



Research on the Power Mechanism and Realization Path of High-Quality Development of Rural Recreation Industry under the Perspective of Common Wealth

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SUMMARY: *The research constructs the evaluation indicator system for common prosperity and rural recreation industries, uses the entropy weighting approach and obstacle degree model, and quantitatively evaluates the development degree and obstacle degree of common prosperity and rural recreation industries in 30 provinces of China from 2018 to 2025. The next stage in the analysis is that a two-way fixed effect model would be applied to evaluate the influence of common prosperity to the high-quality development of rural recreation industries, and the threshold model will be incorporated to examine the stage effect of common prosperity on the latter. It is established that the general observation is that the index value of common prosperity is low compared to the index value of high-quality development in the rural recreation industries. However, the two indexes have a consistent upward trend. Economic development is regarded as the main obstacle factor from the perspective of common prosperity with an average obstacle degree of 59.57%. Besides, it is also observed that common prosperity helps to advance the high-quality development of rural recreation industries due to the fast movement of productive factors.*

KEYWORDS: *entropy weight method; obstacle degree; two-way fixed effect model; threshold model; common wealth; recreation industry*

1 Introduction

Due to the rich natural endowments and peculiar cultural traditions of rural communities, the rural area has turned out to be one of the most important spots in the recreation industry development sphere [1]. By implementing the rural recreation, it could create an interaction between urban and rural elements by enabling the rural areas to transform blood-transfusion development into blood formation development [2, 3]. However, it also meets the demands of the urban population with high quality and great purchasing power, bringing more income to the villagers. It has become very valuable to appreciate the health industry of China and the policy of the Healthy China strategy was launched [4]. In order to promote the development of the health industry, the government has implemented a number of measures and policies such as financial, tax, and land incentives, setting up national health and wellness demonstration zones, and fostering the development of health tourism demonstration bases [5]. At the same time, the state is also boosting its contribution to and backing of the health and wellness

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industries, which serve to present a powerful assurance and backing in the flourishing growth of the health and wellness industries.

According to the latest academic definition of recuperation, recuperation is defined as the unity of health, wellness and old age in the 2018 China Recuperation Industry Development Report, which views recuperation as an activity that uses nourishment as a means and wellness as a goal, and is a behavior that improves all aspects of human beings and enables them to achieve a good state through the external environment [6-8]. It also clearly explains the three dimensions of health, wellness and old age, indicating that the purpose of recuperation is to enhance the freedom and abundance of life, focus on the quality of life, and extend the length of life [9]. Yang defines the conceptual system of recuperation tourism and discusses in depth the intrinsic motivation of its great development potential. By integrating the existing studies, it aims to condense the operation mode of the recuperation tourism industry, and then puts forward countermeasure suggestions for promoting its high-quality development [10]. Some researchers have tried to summarize the working dynamics of the recuperative tourism industry by examining the existing literature and make policy suggestions that would enhance its quality. Xiaoqin and Jing examined the trend of the development of the forest recreation industry through the lens of supply, demand, and consumption, and afterwards, they offered measures of high-quality development such as developing professionals, enhancing the ability of market actors, developing research on technologies of supporting industries, positively seeking policy support, and development of multi-industry integrated development [11]. The recreation industry comprehensive evaluation system proposed by Yang and Wu is based on attractiveness, management and influence with five key areas being a humanistic environment and eight factors including infrastructure, nature, investment environment and population aging to make the development status of the recreation industry more intuitive, support the development of related industrial chains, and enhance the optimization and upgrading of the economic structure [12]. Chen et al. had studied the internal logic of the integrated development of the traditional Chinese medicine health-care sector elaborately and came up with the idea of developing a cooperative interaction model, developing a cultural system, optimizing the resource allocation, and improving the strategy planning as the four fundamental dimensions of establishing a novel way of the development of characteristics of the traditional Chinese medicine health-care industry. This goal intended to provide a systematic method to the industrial integration and thus enable industrial development in the traditional Chinese medicine health-care industry to be of high quality [13].

A model based on the concept of health was developed in the 1970s in rural areas of Western countries, serving as a foundation for future development of the rural recreation industry [14]. In the initial period of development of rural recreation industry, it is associated with pension services, with the main target customers being the elderly providing them with tourism services, rural accommodation or pension-based services depending on their financial condition [15, 16]. As a consequence of the fast growth of the cities, the economic situation in the countryside is still relatively less developed compared to the cities. Thus, the consumption pattern in the rural area is less developed than that in the cities; however, the environment in the rural area is relatively better compared to the environment in the cities [17]. Liu and Zhu revealed mechanisms and group heterogeneity of the phenomenon under research. The results show that the high-quality development of China's recreation industry is positively related to increased welfare of residents, while the impact can be strengthened by the country's social security system [18]. Wu et al. highlighted that due to the continued growth of China's life expectancy per capita, fast development of China's recreation industry plays an important role in building "Healthy China". He performed a holistic evaluation of China's recreation industry system. Thereafter, five major directions of development of the industry were formed: recreation and

tourism, medical care and recreation, cultural recreation, sports recreation, and intelligent recreation. Feng and Li argued that reliability, responsiveness, assurance and empathy greatly contribute to increased satisfaction of older adults who, in turn, promote innovative development of recreation and care services industry through the development of innovative technologies [19].

The development of modern information technology has a positive impact on the development of the recreation industry; the development of the recreation industry via information technology makes its intelligent transformation unique. It is a significant trend that facilitates the making of the services offered under the recreation industry more intelligent and convenient to the older adults to utilize in addition to enhancing the quality and efficiency of the development of the recreation industry [20-22]. Xia and Chen highlight the essential part of the digital economy in the growth of the senior care service sphere because it enables efficient utilization of resources, reduced prices, and the creation of a high-quality smart care ecosystem. They offer practical recommendations on how the senior care service sphere could reach the level of high-level and high-quality development [23]. Yang states that a smart geriatric care ecosystem can be defined as a dynamic and responsive network with its development founded on uncertainty, human-centricity, and smart infrastructure. Yang develops implementation strategies and evaluative insight into policy design, human resource training, and technology application in order to ensure that the recreation industry achieves high quality development [24]. According to Wang, Y et al., the application of modern technologies, including the Internet of things, big data, and artificial intelligence, in optimizing the distribution of elderly care resources and enhancing the quality and efficiency of the services delivered can facilitate intelligent and personalized care to the older adults, thereby promoting the desired state of the condition of having someone to care for the elderly, having something to rely on the elderly, and having something to enjoy the elderly [25]. As stated above, the present generation of information technology, which is marked by big data, cloud computing, Internet of Things, and artificial intelligence, is pushing the health care and aged care sector into the direction of improved management of resources. Not only does this trend have the advantage of solving the issue of health care and aged care resource shortages and enhancing the quality and efficiency of these resources but also, it ensures the provision of a smarter experience to the aged population, which plays a crucial part in the achievement of the ideal situation of somebody taking care of the aged, something to rely on the aged, and something to entertain the aged [26].

The paper examines the role played by common prosperity in influencing the high-quality development of rural recreation industry and the high-quality development pathway of the rural recreation industry. With the help of the analysis of the features of the common prosperity development and rural recreation industry, an index system of the common prosperity development and rural recreation industry is built and the degree of development of the two subsystems is measured with the use of entropy weight method. Besides, the indices are comprehensively examined and assessed in terms of the development situation, comparative analysis across the provinces, and the analysis of the obstacles. To perform the empirical study on the influence of common prosperity on high-quality development of the rural recreation industry, two-way fixed effects regression analysis is adopted. At the same time, in order to make the results reliable, the paper performs sensitivity analysis in different aspects and utilizes a strong regression model to address the issue of endogeneity. Also, an extended model is presented to investigate how two transmission channels impact the high-quality development of rural industries, which include labor transfer and land transfer. Moreover, a threshold model is applied to determine the threshold impact of common prosperity on the high-quality development of the rural recreation industry. Lastly, a development pathway of the rural recreation industry is proposed.

2 Measurement of Common Prosperity and the Development Level of the Rural Recreation Industry

2.1 Data sources

This paper will analyze the panel data of 30 provinces in China (except Tibet, Macau, Hong Kong, and Taiwan) during the years 2018-2025. Data used as primary sources were taken as the China Statistical Yearbook, the official website of the National Bureau of Statistics, and other recent statistical yearbooks of individual provinces. Multicollinearity and heteroskedasticity were eliminated and the effect of outliers were reduced through logarithmic transformation of all variables.

2.2 Construction of the indicator system

According to the analysis of the common wealth theory, the assessment index system consists of the three dimensions of economic development, income disparity and public services, and the method of entropy weighting is used to set weights to the indicators at all levels. Lastly, with the three-dimensional perspective of analysis, i.e., time-space-indicator, we examine the dynamic evolution of urban common wealth levels.

2.2.1 Construction of the Common Wealth Indicator System

Socialism cannot exist without shared prosperity. Common prosperity is defined as a condition where the benefits of development are shared equally between people because of a consistent economic development which has three essential elements including the high-level economic development, constant decrease in income difference among the residents, and fair access to essential public services. To enable a non-subjective evaluation of common prosperity in the cities of China depending on the current situation and the trend of development, it is important to develop a scientific approach to the creation of a statistical index system of common prosperity that would correspond to the actual reality of China. It will form a solid foundation of research on common prosperity in China under various angles. According to the definition and characteristics of common prosperity, the index system of common prosperity can be categorized into three factors, i.e. economic development, income gap, and public services, as presented in Table 1.

Table 1: Common rich index system

Criterion layer	Primary indicator	Secondary indicator	Tertiary index
Common wealth	Economic development	Materiality	The user accounts for the end of the mobile phone
			Per capita green space
			Gas penetration
		Spiritual abundance	Number of museums per 10,000 people
			Per capita library
		Live well	Per capita GDP
	Worker average wage		
	Income gap	Crowd gap	Middle-income population ratio
			Urban income gap
		Regional gap	Rural income gap
			Urban consumption gap
		Urban and rural gap	Rural income gap
			Urban and rural per capita disposable income ratio
	Public service	Public education	Urban and rural residents consume spending ratios
			Education expenditure is the fiscal expenditure ratio
		Social security	Normal secondary school
			Social security and employment expenditure account for fiscal expenditure
			Insurance coverage for workers' old-age insurance
		Medical hygiene	Urban registration unemployment
			Health care expenditure is the fiscal expenditure ratio
			The number of health technologies per 10,000 people
Daily bed number of every thousand health institutions			

2.2.2 Construction of the indicator system for the development of rural recreation industry

In view of the features of China's rural recreational projects, the corresponding standards related to rural recreation tourism, and the actual basis of rural recreation facilities, and in light of literature reviews, government policies, actual cases, and professional opinions, these evaluation criteria can be formulated on many levels. They consist of recreation resource utilization, recreation environment quality, rural recreation products, recreation service quality, and tourism infrastructure. In this way, the evaluation index system of rural recreation industry development is constructed, which is illustrated in Table 2.

Table 2: Rural health industry development evaluation index system

Criterion layer	Primary indicator	Secondary indicator	Tertiary index
Quality Evaluation of Rural Recreation Programs	Recreation Theme Services	Recreational Accommodation	Recreational Diet
			Recreational Accommodation
		Recreational Goods	Recreational Agriculture Products
			Recreational apparatus or equipment
			Crafts
		Recreational activities	Chinese Medicine and Health Care
			Exercise and Health
			Traditional Intelligence
			Production techniques
			Literary studies
	Farming Experience		
			Patriotic education category
	Resource support	Natural resources	Mountain
			Water bodies (including wetlands)
			Farmland
			Forest
			Hot Springs
		Environmental resources	Water quality
			Air quality
			Quality of the acoustic environment
			Soil quality
			Health and environmental management
		Landscape resources	Agricultural landscape
			Village View
	Human landscape		
	Ecological landscape		
	Supporting Services	Infrastructure	Location and Transportation
Catering			
		Accommodation provided	
Other packages		Tour Packages	
		Shopping Package	
	Recreational Facilities		

2.3 Assignment method based on entropy weight method

The entropy weighting approach determines indicator weights objectively according to the degree of dispersion in the standardized data. The specific procedures are as follows:

Assume that n indicators are set to measure m evaluation objects, and the measurement indicator $X = (x_{ij})_{m \times n}$, where x_{ij} denotes the j ($j = 1, \dots, n$) indicator value of the i ($i = 1, \dots, m$) city.

(1) Data standardization

The purpose of data standardization processing is to eliminate the differences in the indexes, using the positive indexes positive processing and negative indexes reverse processing methods, and ultimately make the data compression between 0 and 1. The specific operation is as follows: For positive indicators:

$$y_{ij} = (x_{ij} - \min x_j) / (\max x_j - \min x_j) \quad (1)$$

For negative type indicators:

$$y_{ij} = (\max x_j - x_{ij}) / (\max x_j - \min x_j) \quad (2)$$

(2) Determine the entropy weight of measurement indicators

The entropy weight of the measurement index is calculated, the entropy weight method is used to determine the weight of the measurement index (P_{ij}), the entropy value (E_j) is calculated, and finally the entropy weight W_j is derived. The specific calculation formula is as follows:

$$\begin{aligned} P_{ij} &= y_{ij} / \sum_{i=1}^m y_{ij} \\ E_j &= \left(-\sum_{i=1}^m p_{ij} \ln p_{ij} \right) / \ln m, j = 1, 2, \dots, n \\ W_j &= \frac{1 - E_j}{\sum_{i=1}^n (1 - E_j)}, j = 1, 2, \dots, n \end{aligned} \quad (3)$$

(3) Construct weighted normalization matrix

The normalized data is weighted to construct the weighted normative matrix:

$$M = (v_{ij})_{m \times n} = \begin{bmatrix} W_1 y_{11} & W_2 y_{12} & \cdots & W_n y_{1n} \\ W_1 y_{21} & W_2 y_{22} & \cdots & W_n y_{2n} \\ \vdots & \vdots & & \vdots \\ W_1 y_{m1} & W_1 y_{m2} & \cdots & W_n y_{mn} \end{bmatrix} \quad (4)$$

2.4 Common Wealth and Rural Recreation Industry Development Index Measurement

The study obtains the index of common prosperity and high-quality development of rural recreation industry s_{ij} for each provincial administrative region in each year, which is calculated by the following formula:

$$s_{ij} = \sum_{j=1}^n c_j X_{ij}' \quad (5)$$

where c_j is the composite weight of the j th indicator, n is the number of indicators in the indicator layer in the indicator system, and X_{ij}' is the dimensionless score value of the j th indicator in the i th year of each region after the preprocessing in the previous section. The study shows the level gap between the two development indexes in a line graph, and Figures 1 and 2 show the index of common prosperity level and the index of high-quality development of rural recreation industry, respectively.

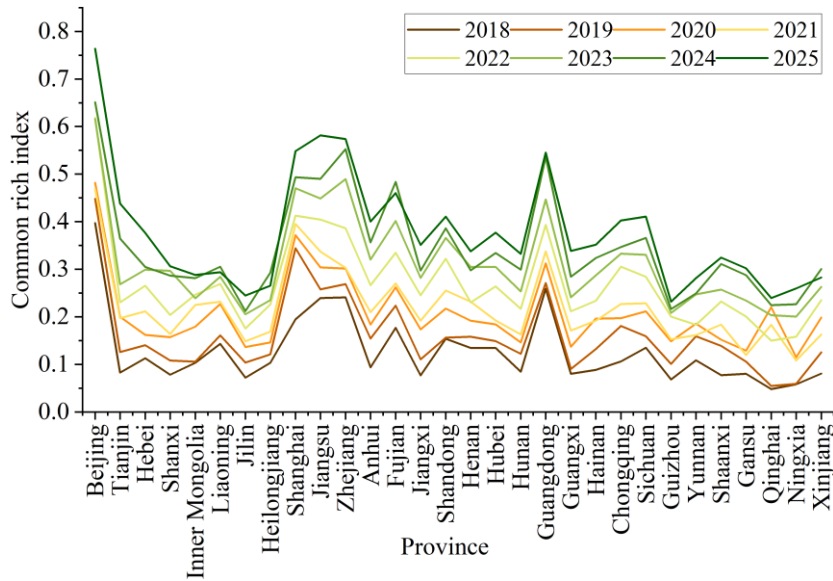


Figure 1: Common rich index

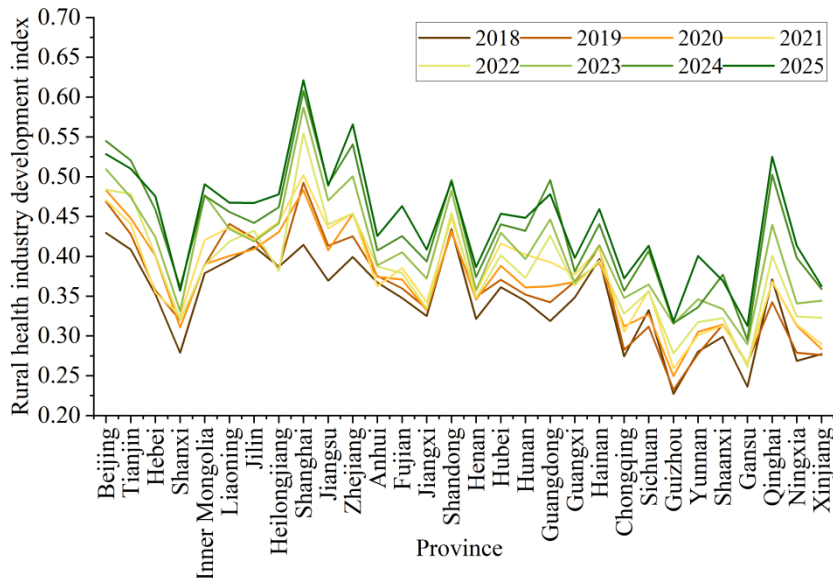


Figure 2: Rural health industry development index

2.4.1 General characteristics

The common prosperity index and the development index of the rural recreation industry trend trajectories are presented in Table 3. On average, the common prosperity index is likely to be lower than the high-quality development index of the rural recreation industry even though the two indicators indicate a fairly steady increase. The high-quality development index of the rural recreation industry has a slower growth rate than the common prosperity index. However, at the same time, the gap between the two indices has been gradually shrinking over the past few years. Since 2018, the high-quality development index of the rural recreation industry has shown a steady growth, which may be attributed to the fact that China has been implementing its poverty reduction and rural revitalization measures on a regular basis. Besides, according to Figures 1 and 2 it can be observed that there are years and provinces where the common prosperity development index exceeds the high-quality development index of the rural recreation industry. It shows that the overall system is heading toward higher coupling and

coordination. However, the two indices remain quite low. According to Table 3, in 2024, the national average index values would be 0.419 and 0.341, respectively. Also, as one may see in Table 3, the highest index values for the common prosperity and high-quality development indices were found in Beijing (0.651) and Shanghai (0.608), respectively. Hence, the persistent difference between the average national indexes and their peaks demonstrates that both indices can still improve significantly.

Table 3: Changes in the index

Year	Rural health industry	Common wealth
2018	0.331	0.128
2019	0.369	0.167
2020	0.372	0.216
2021	0.379	0.232
2022	0.396	0.253
2023	0.404	0.308
2024	0.419	0.341
2025	0.441	0.383

2.4.2 Regional characteristics

Regionally speaking, the eastern region clearly takes the lead in terms of indices for development for both subsystems. Figure 3 shows the trend of the subregions on both the common prosperity index and the high-quality development index of the rural recreation industry. As can be seen from the data shown above, the common prosperity subsystem follows the sequence of Eastern (0.359) > Central (0.230) > Western (0.199) ≈ Northeastern (0.195), while the high-quality development index of the rural recreation industry follows the sequence of Eastern (0.447) > Northeastern (0.428) > Central (0.370) > Western (0.337). For both indices, the development indices at the regional level are above the national level in the eastern region while below the national level in other regions.

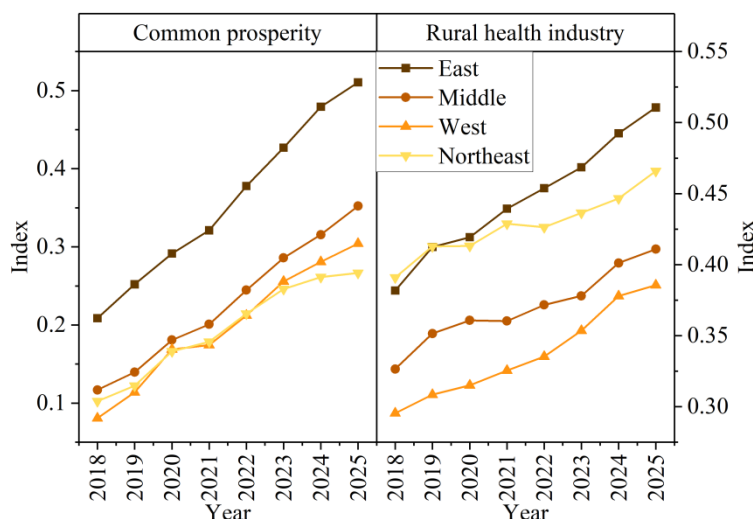


Figure 3: Regional trends

Compared to the high-quality development of the rural recreation industry, the interprovincial and intercity differences between common prosperity achievement are much more obvious. As shown in Figures 4 and 5 below, the five most advanced provinces of common

2.5 Analysis of barrier factors

2.5.1 Barrier degree model

The joint development of the two subsystems that include common prosperity and high-quality development of the rural recreation industry cannot be achieved without taking into account its constituent subsystems and elements of each of them. To reveal the problems and barriers that hinder further development of the subsystems, thus improving their joint development, this paper refers to literature on the topic and applies the obstacle degree method to reveal barrier factors impacting the two systems. The obstacle degree method is considered one of the most frequently used approaches to measuring development barriers quantitatively. This approach mainly covers three main criteria: factor contribution, indicator deviation, and obstacle degree. The process is as follows:

(1) Determination of factor contribution. Factor contribution refers to the degree of influence of each indicator on the overall level of development of the subsystem to which it belongs, and the study uses the weight of the indicator W_j instead.

(2) Calculate the deviation of indicators. Indicator deviation refers to the difference between the actual value and the ideal value of each indicator. The study takes the standardized value X_{ij} of each indicator after standardization using the extreme value processing method as the actual value of the indicator, and the ideal value is usually set to 1. Therefore, the indicator deviation Z_{ij} is:

$$Z_{ij} = 1 - X_{ij}' \quad (6)$$

(3) Calculate the obstacle degree O_j :

$$O_j = \left(\frac{Z_{ij}W_j}{\sum_j^m Z_{ij}W_j} \right) * 100\% \quad (7)$$

$$S_j = \sum_j^m O_j \quad (8)$$

where O_j and S_j are the obstacle degree of the indicator layer and the second-level indicator layer respectively, the obstacle degree of each second-level indicator layer is the sum of the obstacle degrees of all the indicator layers contained in the layer, and m is the number of indicator layers contained in a certain second-level indicator layer. The greater the value of obstacle degree, the stronger the obstacle degree of the indicator or element to the overall development of the subsystem.

2.5.2 Barrier factor analysis

The research is based on Microsoft Excel as an estimated measure of the extent of barriers of second-level indicator layers in the coupled system of common prosperity and high-quality development of the rural recreation industry in China within the timeframe of 2018-2025 using the obstacle degree model. The analysis findings are shown in Table 4. On the whole, the dynamics of changes in the barrier degree of the two major subsystems are significantly different. The level of variability of the barrier degree of the second-level indicators in the

common prosperity subsystem is higher compared to the corresponding distribution in the high-quality development of the rural recreation industry subsystem. Economic development is the key obstacle factor in the common prosperity subsystem with the average value being 59.57%. Nevertheless, the intensity of economic development barrier is decreasing over the years. For instance, it drops down to 78.39 percent in 2018, and to 51.22 percent in 2025, or by 34.66 percent. This information tells us that the economic development conditions in China have improved significantly, but there is still considerable potential to improve them further. To compare, the income gap and the level of obstacles to public services are growing every year. The common wealth development should be focused on the income gap and public services. As regards the high-quality development of the rural recreation industry, resource support has become the most limiting factor. Resource support barrier is low rising in 2018-2023 and then starts to decrease slowly. The intensity of barriers to the supporting service is generally decreasing in the time frame, yet the absolute value is quite high.

Table 4: level of the secondary index barrier(%)

Year	Common wealth			Rural health industry development		
	Economic development	Income gap	Public service	Concentric service	Resource support	Supporting service
2018	78.39	18.72	7.17	14.35	33.11	27.74
2019	65.72	24.16	9.97	14.96	34.91	26.88
2020	60.38	28.84	10.68	15.57	35.29	25.91
2021	59.50	29.44	10.98	14.36	36.47	26.27
2022	55.29	33.41	10.98	14.73	37.04	24.61
2023	53.62	34.57	11.81	14.85	37.62	24.49
2024	52.47	35.23	12.06	15.09	37.24	24.33
2025	51.22	36.12	12.67	14.95	35.58	24.13
Mean	59.57	30.06	10.79	14.86	35.91	25.55

3 Selection of variables

(1) Research hypotheses

Hypothesis 1: Common prosperity can greatly help in developing the rural recreation industry sustainably.

Hypothesis 2: Common prosperity provides a way for the movement of production factors such as labor and land resources to achieve high-quality development of the rural recreation industry.

Hypothesis 3: The effect of common prosperity on high-quality development of the rural recreation industry follows an inverted-U shape.

(2) Explained Variables

To evaluate the effect of common prosperity on the rural recreational industry with a more severe approach, this paper is going to employ the growth rate of the rural recreational industry (RUR) of 30 provinces in China (Hong Kong, Macau, and Taiwan not included) during 2018-25, which is stated in Chapter 2, as the dependent variable in this research.

(3) Core explanatory variables

The measured results for the common prosperity level (COM) presented in Chapter 2 are used as the core explanatory variable.

(4) Control Variables

This study is based on the current literature and it posits that the following variables might have effects on the high-quality development of the rural recreation sector: urbanization (CON), external openness (OP), government financial support (GOV), economic development (EM), education of the older generation (EDUC) and infrastructure (INFR). This is why they are regarded as control variables.

(5) Model Construction

In this section, the empirical data is used to explore the encouraging nature of common prosperity. In order to mitigate potential biases created by the variance among provinces, regional fixed effects and year fixed effects are incorporated into the model. The empirical model is specified in the following manner:

$$RUR_{it} = \alpha_0 + \alpha_1 COM_{it} + \alpha_2 CON_{it} + \alpha_3 OP_{it} + \alpha_4 GOV_{it} + \alpha_5 EM_{it} + \alpha_6 EDUC_{it} + \alpha_7 INFR_{it} + u_i + \varphi_t + \varepsilon_{it} \quad (9)$$

In the above equation, i represents area and t represents year. u_i and φ_t represent unobservable area effects and time effects, respectively. ε_{it} serves as the random disturbance term.

In addition, in order to understand how much common prosperity influences the high-quality development of the rural recreation industry at different development levels, it is necessary to consider if there is any threshold effect that may occur when the industry's development reaches another stage once a particular development level is achieved by common prosperity. This will be done through the use of threshold regression models to see the relationship between the two variables.

Since it is difficult to identify the number of thresholds at the beginning of the study, we use a one-threshold model and estimate the model below:

$$RUR_{it} = a_1 + a_{12} COM_{it} (q_i \leq r) + a_{13} COM_{it} (q_i > r) + \sum_{n=1}^3 a_{1n} CV_{it} + \gamma_t + n_i + \varepsilon_{it} \quad (10)$$

q_i denotes the threshold variable and r denotes the unknown threshold value. Finally, the thresholds of the model are tested sequentially using bootstrap method to obtain F-statistics and P-values.

(6) Correlation analysis

Before carrying out the empirical analysis of the study, we need to conduct tests for correlation and multicollinearity between the variables. In this case, the article makes use of the pairwise correlation (pwcrr) method to calculate the correlation coefficients of the indicators, as shown in Table 5.

The correlation coefficient between the main independent variable, i.e. common prosperity, and the dependent variable is 0.383, and the significance level is 1 percent. This already provides us with preliminary evidence that common prosperity can be considered as one of the factors that influence high-quality development of the rural recreation sector. Concerning the control variables, the obtained results of their tests are statistically significant at 5 per cent which means that our selected indicators have been making the correct decision. For the multicollinearity test, the presence of severe multicollinearity means that the correlation coefficient should be above 0.7. According to the results, the highest correlation coefficient among the control variables is 0.640.

Table 5: Correlation analysis of indicator variables

Variables	RUR	COM	CON	OP	GOV	EM	EDUC	INFR
RUR	1.000							
COM	0.383***	1.000						
CON	0.389***	0.143***	1.000					
OP	0.299**	0.105**	0.221***	1.000				
GOV	0.433***	0.191***	0.446*	0.185***	1.000			
EM	0.531***	0.542**	0.588***	0.281***	0.107***	1.000		
EDUC	0.640**	0.598***	0.289***	0.517***	0.391***	0.134**	1.000	
INFR	0.407***	0.426***	0.215*	0.172***	0.506**	0.588**	0.185***	1.000

Note: *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

To further ensure the accuracy and validity of the empirical results, the study also tests multicollinearity through the Variance Inflation Factor (VIF). The calculations, performed with STATA 17.0, show that multicollinearity is generally considered absent when $VIF < 5$. The maximum VIF among the correlated variables is 3.85, which is well below 5. Therefore, there is no substantive multicollinearity among the indicators.

Table 6: VIF test results of variables

Variable	VIF	1/VIF
RUR	3.53	0.283
COM	2.96	0.338
OP	3.66	0.273
GOV	3.85	0.260
EM	3.73	0.268
EDUC	3.52	0.284
INFR	3.49	0.287

For a description of each variable, see the details shown in Table 7 below.

Table 7: Describes indicator variables

Variable specification	name	content	symbol
Explained variable	The development level of rural kangshan industry		RUR
Core interpretation variable	Common wealth		COM
Control variable	Level of urbanization	Urban population/Rural population	CON
	Open level	Total import and export / Regional GDP	OP
	Financial support	Elderly welfare expenditure	GOV
	Economic development level	Regional economic product	EM
	Older people's oral dependency ratio	The number of people over the age of 65 /The number of 15-64 years	EDUC
	Infrastructure	Every thousand medical institutions	INFR

(7) Descriptive statistics

In a study of the impact of common prosperity on the high-level development of the rural recreation industry, seven variables were considered. These descriptive statistics are shown in Table 8. Both COM and RUR have relatively small averages, with considerable differences between their maximum and minimum values. Hence, in most Chinese regions, common prosperity and the rural recreation industry seem to be limited. Moreover, considerable variations between regions are observed, while the average value of other control variables is not low enough, although the difference between their maximum and minimum values is significantly large.

Table 8: Descriptive statistics of variables

Variable	Mean	SD	Min	Max
RUR	0.426	0.101	0.268	0.548
COM	0.539	0.257	0.093	0.974
CON	61.319	10.755	30.313	89.966
OP	0.022	0.006	0.018	0.032
GOV	22826.046	11669.082	1489.370	67605.152
EM	63648.472	30249.620	25953.702	187523.912
EDUC	16.438	4.374	6.980	28.137
INFR	7.494	3.404	2.820	11.821

4 Empirical results and analysis

4.1 Benchmark Regression for the Full Sample

This section employs empirical studies to examine the association between common prosperity and a high quality development of the rural recreation industry through the application of the panel data of 30 provinces in China during 2018-2025. In order to determine whether the fixed effect is superior to the random effect we use the Hausman test. Based on our findings, the fixed-effect panel model is more effective than the random-effect panel model, and hence the first will be used in our study. The regression results are reported in Table 9. In particular, column (1) reports the results of the regressions without including any fixed effect, whereas columns (2), (3), and (4) progressively include the time fixed effect, regional fixed effect, and control variables to the regression model as two-way fixed effects. It can be seen that the signs and significances of all the variables remain relatively unchanged as the fixed effect is gradually included as shown in Table 9, indicating that our estimated results are stable. More so, our regression coefficient of common prosperity is significant at both 1 per cent and 5 per cent levels. This implies that common prosperity plays a role in contributing to high-quality development of the rural recreation industry. To put it simply, common prosperity enhances the high-quality development of the rural recreation industry, which is backed up by our empirical evidence based on the previous theoretical analysis.

Regarding the independent variables, it shows that there is a significant impact of finance at a confidence interval of 1%. It means that the finance invested in the recreation industry can compensate for the shortcomings in the sector through faster rural infrastructure development, structural optimization, and upgrading in the rural recreation industry, hence its high-quality development.

Table 9: Regression results

Variable	(1)	(2)	(3)	(4)
COM	0.0151***	0.1030***	0.0229***	0.0752**
	(0.0017)	(0.0321)	(0.0047)	(0.0286)
CON	0.0017*	0.2069**	0.1375*	0.2202**
	(0.1061)	(0.1220)	(0.1059)	(0.1274)
OP	0.2694*	0.2902*	0.0904*	0.1163*
	(0.0743)	(0.1058)	(0.1036)	(0.1639)
GOV	0.0236***	0.0391***	0.0197***	0.0287***
	(0.0104)	(0.0108)	(0.0125)	(0.0150)
EM	0.0188**	0.0158***	0.0104***	0.0097**
	(0.0094)	(0.0082)	(0.0049)	(0.0066)
EDUC	0.0877***	0.0888***	0.0948***	0.0908***
	(0.0371)	(0.0426)	(0.0353)	(0.0400)
INFR	0.0749***	0.0232***	0.0960***	0.0232***
	(0.0263)	(0.0672)	(0.0229)	(0.0782)
Constant term	0.1971***	0.2517***	0.0487*	0.0881*
	(0.0776)	(0.1025)	(0.0752)	(0.1376)
Time fixed effect	Uncontrolled	Control	Uncontrolled	Control
Regional fixation effect	Uncontrolled	Uncontrolled	Uncontrolled	Control
Sample size	455	455	455	455
R^2	0.8767	0.8904	0.8862	0.8965

4.2 Endogeneity analysis and robustness tests

4.2.1 Endogeneity analysis

Due to the fact that the correlation between common prosperity and high quality development of the rural recreation industry has many applications on the macro-level, additional research is needed to overcome the problem of endogeneity in the model suggested. The establishment of the system where the reverse causation cannot be observed, i.e., the high-quality development of the rural recreation industry does not cause common prosperity, is an inevitable step in the direction of achieving reliable empirical evidence. Although the benchmark regression uses a two-way fixed-effect regression model so as to reduce the influence of endogeneity and bias estimates, residual endogeneity may still occur because there are unobservable or omitted variables.

We compute the spherical distance between every provincial capital city and the three most significant cities associated with common prosperity, which are Beijing, Hangzhou, and Shenzhen, and we relate the distance to the average national common-prosperity index over the same time. Endogeneity test instrumental variable is the product of the stated variables. Table 10 shows the regression results. Column (1) and Column (2) report the two-stage regression estimates produced by the instrumental variable method. The coefficient of the instrumental variable is negative in the first stage, which implies that there is a smaller chance of provincial common-prosperity development as the distance to core cities increases. The core explanatory variables are significantly positive in the second stage, which implies that even after addressing the endogeneity issue, common wealth remains highly significant in promoting high-quality development of rural recreation industry.

Table 10: Endogenous test results

Variable	(1)	(2)	(3)
COM		0.1545***	
		(0.0237)	
IV	-2.1567***		
	(0.5559)		
treat*post			0.0118**
			(0.0092)
CON	-0.5222	0.5453***	0.1672
	(0.3936)	(0.1372)	(0.1173)
OP	-0.6718	0.2398***	0.1595
	(0.4618)	(0.0496)	(0.1903)
GOV	-0.1860***	0.0378***	0.0163
	(0.0421)	(0.0088)	(0.0139)
EM	0.0014	0.0099***	0.0128***
	(0.0274)	(0.0055)	(0.0044)
EDUC	-0.1071	-0.0038**	-0.0917**
	(0.0810)	(0.0248)	(0.0438)
INFR	0.1748	0.1896***	0.0408
	(0.2404)	(0.0792)	(0.0829)
Constant term	2.0732***	-0.2732***	0.0690
	(0.3358)	(0.0851)	(0.1284)
Time fixed effect	Control	Control	Control
Regional fixation effect	Control	Control	Control
Sample size	455	455	455
R^2	0.9984	0.8025	0.8885

4.2.2 Robustness Tests

To test the reliability of the benchmark regression findings with respect to the influence of common prosperity on high-quality development in the rural recreation industry, the present paper performs robustness tests through the following dimensions.

(1) To begin with, the measurement method of the explanatory variable is changed. The index of high-quality rural recreation industry development was measured through entropy weighting method in the previous analysis. In order to eliminate the potential bias associated with a particular weighting procedure, the equal-weighting approach is used in this case to recompute the index and repeat the regression analysis.

(2) The second is that the explanatory variables are one-period lagged. In order to minimize correlations between similar variables and to reduce the effect of mutual causality even more, both the key explanatory variable and the control variables are subjected to one-period lag.

(3) Changing regression methods. The policy support and attention to the development of common wealth may vary greatly across regions, which may cause the effects of time-varying changes in different regions to be difficult to be captured by the time fixed effects and region fixed effects, so this paper introduces the joint region-time fixed effects for the robustness test.

(4) Shorten the sample time window. This paper shortens the sample period and conducts regression analysis for the sample after 2020 separately. The robustness test results are shown in Table 11.

To sum up, various robustness tests are performed under various perspectives and the regression coefficients of the common prosperity as the main explanatory variable are significantly positive. It means that the benchmark regression results are robust.

Table 11: Stability test results

Variable	(1)	(2)	(3)	(4)
COM	0.0682***	0.0794***	0.0709***	0.0744**
	(0.0217)	(0.0264)	(0.0122)	(0.0422)
CON	0.1391	0.2892***	0.4082***	0.1854
	(0.1111)	(0.1365)	(0.1256)	(0.1110)
OP	0.0826	0.1398	0.2883***	0.1241
	(0.1294)	(0.1924)	(0.0519)	(0.2466)
GOV	0.0106	0.0177	0.0329***	0.0264***
	(0.0134)	(0.0179)	(0.0070)	(0.0141)
EM	0.0013	0.0092	0.0138**	0.0108
	(0.0053)	(0.0079)	(0.0069)	(0.0092)
EDUC	-0.0257	-0.0785***	0.0316	-0.0737
	(0.0241)	(0.0345)	(0.0258)	(0.0486)
INFR	-0.0189	-0.0129	0.2411***	-0.0008
	(0.0707)	(0.1545)	(0.0552)	(0.0716)
Constant term	0.1088	-0.0514	0.2723***	-0.1649
	(0.1160)	(0.1332)	(8.9389)	(0.2086)
Time fixed effect	Control	Control	Control	Control
Regional fixation effect	Control	Control	Control	Control
Joint fixation effect	/	/	Control	/
Sample size	455	455	455	455
R^2	0.9343	0.8771	0.7807	0.8620

4.3 Mechanism Analysis

The findings of the benchmark regression demonstrate that common prosperity may make a strong contribution to the development of the high quality of the rural recreation sector. For this reason, this section will also touch upon the possible channels of transmission. Previous research hypotheses suggest that common prosperity might impact the high-quality development of the rural recreation industry by guaranteeing the factor movement of production such as labor migration and land migration. Based on this, this section adopts an extended model to explore these mechanisms.

Table 12 reveals the results of the labor-transfer channel regression. Columns (1) and (2) are the regression analysis results without and with control variables, respectively. Columns (3) and (4) as shown in Table 12 show the regression estimates excluding and including control variables associated with the land-transfer channel. Column (4) also indicates that the interaction term between the land transfer rate and the common prosperity index is positively significant at 1 percent. This means that the common prosperity level could lead to the land transfer, which will facilitate the high-quality development of the rural recreation industry. That is why Hypothesis 2 is validated. In general, common prosperity plays an important role in driving the movement of factors of production. The resources can be redistributed among various actors and the division may be converted into intensification, thus achieving economies of scale and the complete restoration of the rural recreation industry. Surplus rural labor can be transferred to other industries by labor transfer, which can make the allocation of rural human

capital more rational, which can help upgrade the structure of the rural industry in China, and eventually develop the high-quality development of the rural recreation industry.

Table 12: Mechanism test results

Variable	(1)	(2)	(3)	(4)
COM*LABOR	0.0195**	0.0202***		
	(0.0172)	(0.0101)		
LABOR	-0.0116	0.0208		
	(0.0564)	(0.0472)		
COM*LAND			0.0471***	0.0541***
			(0.0182)	(0.0193)
LAND			-0.0542**	-0.0485
			(0.0295)	(0.0320)
COM	0.0011	0.0235	-0.0033	0.0106
	(0.0178)	(0.0248)	(0.0194)	(0.0236)
CON		0.2462		0.2301
		(0.1490)		(0.1386)
OP		-0.0943		0.1025
		(0.2343)		(0.2149)
GOV		0.0100		0.0015
		(0.0175)		(0.0183)
EM		-0.0052		-0.0079
		(0.0143)		(0.0037)
EDUC		0.0073		0.0040
		(0.0190)		(0.0151)
INFR		-0.1121		-0.1711**
		(0.1023)		(0.0969)
Constant term	0.1186***	0.2255	0.0891**	0.1155
	(0.0387)	(0.2155)	(0.0376)	(0.1747)
Time fixed effect	Control	Control	Control	Control
Regional fixation effect	Control	Control	Control	Control
Sample size	455	455	455	455
R^2	0.8695	0.8755	0.8887	0.9027

4.4 Analysis of threshold regression results

4.4.1 Threshold effect test

In order to enhance the precision of the threshold estimates and continue exploring the nature of the threshold of common prosperity concerning the high-quality development of the rural recreation industry, the bootstrap approach is used to test and confirm the hypothetical threshold values. Final F-statistics and p-values are presented in Table 13.

Table 13: Threshold effect

threshold	F	P	10%	5%	1%
Single threshold	25.032	0.002	15.398	17.138	22.126
Double threshold	7.616	0.117	11.833	15.295	22.441
Triple threshold	4.190	0.488	12.254	16.214	25.611

From the above table, we can see that the p-values associated with testing the single-threshold, double-threshold, and triple-threshold impacts of common prosperity on the high-quality development of the provincial rural recreation industry are 0.002, 0.117, and 0.488, respectively. From the result above, only the single-threshold effect achieves statistical significance at the 1 percent level, while the double-threshold and triple-threshold effects fail to reach significance. The above result indicates that there is the existence of a single-threshold effect of the influence of common prosperity on the high-quality development of the provincial rural recreation industry. In this case, the research then continues to explore the nonlinear relationship between common prosperity and high-quality growth of the provincial rural recreation industry by employing the single-threshold model. The estimation of the single threshold effect is conducted following the threshold test. The single threshold estimation result is presented in Table 14 below.

The result shows the 95% confidence interval for the threshold effect of common prosperity on the high-quality growth of the rural recreation industry. It can be observed from Table 14 that the threshold value for the threshold regression model is estimated to be 349.67, which lies within the range [339.1233, 373.5562].

Table 14: Results of the first threshold

Threshold estimator(level=95)			
Model	Threshold	Lower	Upper
Th-1	349.67	339.1233	373.5562

4.4.2 Threshold regression results

The regression results relating to the starting point of common prosperity for the high-quality development of the rural recreation industry are shown in Table 15. According to the single-threshold model, it can be seen that common prosperity has a significant and positive impact on the high-quality development of the rural recreation industry at a 1% significance level when $COM = 349.67$. In particular, an improvement by one percentage point in the common prosperity of the rural recreation industry will lead to an increase of 0.019 in the high-quality development level of the rural recreation industry.

Table 15: Results of the first threshold

VARIABLES	AQ
EM	0.095*** (10.388)
CON	-0.412*** (-2.844)
EDUC	0.032*** (2.214)
Threshold unit x1	0.019*** (2.781)
Beyond the threshold x1	0.031*** (3.492)
Constant	18.513*** (4.037)
Observations	255
R-squared	0.460
r ² a	0.458
F	64.534

Figure 6 shows the image reflection of the above empirical results, i.e. the likelihood ratio test diagram. The figure shows well the threshold characteristics of common wealth in terms of high-quality development of rural recreation industry. The black solid line in the table indicates the 5% threshold, the green solid line is the likelihood ratio estimator, the point of minimum value is the point estimate of the first threshold, and the range of the line segment starting from the point estimate in contact with the threshold is the credible interval of the threshold, i.e. the 95% confidence interval.

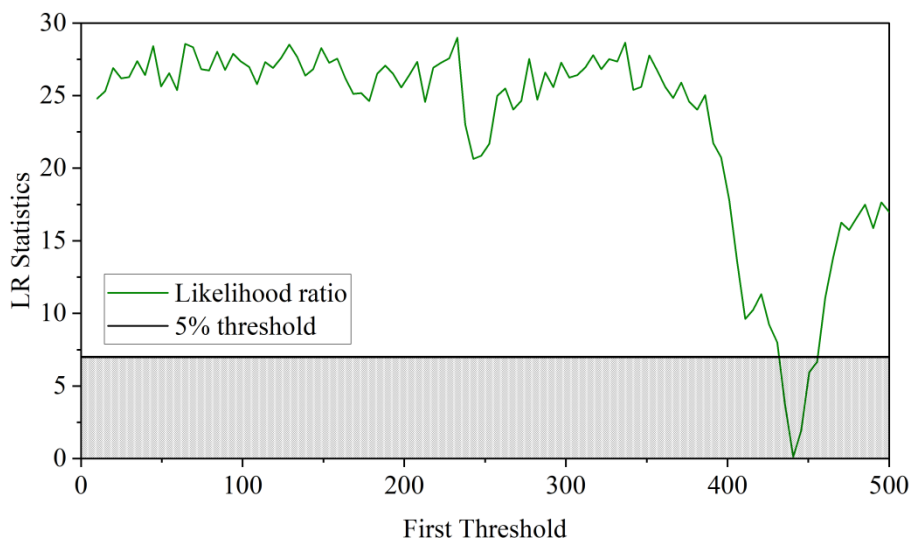


Figure 6: First threshold image

Based on these empirical observations it is probable that the rural recreation industry sector is still somewhat underdeveloped. The common prosperity could alleviate these adverse constraints in rural areas and thus develop the high-quality growth of the rural recreation industry. Nevertheless, as long as the level of common prosperity is low, accompanied by the relatively poor spillover effect on the countryside, its impact will not be extended to the rural areas unless the overall common prosperity environment has advanced to a more mature stage. Consequently, Hypothesis 3 fails. Currently, the development is at its early stage, and the potential contribution of common prosperity to the high-quality development of the rural recreation industry is estimated to become more significant in the future instead of declining.

5 High-quality development pathways

This paper pinpoints the modern issues that the recreation industry faces and makes recommendations on how to address them in an effort to achieve quality improvement in the rural recreation industry.

(1) Strengthen the top-level design and help revitalize the rural industry

The top-level design becomes necessary both as a precondition and an indispensable condition for high-quality development of the industry. The improvement of the top-level design implies taking into consideration a holistic approach to assessment of different elements like rural policies, resources, and support from the national or regional level and making comprehensive plans for all stages from design to operation of projects. First, scientifically formulate industrial development planning. The second is to build a standard system for the recreation industry.

(2) Strengthening industrial integration and helping rural cultural and ecological revitalization

Recreation industry is a large health industry integrated by a variety of industries, industrial integration plays a crucial role in industrial development. In addition to strengthening the docking and coordinated development between various industries, industrial integration should also work on improving the industrial chain. First, to play the linkage effect between the pension industry and agriculture, culture and tourism and ecology. The second is to improve the industrial chain.

(3) Strengthen standardization to revitalize rural products and services

Standardization plays an important part in guiding the development of the industry toward sustainability and efficiency and improving product and service quality. Due to insufficient governance capacity and mechanisms in the countryside, problems like poor regulation and emphasis on hardware over the services themselves may arise in this regard, thus affecting product and service quality. Therefore, it is important to tighten standards and regulation in order to renew the countryside's products and services. Firstly, the standardization mechanism must be enhanced. Secondly, the process of implementing the standards must be strengthened. In this way, renewal can be better achieved.

(4) Strengthening the construction of talent teams to help revitalize rural talent

Talent represents the essential power that drives industrial growth. With regard to rural regions, problems arise not only from the reduction in population but also from the lack of skilled workers, which calls for greater efforts in building the talent pool to guarantee continuous growth within the rural tourism industry. This can be achieved through three major measures, namely, improving internal talent training, recruiting external talent, and optimizing the talent pool structure.

(5) Strengthen the support of information technology to help the construction of digital countryside

Efficiency and accuracy characterize information technology and could make great contributions towards the development of the tourism industry. In order to develop information technology further, it is essential that not only several information technology platforms should be created but also that the application of information technology should be popularized widely throughout the tourism industry. In this regard, the following measures are recommended: (1) building an intelligent recreation regional database; (2) constructing an intelligent recreation service platform; and (3) developing intelligent recreation equipment. All these efforts will contribute to the building of the digital countryside.

6 Conclusion

The study uses panel data of 30 provinces in the mainland of China (excluding Tibet, Hong Kong, Macao and Taiwan) during 2018-2025 with the consideration made of the common prosperity index and development of rural recreation. The effect of the common prosperity on the high quality development of rural recreation is also considered. This results in the following findings:

The index of common prosperity and high-quality development index of the rural recreation industry both show an upward trend. The speed of common prosperity is faster than the rural recreation industry high-quality development, but it is relatively slower and approaching the latter slowly.

Regarding the regions, the common prosperity subsystem development process has shown a pattern of East > Central > West = Northeast and the high-quality development subsystem of the rural recreation industry has shown an order of East > Northeast > Central > West.

The common prosperity is an important element that will upgrade the rural recreation industry as the regression coefficient of financial support is positive and statistically significant at the 5 percent level, as it shows that there is a strong correlation between the two factors.

Besides, the general prosperity will facilitate the allocation of resources efficiently by means of labor and land migration, which will enhance the organization of the rural recreation industry and ensure the high-quality growth of the latter.

The only threshold impact of the common prosperity on the high-quality development of the rural recreation industry is at the value of 349.47. At less than 349.67, a one percent change in the common prosperity leads to a rise of 1.9 per cent in the level of high-quality development of the rural recreation industry. Beyond 349.67, a one percent change in the common prosperity may lead to a higher 3.1 percent development in the level of high-quality development of the rural recreation industry, which is a facilitation effect due to the exceeding of the threshold value.

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