

Study on Correlation of Guizhou Tourism and Regional Economic Growth Based on Granger Causality Examination

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Abstract: Through the study of relevant literature at home and abroad, it was found that the relationship between tourism and regional economic growth is not unique in the context of the complex social and economic environment. This paper, taking Guizhou Province as the research object, uses serial cointegration test and Granger causality test for empirical analysis. According to the data results, there is a long-term and stable relationship between Guizhou tourism and economic growth. Combined with China's national conditions and statistical data of Guizhou Province, we show that at this stage, it still needs to be carefully considered to set tourism as a strategic leading industry at this stage, so as to achieve sustainable development.

Key words: tourism; regional economic growth; co-integration test; Granger causality test

1 Introduction

In recent years, with the improvement of people's living standards, people are no longer satisfied with food and clothing, but pursue a higher level of spiritual and experience satisfaction. Therefore, many countries and regions regard tourism as the leading industry, and hope that through tourism development, promote regional economic growth, or allow the two to promote each other to form a virtuous circle. Through the research on the relationship between tourism and regional economic growth in recent years, it was found that the development of tourism may not only promote regional economic growth, but also deteriorate the regional economic environment. In order to verify this point of view, this paper selects the data of Guizhou Province, adopts the stability test analysis method, conducts an empirical study on the relationship between tourism and regional economic growth in Guizhou Province, discusses the relationship between the development of tourism and economic growth, and tries to draw a conclusion. Must be a convincing conclusion.

Foreign scholar Bilen[1] believed that there was a temporary and permanent two-way causal relationship between tourism development and economic growth. The bidirectional causal relationship between tourism development and economic growth suggested that in order to achieve high economic growth, policymakers shall pay attention to tourism development. Fonseca[2] summarized the literature on the causal relationship between Granger tourism and income through meta-regression analysis. The higher the probability of accepting the tourism-led growth assumption, the higher the tourism specialization and population size of the country. Katircioglu[3] verified and tested the tourism-led growth ¹ hypothesis in Singapore. Taking Singapore as an example, there was a long-term equilibrium between international tourism and economic growth. Industrial structure and demand structure, the development of tourism could promote the optimization and upgrading of my country's industrial structure and demand structure [4]. However, tourism does not necessarily contribute to regional economic growth. Mao Lijuan [5] found that the impact of tourism scale on economic growth showed an inverted U shape, that was, the development of tourism would promote economic growth, but the marginal effect of economic growth brought by tourism development would gradually decrease, and eventually brought about negative effects. Therefore, while implementing effective tourism development policies, we will further activate the boosting effect of tourism consumption on economic growth, expand the intermediary effect of tourism consumption, and improve the comprehensive contribution of tourism development to economic growth.

2 Data sources and research methods

2.1 Sources of Data

This paper uses the GDP of Guizhou Province as an indicator of economic growth (GDP), and uses the total tourism revenue of Guizhou Province to measure the level of tourism development (TOUR). The data are from China Statistical Yearbook and Guizhou Provincial Bureau of Statistics, and some data are from CNKI. Based on the validity of these data, this paper selects the data from 2001 to 2021, a total of 21 years as the sample data. In order to highlight the changes of variables and eliminate heteroscedasticity to a certain extent, the original variables are logarithmic variables, lnGDP variables and lnTOUR variables. All examinations were performed using Eviews 10.0 software. This paper argues that Guizhou Province, with its national culture and Tongbao culture as the representative of the diverse mountain culture, has attracted a large number of tourists from home and abroad. Studying the relationship between tourism and economic development in Guizhou Province has practical significance for the development of tourism economy in other regions of our country.

2.2 Research Methods

Granger Casualty Test is a statistical method of hypothesis testing that reveals the correlation of time lags between different variables through a series of tests in autoregressive models. A prerequisite for Granger's causality test is that the time series must be stationary, otherwise

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spurious regression problems may arise. Therefore, before the analysis test, the first thing to do is the unit root test, that is, the stationarity test used in this article.

3 Results and analysis

3.1 Descriptive statistical analysis

This paper uses the data of total tourism revenue and regional GDP of Guizhou Province from 2001 to 2021 to study and explore the relationship between tourism development and economic growth, and use evIEWS10.0 software to analyze the data, and the descriptive statistical analysis of the data is mainly described from three aspects: concentration trend, degree of dispersion and distribution shape.

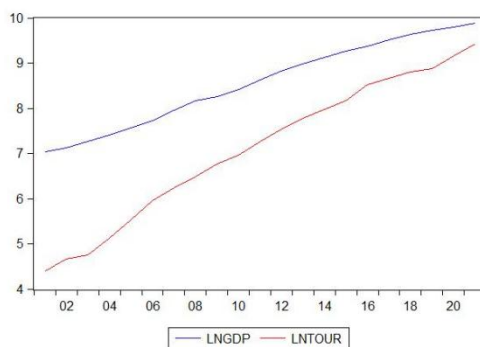


Figure 1. Economic growth (GDP) and tourism trends in Guizhou Province

This paper conducts a logarithmic study of GDP and TOUR separately to eliminate heteroskedasticity and reduce instability. Among them, the economic growth variables and tourism development variables of Guizhou Province are selected from the total tourism income index and the GDP index respectively. The specific data trends are shown in Figure 1. It can be seen that the tourism industry and the regional economy as a whole are on the rise, and the GDP is above the tourism industry, but the development slope of the tourism industry is significantly greater than the growth rate of GDP, that is, the development rate of tourism is faster than the growth rate of GDP.

The overall development of tourism in Guizhou Province also shows an upward trend, but because the development of tourism is affected by many uncertain factors, the process fluctuates. For example, the sudden drop in growth rate in 2003 was caused by the occurrence of SARS in Foshan City, Guangdong Province in early November 2002. Not only Guizhou Province, but the tourism industry in other parts of the country was hit hard. In 2019, due to the impact of the new crown pneumonia epidemic, the growth rate of the tourism industry declined. In 2020, the development of the tourism industry has shown an upward trend. The new crown pneumonia epidemic has brought a serious impact on the cultural tourism industry. Guizhou issued the "Ten Measures to Support the Restoration and High-Quality Development of Cultural Tourism", and at the same time accelerated the supply-side structural reform of cultural tourism, achieved high-quality development, and built an international first-class

mountain tourism destination and a domestic first-class exclusive health care destination as soon as possible.

3.2 Cointegration test

The concept of cointegration is a powerful concept because cointegration allows us to characterize equilibrium or stationary relations between two or more sequences. Studying the cointegration relationship between variables is equivalent to studying the quantitative laws between variables. Secondly, before establishing the model, the cointegration relationship between the variables is tested to prove that they are cointegration, and the established regression model can avoid pseudo-regression.

The standard method for checking sequence stationarity is the unit root test method. First, the unit root test is to test whether a unit root is present in the time series, if the sequence does not have a unit root, it indicates that the time series is stationary, if the unit root is present in the sequence, it means that the time series is not stationary, and the unstable time series will cause pseudo-regression in the regression analysis.

Stationarity test: First, the unit root cointegration test is carried out on LnGDP and LnTOUR respectively. From Figure 1, it can be seen that both variables show a significant upward trend, and it can be seen that the two variables are not stable. In addition, the changing trends have a certain similarity, and they are all sloping to the upper right. Using the ADF test, it was concluded that both LnGDP and LnTOUR were second-order stationary time series, and their ADF values were -5.140134 and -4.784935, respectively, which were less than the ADF critical value at the 1% significance level, rejecting the null hypothesis of the existence of a unit root. The original variables and first-order sequences of LnGDP and LnTOUR failed the test. The detailed results are shown in Table 1.

Table 1. The stationarity test of the data

variable	Test form	ADF statistics	1%ADF critical value	Prob.	Does the unit root exist
lnGDP	intercept and trend	0.634236	-4.498307	0.9989	Yes
dlnGDP	intercept	-2.385705	-3.831511	0.1584	Yes
d2lnGDP	none	-5.140134	-2.708094	0.0000**	No
lnTOUR	intercept and trend	-0.935408	-4.498307	0.9311	Yes
dlnTOUR	intercept	-3.318693	-3.831511	0.0284*	Yes
d2lnTOUR	none	-4.784935	-2.717511	0.0001**	No

Note: * Representative significant at 0.05, ** significant at 0.01, d represents first-order difference, d² represents the second-order difference test prob using MacKinnon critical value.

Cointegration relationship test: The cointegration test is a description of the long-term equilibrium relationship between the two time series data[6], and the final ADF test without trend and intercept is used for the residuals, the equation is: $LNGDP=4.30472343608++=0.59903594607*LNTOUR$, the test statistic is -2.542817, and the significance test value is 0.0139, which is less than the ADF critical value at the 5% significance level. Accordingly, the residuals can be considered to be stable. Therefore, it can

be proved that there is a long-term cointegration relationship between $\ln\text{GDP}$ and $\ln\text{TOUR}$. That is to say, there is a long-term equilibrium relationship between economic growth and tourism development in Guizhou Province, and the two have similar development trends.

3.3 granger test

The coherent relationship test has confirmed the equilibrium relationship between tourism development and economic growth in Guizhou Province, but its structure has not yet been clarified, and it is impossible to determine whether economic growth promotes the development of tourism, or whether tourism development drives economic growth, or has a mutual effect. In order to ensure the validity of the test results, the two variables $\ln\text{GDP}$ and $\ln\text{TOUR}$ do not meet the causal test conditions, but their second-order differential form is a stationary sequence, so we test $d2\ln\text{GDP}$ and $d2\ln\text{TOUR}$. As shown in Table 2.

Table 2. Results of the Granger causality test

Null Hypothesis	Obs	lags	F-Statistic	Probability
$d2\ln\text{GDP}$ does not Granger Cause $d2\ln\text{TOUR}$	18	1	0.42627	0.5237
$d2\ln\text{TOUR}$ does not Granger Cause $d2\ln\text{GDP}$	18	1	1.26016	0.2793
$d2\ln\text{GDP}$ does not Granger Cause $d2\ln\text{TOUR}$	17	2	0.32806	0.7266
$d2\ln\text{TOUR}$ does not Granger Cause $d2\ln\text{GDP}$	17	2	3.62734	0.0586*
$d2\ln\text{GDP}$ does not Granger Cause $d2\ln\text{TOUR}$	16	3	0.47709	0.706
$d2\ln\text{TOUR}$ does not Granger Cause $d2\ln\text{GDP}$	16	3	3.32409	0.0705*
$d2\ln\text{GDP}$ does not Granger Cause $d2\ln\text{TOUR}$	15	4	0.27974	0.881
$d2\ln\text{TOUR}$ does not Granger Cause $d2\ln\text{GDP}$	15	4	2.4644	0.1552

Note: * The significance level of the statistical test is above 0.1.

Due to the limited length of the data, this paper only intercepts the test of the lag period 1-4. Through the above analysis, it is found that the development of tourism in Guizhou Province is the reason for its economic growth, that is, the annual fluctuation of tourism revenue has a significant impact on the year-on-year fluctuation of the total output value of Guizhou Province, while the fluctuation of GDP has not caused the fluctuation of tourism revenue.

The above analysis confirms the long-term stable relationship between tourism and economic growth in Guizhou Province. It is worth noting that at present, the role of tourism in Guizhou in economic growth is not as obvious as in other regions, and as the leading sector of regional economic development, it should drive the growth of other sectors, investment and consumption, so as to become the leading industry driving local economic growth. Although Guizhou Province is currently vigorously developing tourism, and tourism revenue and tourism investment have been significantly increased, which may have promoted economic growth to some extent, the effect is not very obvious. Of course, the development of tourism in Guizhou Province has its unique resource advantages and is an inevitable trend of its future development, but it lags behind in time.

4 Conclusions and Outlook

4.1 Conclusion

The results of this paper's statistical analysis of GDP and tourism revenue data in Guizhou Province show that tourism based on Granger's causal test shows a strong correlation with economic growth, and tourism development is the Granger cause of economic growth, while regional economic growth is not very obvious to the Granger test of tourism. As of 2021, the year-on-year fluctuations in the economic development of Guizhou Province have not had a great impact on the income fluctuations of tourism, and the fluctuations in regional tourism development are the reasons for the fluctuations in economic growth. The development potential and development trend of tourism in Guizhou Province in recent years is beyond doubt, and the purpose of this study is only to question the current tourism as a leading industry in many parts of the country, whether this behavior is feasible and whether it can really drive regional economic growth is worth pondering.

This is not to say that tourism cannot be used as a leading industry to develop the regional economy, but it is emphasized that each region should make decisions after adapting to local conditions and comprehensively considering various factors, rather than blindly following, so as to formulate a feasible strategy suitable for regional economic development.

4.2 Recommendations

Guizhou Province is a suitable place for the development of tourism, with unique natural scenery, good climatic conditions, and a unique cultural heritage. However, its transportation is not developed, infrastructure construction is lagging behind, the overall image is not prominent, and the publicity is insufficient. The following recommendations are made for this behavior: (1) To improve the tourism management system, it is necessary to decentralize the management of various functional departments, give full play to the leading role of the government, do a good job in macro-control in the development of tourism, and give the management power to each tourism management department to the greatest extent. (2) Strengthen infrastructure construction, accelerate the improvement of traffic conditions, accelerate the construction of high-grade highways, and improve the construction of basic supporting facilities such as accommodation, catering, and communications in tourist areas, so as to attract more tourists. (3) To improve the comprehensive quality of residents of tourist areas, the competent departments of tourism should train local residents in cultural quality and moral accomplishment in a planned manner. (4) Strengthen the overall packaging of tourism resources and enhance the image of local tourism. Nowadays is an Internet era, the local government and enterprises should invest in image publicity, through the major short video platforms, and major websites, publicize Guizhou, the customs and cultural landscapes of some scenic spots into documentaries, so that domestic and foreign tourists understand Guizhou, yearn for Guizhou, walk into Guizhou, and miss Guizhou.

4.3 Outlook

The limitations of this paper are mainly in three aspects: First, the selected indicators are few, only the relationship between tourism development and economic growth is studied, and the feasibility and persuasiveness of the theory can be increased through the study of more

variables in the future. Second, this paper only selects the Guizhou region as the research object, does not consider and study the situation in other regions, and the conclusions reached are not universal, and other geographical spaces can be studied in the future.

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