

Analysis on the Influence of Digital Economy on the High-quality Development of Tourism

-- Analysis based on Panel Data of Guizhou Province

Xiaolang Ao^a, Xiaoqin Li^b

School of Accounting, Anhui University of Finance and Economics, Bengbu, Anhui 233030, China

^a2067847613@qq.com, ^b2242048100@qq.com

Abstract

To promote the effective combination of digital economy and tourism is an important path for the modernization transformation of tourism industry and the development of characteristic new smart tourism industry in Guizhou Province. However, as a new form of economic structure, can digital economy effectively promote the improvement of tourism income? What is the internal mechanism of its influence? Based on the above questions, this paper uses the panel data of nine prefecture-level cities in Guizhou Province from 2011 to 2019 to study the impact of digital economy on tourism by using two-way fixed effect model and intermediary model. The results show that: (1) From the analysis of the two-way fixed effect model, the digital economy presents an inverted "U" shaped nonlinear relationship on tourism, which first promotes and then inhibits. (2) The analysis of intermediary model shows that technology level and Internet level are the internal influence mechanism of digital economy on tourism; (3) Heterogeneity analysis shows that the impact of digital economy on tourism varies in different regions. Among them, the digital economy in non-minority areas plays a significant role in promoting local tourism, while the digital economy in minority areas plays an insignificant role in promoting local tourism. Based on the research conclusions, this paper gives corresponding policy suggestions for the development of tourism and helps the rapid development of tourism in Guizhou province.

Keywords

Digital Economy; Tourism; Bidirectional Fixed Effect; Mediation Model.

1. Introduction

As an important part of the modern service industry, tourism is one of the main sources of economic development in Guizhou Province. Practice has proved that the rational use of digital economy can effectively promote the transformation of tourism: Based on this, this paper will sort out the existing modern research theories on tourism economy, and use the panel data of 9 prefecture-level cities in Guizhou Province from 2011 to 2019 to carry out theoretical research on the digital economy promoting the rapid growth of tourism.

Through sorting out relevant literature on digital economy and tourism, the current research on the impact of digital economy on tourism growth is mainly carried out from the following two lines: First, whether the development of digital economy can promote the growth of tourism economy. For example, Jing Lili and Chen Yao (2023) [1] made empirical analysis on relevant data of Jilin Province and concluded that digital economy has a positive impact on high-quality development of tourism. Second, explore the internal mechanism of digital economy's impact on tourism. Wu Dandan, Feng Xuegang et al. (2023) [2]decompose the internal

mechanism of digital economy's impact on tourism total factor productivity, and believe that digital basis is the internal mechanism of digital economy's impact on digital economy. To sum up, although the current research on the influence factors of digital economy on tourism has a certain foundation, there are still the following deficiencies: First, most of the traditional research stays on the linear relationship between the two, without considering the complexity of reality; Second, although a small number of researches on the influence factors of digital economy on tourism point out that there is a nonlinear influence between them, this paper will, on the basis of existing researches, make an empirical analysis based on the panel data of nine prefecture-level cities in Guizhou Province from 2011 to 2019 by using the existing model theory.

2. Research Design

2.1. Model Building

In this paper, the two-way fixed-effect panel regression model is first established. The overall model is shown as follows:

$$Tour_{it} = \alpha_0 + \alpha_1 Dige_{it} + \alpha_2 Dige_{it}^2 + \alpha_3 Controls_{it} + \mu_i + \delta_t + \varepsilon_{it} \quad (1)$$

Where, i represents the city, t represents the year, $Dige_{it}^2$ is the square term of the core explanatory variable. Controls is the control variable, α_0 is the constant term, μ_i is the city fixed effect, δ_t is the time fixed effect, ε_{it} is the residual.

Meanwhile, in order to clearly understand the internal influence mechanism of digital economy on tourism, the intermediary effect model is constructed as follows:

$$\begin{aligned} M_{it} &= \gamma_0 + \gamma_1 Dige_{it} + \gamma_2 Controls_{it} + \mu_i + \delta_t + \varepsilon_{it} \\ Tour_{it} &= \beta_0 + \beta_1 Dige_{it} + \beta_2 M_{it} + \beta_3 Controls_{it} + \mu_i + \delta_t \end{aligned} \quad (2)$$

Where, M_{it} are intermediate variables, namely, technology level (TI) and Internet level (IL).

2.2. Variable Selection and Explanation

The common practice of the current literature referred to in this paper selects variables and makes specific explanation:

1) Tourism development level (Tour) : At the present stage, indicators mainly used to measure the economic development level of tourism include tourism income, tourist number ratio, tourism specialization level, etc. (Wu Rulian, 2022) 错误!未找到引用源。 . Through comprehensive consideration, this paper determines that the tourism income of each prefecture-level city is taken as the measurement index of the tourism development level of each region.

2) Development level of Digital Economy (Dige) : Based on the practice of Jiang Song and Sun Yuxin (2020) [4], this paper obtains the development level of digital economy from the three dimensions of digital foundation, digital innovation and digital industry, and uses the entropy method to calculate the comprehensive development level of digital economy (see Table 1).

3) Technology level (TI): In this paper, three indexes of the number of invention patents, the number of practical technology and the number of appearance patents in nine prefecture-level cities of Guizhou Province were selected, and the regional technology level was calculated comprehensively by entropy method.

4) Internet Level (II): This paper selects the number of Internet broadband users and the number of mobile phone users through the entropy method to calculate the Internet level in Guizhou Province.

5) After taking full account of the tourism factors that may affect it, four control variables are selected in this paper: level of opening to the outside world, level of economic development, upgrading of industrial structure and transportation infrastructure. Among them, the level of opening to the outside world is obtained by the ratio of export value to the gross regional product, the level of economic development is measured by the per capita GDP, the level of industrial structure is measured by the ratio of the tertiary industry to the gross regional product, and the transportation infrastructure is obtained by the ratio of the annual resident population to the length of roads.

Table 1. Digital economy evaluation index system

index	dimension	measures standard	attributes
Development level of digital economy	Digital basis	Internet broadband users	+
		Number of mobile phone users	+
	Digital innovation	Research and Experimental development (R&D) expenditure statistics Bulletin	+
		Science and technology	+
	Digital industry	Total volume of telecommunication service	+
		Telecom revenue	+

2.3. Data Sources

After fully considering the realizability of the data and the accuracy of the results, and in order to ensure that the data is not affected by the index dimension, this paper will carry out logarithmic de-dimensional processing on the obtained data. All the data in this paper are mainly from China Statistical Yearbook and Guizhou Statistical Yearbook.

3. Empirical Analysis

3.1. Baseline Regression

In this paper, the bidirectional fixed effect model, fixed model, random effect model and mixed effect model were respectively adopted in the benchmark regression to analyze the empirical results, and the corresponding tests were used to select the empirical model. The final regression results are shown in Table 2:

It can be seen from the results that, through the F test, it is significant at the level of significance of 1%, indicating that the fixed due to mixing; Wald test showed that the significance level was significant, so random outperformed the effect. According to the results of Hausman test, the conclusion is significant, indicating that fixed is better than random. At the same time, through Lr Test analysis, it is concluded that the bidirectional fixed effect cannot be degraded, so the final model in this paper is determined as the bidirectional fixed effect model.

As can be seen from the benchmark regression results, under the two-way fixed effect model, the coefficient of the digital economy is 4.007, and the coefficient of the square term of the digital economy is -0.946, which is significant under the requirement of 1% significance, indicating that with the continuous development of the digital economy, when the digital economy reaches a specific level, The influence of digital economy on tourism in Guizhou Province has changed from promoting effect to inhibiting effect.

Table 2. Results of baseline regression

variable	FE_twoway		FE	RE	OLS
	(1)	(2)	(3)	(4)	(5)
Dige	2.6094*** (2.67)	4.0075*** (3.65)	3.2064*** (2.87)	3.2808*** (3.39)	3.2808** (2.45)
Dige2	-0.6606** (-2.55)	-0.9464*** (-3.43)	-0.5555** (-2.19)	-0.5319** (-2.46)	-0.5319 (-1.65)
Edl		-2.1007* (-1.90)	-0.9234*** (-2.76)	-0.7440*** (-2.62)	-0.7400 (-1.65)
Tisia		-2.5362 (-1.44)	1.1812** (2.06)	0.7984*** (2.64)	0.7984 (1.40)
Tf		0.1416 (0.01)	14.418 (1.37)	16.259* (1.66)	16.259 (1.79)
Lop		0.4438 (1.52)	1.0115*** (3.19)	1.3290** (2.31)	1.3290 (1.74)
Constant term		9.5907* (1.85)	1.4447 (0.77)	0.3773 (0.28)	0.3773 (0.19)
Urban fixation	Yes	Yes	Yes	No	No
Fixed time	Yes	Yes	No	No	No
F Test					14.39*** (0.000)
Wald Test				186.09*** (0.0000)	
Hausman Test			20.59*** (0.0022)		
Lr Test		38.60*** (0.0000)			
R2	0.8274	0.8468	0.7532	0.7155	0.7155
Sample size	81	81	81	81	81

Note: ***, ** and * are significant at the level of 1%, 5% and 10% respectively; The t values are in parentheses.

3.2. Internal Mechanism Research

In order to study the internal mechanism of the digital economy's impact on tourism in Guizhou province, this paper adopts the intermediary model regression, and finally gets the regression result.

Among them, column (1) is the baseline regression result, and column (3) and (5) are the regression results after adding intermediary variables. It can be concluded from the results that digital economy has a positive impact on the technical level and the development level of the Internet. From the regression result of column (3), it can be seen that with the introduction of the technical level, The influence coefficient of digital economy on tourism decreased from 0.8206 to 0.0440 and was no longer significant, while the influence coefficient of technology level on Guizhou's tourism was 0.6021 and the result was significant. It can be seen that the technical level is the internal factor of the influence of digital economy on tourism in Guizhou Province. According to the same analysis method, the author introduces the Internet level and

draws the conclusion that the technology level and the Internet level are the internal influence mechanism of the digital economy on the tourism industry.

Table 3. Test results of mediating effect

Variable	Tour	Tl	Tour	Il	Tour
	(1)	(2)	(3)	(4)	(5)
Dige	0.8206*** (3.55)	0.3075** (2.04)	0.0440 (0.16)	0.2884*** (7.29)	0.5083
Tl			0.6021** (2.39)		
Il					0.9709*
Constant term	Yes	Yes	Yes	Yes	Yes
Urban fixation	Yes	Yes	Yes	Yes	Yes
Fixed time	Yes	Yes	Yes	Yes	Yes
R2	0.6757	0.9701	0.8253	0.9630	0.6740
Sample size	81	81	81	81	81

Note: ***, ** and * are significant at the level of 1%, 5% and 10% respectively; The t values are in parentheses.

3.3. Heterogeneity Analysis

In order to analyze whether the empirical results are different in different regions, this paper carries out heterogeneity analysis. Guizhou is divided into ethnic areas and non-ethnic areas. Ethnic areas are ethnic minority autonomous regions, and non-ethnic areas are prefecture-level cities. The heterogeneity regression analysis results shown below are obtained:

Table 4. Heterogeneity analysis

Variable	Non-national areas	national areas
Dige	4.9167*** (3.28)	0.4697 (0.42)
Dige2	-1.2180*** (-3.23)	-0.0383 (-0.14)
Constant term	15.138** (2.09)	2.9320 (0.67)
Urban fixation	Yes	Yes
Fixed time	Yes	Yes
R2	0.8259	0.9964
Sample size	54	27

Note: ***, ** and * are significant at the level of 1%, 5% and 10% respectively; The t values are in parentheses.

As can be seen from the heterogeneity test results, the digital economy in non-ethnic areas has a significant impact on tourism, while the digital economy in ethnic areas has no significant impact on tourism. The reason is that the development level of digital economy in minority areas is still to be improved, and the level of digital economy is still at a low level. At the same time, due to the ethnic autonomy of the ethnic areas, there are still different characteristics in some management policies, which makes some policies on digital economy in Guizhou Province limited, and the traditional ethnic style of regional tourism is still preserved, so the combination

level of tourism and digital economy is not high. As a result, the role of digital economy in promoting the development of tourism in ethnic areas has not yet emerged.

4. Conclusion

Through the above research, the following main conclusions are obtained by using the bidirectional fixed effect model and the mediation model: 1) The influence of digital economy on tourism presents an inverted "U" shaped nonlinear influence, which is promoted first and then inhibited. The development of digital economy can effectively promote the allocation of the overall industry elements of the tourism industry and improve the overall industry liquidity, but at the same time, the large amount of digital elements will lead to the overall elements of the tourism industry mismatch problem. 2) Technology level and Internet level are the internal influence mechanism of digital economy on tourism. Digital economy promotes tourism development through the improvement of technology level and Internet level; 3) Through the heterogeneity test, it is concluded that non-ethnic areas and ethnic areas will have different results due to the development level of digital economy

Based on the above research conclusions, this paper will give some policy suggestions. 1) While promoting the combination of digital economy and tourism, local governments should fully coordinate the elements of the two industries and make use of the structural dividend of digital economy to help the transformation of tourism. 2) Guizhou Provincial government should continue to strengthen the infrastructure construction of digital economy and use digital economy to promote the rapid development of tourism industry in minority areas.

Acknowledgments

This article research mentality originates from the national university student innovation and entrepreneurship training project (number: S202210378039).

References

- [1] Jing Lili, Chen Yao. Digital economy and tourism development of panel data regression analysis [J]. Journal of changchun university of technology, 2023, 44 (01) : 90-96. The DOI: 10.15923 / j.carol carroll nki cn22-1382 / t. 2023.1.14.
- [2] Wu Dandan, Feng Xuegang, Ma Renfeng et al. Digital nonlinear effect of total factor productivity of tourism economic development [J]. Journal of travel, 2023, 38 (02) : 47-65. The DOI: 10.19765 / j.carol carroll nki. 1002-5006.2022.00.036.
- [3] Wu Rulian. Study on the Coupling coordination measurement, evolution and Spatial effect of high-quality tourism development and rural revitalization [D]. Jiangxi university of finance and economics, 2022. DOI: 10.27175 / , dc nki. Gjxcu. 2022.000469.
- [4] Jiang Song, Sun Yuxin. Digital economy impact on the real economy effect of empirical research [J]. Journal of scientific research management, 2020, 9 (5) : 32-39. DOI: 10.19571 / j.carol carroll nki. 1000-2995.2020.05.004.