

The Effect Analysis of Textile Intangible Cultural Heritage on Tourist Income based on Propensity Score Matching

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Abstract—Whether textile intangible cultural heritage can promote tourist economic growth has remained controversial for a long time. Taking 35 prefecture-level cities with textile intangible cultural heritage as an example, this paper extracts panel data from 2015 to 2017 and use Propensity Score Matching (abbreviated as PSM) to carry out the empirical analysis. The neighbor matching method is used to carry out matching and test, and the result whether it is the national textile intangible cultural heritage has no significant impact on tourist income is obtained. Three conclusions and suggestions are speculated from this result. It is hoped that it can provide suggestions for the development of the tourism industry and the protection and inheritance of textile intangible cultural heritage.

Keywords—Tourist income; Textile intangible cultural heritage; PSM; Inheritance and protection

I. INTRODUCTION

After the reform and opening-up, China's economy has rapid development, with the continuous increase of per capita income level of residents, gradual improvement of transportation, accommodation, catering and so on, and prosperous development of tourism industry. Tourism income can directly reflect the development level of the tourism industry in a country or region. Many scholars at home and abroad have carried out relevant studies in many aspects. Yao Zhaoqi uses the unit root test, co-integration test and Granger causality test to point out that the per capita expenditure of Chinese residents has a great influence on the domestic tourist income through models^[1]. Based on the current situation of tourism development in 16 prefecture-level cities in Anhui Province, Zhou Xingli and Shi Tingting make the vertical comparison through factor analysis and establishing multiple linear regression model, and summarize five key factors that affect domestic tourism income in Anhui Province^[2]. For the indexes of tourist income, most of the domestic scholars choose the world cultural heritage as an index to measure the tourist income. For the contradictions in the protection and tourism development of the world heritage sites in our country at present, Wu Bihu, Li Mimi and Huang Guoping use the spatial structure, the theory of quantitative geography and technological means such as geographic information system, questionnaire survey and so on to prove that China's world

heritage sites are facing the great demand of the tourism development from five angles, thus demonstrating the necessity of strengthening the protection of the world heritage sites in our country^[3]. Lin Yuxia, Lin Bishu, and Sun Xiaolong use panel data to analyze the influence of world heritage on the tourism demand of overseas tourist market to mainland China, and further distinguish the differences in the impact of world cultural heritage and natural heritage. The result shows that there are some differences in the influence of world heritage on inbound tourism demand of different tourist markets^[4]. Taking luoyang city as the research object, this paper establishes the principal component model, discusses the influencing factors of tourism income and its development countermeasures^[5]. This paper constructs a three-level analysis model and makes a comprehensive analysis of the factors affecting the domestic tourism income of fujian province by using the grey correlation theory. The results show that the factors of transportation base and economic strength have great influence on the domestic tourism income of fujian province^[6]. However, there is no unified conclusion in the research at home and abroad whether the reasons that affect the growth of tourist income include textile intangible cultural heritage, as well as the difference between domestic national and provincial textile intangible cultural heritage on tourist income effect.

On the basis of the above discussions, it is concluded that there are still two problems that need to be solved urgently: (1) The influence of textile intangible cultural heritage on tourism income. (2) Comparison of the influence of national textile intangible cultural heritage and provincial textile intangible cultural heritage. In view of this, this paper plans to adopt the panel data of the provinces and prefecture-level cities in China from 2015 to 2017, and comprehensively inspects the impact of textile intangible cultural heritage on tourist income through the increase and decrease of tourist income, so as to put forward more effective tourism development plannings and protection strategies of textile intangible cultural heritage.

II. EASE OF USE

A. Theoretical Basis

PSM is a statistical method used for processing observational study data. In the experiment of observational

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study, there are numerous data package bias and confounding variables for many reasons, and PSM aims at reducing the above effects, which is beneficial to carry out a more reasonable comparison between the experimental group and untreated. In the experiment, two experimental subjects with the same score are required. One is put in the treated while the other is in the untreated, that is, two experimental subjects with the same possibility are randomly distributed into one of two groups. No matter which matching method is adopted, if only the final estimated results are similar, it can indicate that the estimated results are robust and authentic. The selection of matching variables is the key to carry out the effect evaluation by using PSM.

If the traditional OLS is used to estimate the effect of textile intangible cultural heritage on tourist income, the estimation bias will be caused by the self-selection of samples. At the same time, endogeneity related problems can not be effectively overcome. So, this paper adopts PSM to overcome the estimation bias caused by the self-selection of samples.

B. Maintaining the Integrity of the Specifications

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III. RESEARCH DESIGN

A. Variable Selection

Because there is no specific index of textile intangible cultural heritage, according to the statistical yearbooks and references of each prefecture-level city, the total tourist income of the prefecture-level city where the textile intangible cultural heritage is located is finally selected as the research object of this paper, which makes the research become typical. Tourism has a high relational degree, depends on various departments and has numerous influencing factors. Choosing reasonable indexes is conducive to the validity of data analysis results.

Through searching the literature and statistical materials and taking into account the difficulty of searching for data and complexity of building the model, the factors that affect the tourist income of the current prefecture-level cities will be sorted into 11 variables including tourism popularity, resource endowment, level of operation and management, state support dynamics, traffic convenience, tourism capacity, tourism consumption ability, economic development level, industrial structure, resource restoration and protection ability, and environmental quality to establish the index system. The 3-year panel data of provinces and prefecture-level cities in China from 2015 to 2017 are selected to analyze the current situation of tourist income.

B. Data Source

The data used in this paper are basically derived from the Statistical Bulletin of National Economy and Social Development and Statistical Yearbook of each prefecture-level city where the textile intangible cultural heritage is located, including the area of prefecture-level city, the number

of star-rated hotels, per capita GDP, per capital disposable income, the proportion of the tertiary industry, the internal expenditure of R&D, and the industrial waste gas emission. In addition, the density of highway network comes from China Urban-Rural Construction Statistical Yearbook, and partial data come from the Statistical Yearbook of each province and The Yearbook of China Tourism Statistics. See TABLE I.

TABLE I. TABLE STYLES

<i>The variable name</i>	<i>Variable meaning</i>
Tourism income	Tourism revenue of prefecture-level cities(Ten thousand yuan)
Become a national textile intangible cultural heritage	1=yes; 0=no
Resources endowment	Prefecture-level city area
Management level	Management investment(Ten thousand yuan)
State support	National investment(Ten thousand yuan)
Transportation convenience	The density of the road network
Tourist reception capacity	Number of state hotels
Tourism consumption capacity	Per capita disposable income(yuan)
Level of economic development	GDP per capita(yuan)
The industrial structure	The proportion of tertiary industry(%)
Resource repair and protection capabilities	R&D expenditure(Ten thousand yuan)
Environmental quality	Industrial emissions(m ³)

IV. ANALYSIS

A. Estimation Results based on OLS

The template is designed so that author affiliations are not repeated each time for multiple authors of the same affiliation. Please keep your affiliations as succinct as possible (for example, do not differentiate among departments of the same organization). This template was designed for two affiliations.

TABLE II. DESCRIPTIVE STATISTICS

<i>Variable</i>	<i>Obs</i>	<i>Mean</i>	<i>Std.Dev.</i>	<i>Min</i>	<i>Max</i>
<i>ln ti</i>	102	6.273	1.661	0.788	10.73
<i>ln pcdi</i>	103	10.33	0.487	9.098	12.89
<i>ln pcgdp</i>	103	10.99	0.552	9.959	11.92
<i>ln mi</i>	84	11.71	2.199	4.920	15.55
<i>ln ni</i>	85	11.60	2.131	6.518	15.22
<i>ln year</i>	105	1.602	0.855	0	2.398
<i>ln nosh</i>	96	3.825	0.999	0.693	6.252

TABLE III. CORRELATION ANALYSIS

	<i>ln ti</i>	<i>ln pcdi</i>	<i>ln pcgdp</i>	<i>ln mi</i>	<i>ln ni</i>	<i>ln year</i>	<i>ln nosh</i>
<i>ln ti</i>	1						
<i>ln pcdi</i>	0.515***	1					
<i>ln pcgdp</i>	0.645***	0.777***	1				
<i>ln mi</i>	0.553***	0.344***	0.464***	1			
<i>ln ni</i>	0.719***	0.495***	0.605***	0.685***	1		
<i>ln year</i>	0.117	0.136	0.226**	0.134	0.244**	1	
<i>ln nosh</i>	0.694***	0.444***	0.512***	0.588***	0.689***	0.154	1

According to TABLE III, it can be seen that the Pearson correlation coefficient between dependent variables and independent variables has statistical significance at the significance level of 5%, and the coefficient is positive, which indicates that ln tourist income is positively correlated with these variables. The correlation coefficient between the dependent variable ln tourist income and the independent

variable \ln years has no statistical significance at the significance level of 10%, which indicates that there is no significant correlation between the variables. The Pearson correlation coefficient between most of the independent

variables has statistical significance at the significance level of 5%, and the absolute value of the correlation coefficient between the independent variables is less than 0.8, so the existence of multicollinearity has the low possibility.

TABLE IV. REGRESSION RESULTS

	<i>ln ti</i>		
	(1)	(2)	(3)
dum	-0.0293 (0.0394)	0.0878 (1.235)	0.0174 (0.0639)
\ln pcdi	0.197 (0.274)	-0.0193 (0.230)	0.0807 (0.234)
\ln pcgdp	0.325 (0.286)	0.00571 (0.333)	0.407 (0.293)
\ln mi	-0.0113 (0.0629)	-0.101 (0.0693)	-0.0285 (0.0630)
\ln ni	0.129 (0.0782)	0.0459 (0.0650)	0.0887 (0.0650)
\ln year	0.146 (0.147)	0.854*** (0.258)	0.451** (0.195)
\ln nosh	0.523*** (0.162)	-0.130 (0.228)	0.370** (0.178)
_cons	-2.685 (2.243)	6.562 (4.015)	-1.698 (2.877)
N	71	71	71
R2	0.597	0.317	
adj. R2	0.553	-0.293	
F	13.35	2.448	
chi2			28.80
F test that all $u_i=0$ (p-val.)		5.91 (0.0000)	
LM test (p-val.)			3.89 (0.0243)
Hausman test (p-val.)		17.66 (0.0239)	
Modified Wald test for heteroskedasticity (p-val.)		2.8e+30 (0.0000)	1.3e+05 (0.0000)
Wooldridge test for autocorrelation (p-val.)		7.616 (0.0125)	

Standard errors in parentheses
* p < 0.1, ** p < 0.05, *** p < 0.01

Regression 1, 2, and 3 are regression results of mixed effect, fixed effect and random effect, respectively. The statistical magnitudes and P values of the regression model test are listed in the table above. From the 3 inspection results, we can see that this paper should select the fixed effect model. For the Wald Joint Survey/ F Test of the coefficient by the regression equation, its original hypothesis of the test is that all the coefficients are zero. The P value corresponding to the Wald Joint Survey/ F Test is 0, and the original hypothesis can be rejected at the significance level of 1%. It can be seen that the equation has significant overall linearity.

Whether textile intangible cultural heritage can become a national textile intangible cultural heritage is not based on exogenous variables, but virtual endogenous variables. Therefore, the application of OLS to estimate the influence of textile intangible cultural heritage on tourism will lead to the bias caused by self-selection.

B. Estimation Results based on Propensity Score Matching

TABLE V. ESTIMATION RESULTS BASED ON PROPENSITY SCORE MATCHING

Logistic regression Log likelihood= -17.713284						Number of obs = 94 LR chi2(4) = 36.37 Prob > chi2 = 0.5066 Pseudo R2 = 0.5066	
Treated	Coef.	Std.Err.	z	P> z	[95% Conf.]	Interval]	
lnplca	2.513517	0.9147914	2.75	0.006	0.720558	4.30648	
\ln nosh	0.8605534	0.8312208	1.04	0.301	2.489716	0.768610	
\ln pcdi	3.686443	1.357175	2.72	0.007	1.026429	6.346458	
\ln pcgdp	-5.307227	2.063519	-2.57	0.010	9.351651	1.262804	
_cons	-3.252187	14.30734	0.23	0.820	31.29406	24.78968	

TABLE VI. THE ABSOLUTE VALUE

Variable Sample	Treated	Controls	Difference	S.E.	T-stat
Inti Unmatched	5.56711813	6.5884531	-1.02133498	0.46940477	-2.18
ATT	5.66229959	5.3049872	0.35731239	0.47643864	0.75
ATU	5.4267213	5.6804458	0.25372442		
ATE			0.30080986		

TABLE VII. THE OBSERVED VALUES

Psmatch2: Treatment assignment	Psmatch2: Common Support		Total
	Off support	On support	
Untreated	69	12	81
Treated	2	10	12
Total	71	22	93

As can be seen in TABLE V, at the significance level of 10%, the coefficient of three variables has statistical significance, and R2 is 0.5047, which means that the data in this paper are suitable for the PSM. TABLE VI shows that the ATT is 0.3573 and the absolute value of the corresponding t value is 0.75, which is less than the critical value of 1.994 (The critical value of t test is 1.994 with the sample size of 71 and the significance level of 5%). Therefore, it has no statistical

significance at the significance level of 5%, which indicates that whether it is a national textile intangible cultural heritage has no significant impact on tourist income. Unmatched reflects the result of the sample estimation before matching. At this time, the absolute value of the corresponding t value is 1.99, which is less than the critical value of 1.994. Therefore, it has no statistical significance at the significance level of 5%, which indicates that whether it is a national textile intangible cultural heritage has no significant impact on tourist income of each province. TABLE VII shows that in the 71 observed values, a total of 22 observed values are in the common value range.

C. Matching Balance Test and Robustness Test

TABLE VIII. ROBUSTNESS TEST

Unmatched Variable	Matched	Mean		%bias	%reduct /bias/	t-test		V(T)/V(C)
		Treated	Control			t	p> t	
Inplca	U	9.8625	8.3867	125.7		3.22	0.002	0.12*
	M	9.7924	10.022	-16.5	84.5	-0.96	0.349	1.39
Innosh	U	3.437	3.8957	-59.8		-1.57	0.121	0.18*
	M	3.4475	3.1748	35.5	40.6	1.09	0.291	0.54
Inpcdi	U	10.219	10.372	-39.3		-0.99	0.325	0.08*
	M	10.241	10.228	3.2	91.7	0.08	0.938	0.10*
Inpcgdp	U	10.5587	11.101	-117.4		-3.14	0.002	0.24*
	M	10.628	10.757	-31.7	73.0	-1.14	0.268	1.19

TABLE IX. THE BALANCE TEST

Sample	Ps R2	LR chi2	p>chi2	MeanBias	MedBias	B	R	% Var
Unmatched	0.511	36.72	0.00	85.5	88.6	208.7*	0.10*	100
Matched	0.122	3.37	0.498	22.5	25.6	80.5*	1.28	25

TABLE VIII shows that the standard bias of all variables after matching are greatly reduced, and the t test results of all variables show that there is no significant systematic difference between the treated and untreated after matching. The balance test is passed. As can be seen from TABLE IX, the meanbias after matching is greatly reduced, which indicates that the matching result is excellent. It can be seen intuitively in Fig. 1 that after matching, the standard bias of all variables are decreased.

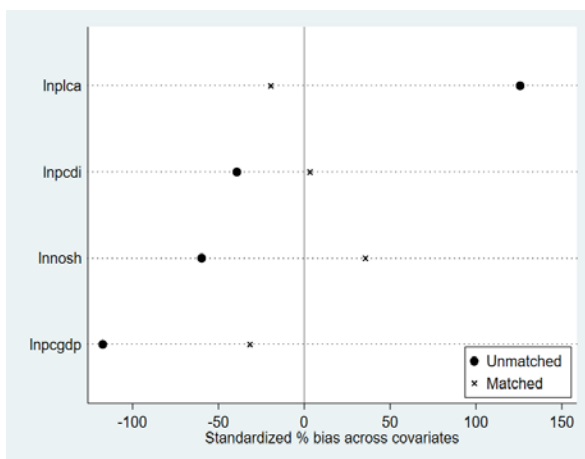


Fig. 1. Standardized % bias across covariates

TABLE X. ROBUSTNESS TEST

Matching method	ATT (T value)	ATU	ATE
Caliper matching	0.1634 (0.69)	0.1634	0.1634
Neighbor matching in the caliper	0.1634 (0.69)	0.1634	0.1634
Kernel matching	0.4626 (1.17)	0.2805	0.3829

Three different matching methods are used to carry out the robustness test, and the obtained result is consistent with the result of neighbor matching.

V. CONCLUSION

A. Conclusion

PSM is used to make an empirical analysis on the indexes that affect the development of the tourism industry by selecting the data of the prefecture-level cities from 2015 to 2017. The result shows that the national textile intangible cultural heritage has no significant effect on tourist income. From the above results, we can speculate on several problems: 1. Textile intangible cultural heritage is not well integrated with the tourism industry. 2. Textile intangible cultural heritage does not play a significant role in tourism industry, and can not guide the government to attach importance to textile intangible cultural heritage. 3. Through the field survey, we have also found that the textile intangible cultural heritage can not keep up with the contemporary social demands, and there are less and less people who can inherit the textile intangible cultural heritage.

B. Suggestion

Promoting the commercialization and tourism of textile intangible cultural heritage is the most effective way for the sustainable development of textile intangible cultural heritage. While protecting "intangible cultural heritage" projects, we should also focus on their development and take them as the selling point to promote tourism development. There are few policies on the marketization of textile intangible cultural heritage protection. Our government should adjust measures to local conditions, combine the local natural landscape and character story characteristics, propagandize the local intangible cultural heritage, and integrate the natural landscape with the human landscape. The government should establish a reasonable inheritance system, give appropriate subsidies to

the inheritors, and guide them to carry out industrialization development in order to improve their initiative and enthusiasm for learning traditional skills.

Universities should continue to follow the special research on the protection and development of textile intangible cultural heritage. They should not only cultivate professional talents but also make non-professional students have an understanding of textile intangible cultural heritage. Educational propaganda can be strengthened by carrying out lectures, seminars or public benefit activities, thus enhancing the national pride and national self-confidence of adolescents.

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