. The Relationship between Regional Tourism Agglomeration and Performance - Based on the Empirical Study of 31 Provinces and Areas in China, *Progress in Geography,* 2013, 32(3): 465-474.

22. Zhao Lei, Mao Runze. Tourism Development, Threshold Effect and Economic Growth - Empirical Evidence from China , *Journal of Shanxi University of Finance and Economics,* 2013, 35 (12): 69-83.

23. Zhao Lei, Fang Cheng. Non-linear Threshold Effect of Tourism and Economic Growth - Empirical Analysis Based on Panel Smooth Conversion Regression Model , *Tourism Tribune,* 2017,32 (04): 20-32.

24. Shen Tiyan, Lao Xin, Yang Kaizhong. Economic Density: A New Perspective on Regional Economic Research , *Economics Information,* 2012, 4 (07): 82-88.

25. Huang Baofeng, Wu Hantao, Cao Zengdong, Mao Ting. Non-linear Effects of High-tech Industry agglomeration on Economic Growth --- Empirical Study Based on Threshold Regression , *Management Modernization,* 2019,39 (03): 30-34.

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