Analysis on the Current Situation of Rural Residents' Living Consumption Expenditure in Anhui Province under the Background of Rural Revitalization

Ding Fang

School of Anhui University of Finance and Economics, Bengbu 233000, China

Abstract

To accurately judge the consumption status of rural residents and solve rural economic problems is the core of rural revitalization. Based on the cross-section data of 16 cities in Anhui Province in 2019, this paper selects 8 indicators representing residents' consumption structure, adopts cluster analysis to study the regional differences of residents' consumption structure and consumption level, and adopts comprehensive evaluation method to analyze and evaluate the current situation of rural residents' consumption expenditure in each city. The results show that the consumption level of rural residents in Anhui province has regional differences and consumption structure imbalance. Finally, based on the economic development of central, southern and northern Anhui, this paper puts forward some suggestions to promote the rural consumer market in Anhui province.

Keywords

Rural Revitalization; Rural Residents; Consumption Structure; Cluster Analysis; Comprehensive Evaluation Method.

1. Introduction

In 2020, the campaign of comprehensively eradicating poverty will come to a perfect end, and the poor will be lifted out of poverty on schedule, which is of epoch-making significance in world history. It is not enough to lift the rural poor out of poverty in an all-round way. On the basis of comprehensively lifting the rural poor out of poverty, China has strengthened poverty alleviation and poverty alleviation development, vigorously developed the Rural Revitalization Strategy, so as to build a modern economic system and realize the great rejuvenation of the Chinese nation. There is still a big gap between urban and rural development in China at this stage. How to achieve the effective convergence of strategies, accurately judge the current consumption situation of rural residents, effectively solve rural economic problems and narrow the gap between urban and rural development is still the core move to achieve rural revitalization. At present, scholars have less research on the analysis of the current situation of rural residents' consumption level. Based on the cross-sectional data of 16 cities in Anhui Province in 2019, this paper selects 8 factors of the composition of rural residents' consumption expenditure, adopts cluster analysis to study the regional differences of residents' consumption structure and consumption level, and adopts comprehensive evaluation method to analyze and judge the appearance of rural residents' consumption expenditure in each city. Studying the living consumption expenditure of rural residents, understanding the current living situation of rural residents in China, finding out the reasons for the imbalance of rural residents' consumption level and further analyzing the countermeasures can effectively improve the living consumption level of rural residents, help rural construction and realize rural revitalization.

2. Literature Research

R. Li (2003) [1] the research shows that there are great differences in the propensity of rural residents to different types of consumer goods, and the consumption structure is backward. B. C. Wang and H. Wang (2013) [2] used cluster analysis to compare the consumption structure of rural residents in China, and found that the consumption expenditure of rural residents is mainly to meet the survival and travel needs of lower levels, and the consumption level is low as a whole. F. Q. Li (2015) [3] rural financial development has differences in promoting the consumption structure of various categories, and has not formed a good interaction mechanism.S. Fang (2017) [4] studied the consumption expenditure of Urban Households by using the methods of factor analysis and cluster analysis. It is concluded that China's economy is divided into three gradients according to regions, and the scale of residents' consumption expenditure is mainly affected by the level of regional economic development. Q. He (2018) [5] analyzed the current situation of China's rural residents' consumption and pointed out that there are some problems in China's rural residents' consumption, such as the imbalance between consumption and savings, the imbalance between consumption supply and demand structure, outdated consumption concepts and so on. G. Dai (2018) [6] constructed a model reflecting the regional comprehensive economic development level based on the method of principal component analysis, evaluated the development level of cities in Jiangsu Province, and analyzed the reasons for the differences in regional economic development. J. Du et al. (2021) [7] conducted an empirical study on the influencing factors of rural residents' consumption expenditure by using the fixed effect model, and found that rural residents' income and rural residents' food consumption expenditure are the most important factors affecting their consumption expenditure level. S. M. Xu (2021) [8] concluded that the financial expenditure of Anhui provincial government on rural areas is conducive to promoting the consumption of rural residents. W. Q. Liu (2017) [9] used principal component analysis and cluster analysis to study the consumption index of inter provincial urban residents, and concluded that there are spatial differences in the consumption level of urban residents in China.

In the research of existing scholars, the principal component analysis method and entropy method are mostly used to comprehensively evaluate the living consumption level of residents. In the research process of the author, it is found that the comprehensive evaluation of principal component analysis can not fully consider the weight relationship between expenditure components, while the entropy method only uses the existing data to obtain the weight between expenditure components, which is lack of consideration under the actual economic background, which affects the authenticity of the evaluation results. Therefore, this paper refers to the consumption structure weight calculation method of consumer price index (CPI) and combines the weighted TOPSIS method to comprehensively evaluate the current situation of rural residents' living consumption expenditure in various cities of Anhui Province, so as to make the research results more authentic and effective.

3. Index Selection and Data Source

This paper takes the rural areas of Anhui cities as the research object. Nowadays, residents' living consumption is no longer simply based on material consumption. More needs such as education, medical treatment, entertainment and other consumption account for an increasing proportion of the total living consumption. According to the classification standard of consumption expenditure designated by the state, this paper selects a total of 8 indicators such as food, tobacco, alcohol and clothing for analysis. Among them, index1 describes food, tobacco and alcohol, index2 describes clothing, index2 describes clothing, index3 describes housing, index4 describes daily necessities and services, index5 describes traffic communication, index6 describes education, culture and entertainment, index7 describes medical care, index8

describes other supplies and services, index9 describes per capita disposable income,index10 describes Per capita living consumption expenditure. The data used in this paper are from the statistical yearbook of cities in Anhui Province in 2020. The specific data are shown in Table 1.

Table 1. Consumption expenditure of rural residents in 16 cities of Anhui Province

Region	Index1	Index2	Index3	Index4	Index5	Index6	Index7	Index8	Index9	Index10
Hefei	4677	653	3072	776	1744	1749	957	177	22462	13805
Wuhu	4857	618	3591	715	1568	1324	1099	173	22745	13944
Bengbu	2891	399	2263	461	694	728	907	146	16666	8490
Anqing	4541	587	3497	726	1510	1392	1241	284	14347	13778
Bozhou	4116	666	2356	561	2055	611	1290	242	14102	11897
Suzhou	3109	754	2377	665	846	1029	639	156	13213	9578
Fuyang	3390	587	2618	605	1124	806	1196	111	13079	10437
Huainan	3864	555	2552	636	1290	1240	1267	358	14250	11762
Chuzhou	4022	735	2174	600	1429	1168	1024	200	14487	11352
Maanshan	5538	908	2685	1210	2420	1492	943	188	23473	15384
Xuancheng	5593	1277	2889	1004	1898	2113	1516	352	17542	16642
Tongling	3408	418	2381	603	965	1368	958	245	15791	10346
Chizhou	3715	425	3528	503	902	2592	1405	198	16099	13268
Huangshan	4398	558	4195	758	1241	1083	914	265	16970	13412
Huaibei	3755	890	2511	694	870	1240	858	272	14052	11090
Luan	3835	623	2647	585	1147	1213	903	136	13244	11089

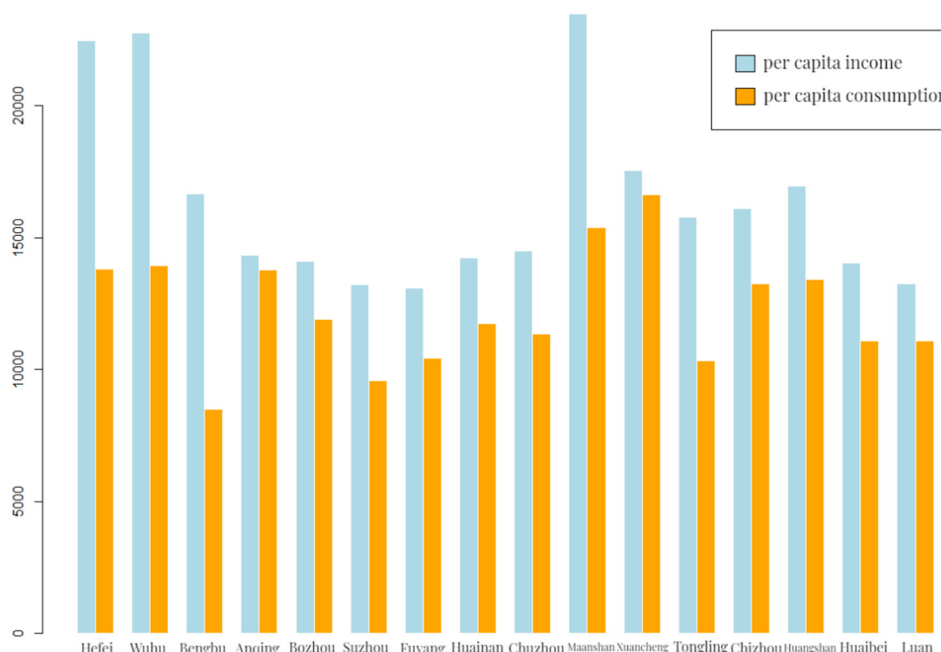## 3.1.   Comparative Analysis of Per Capita Income and Expenditure

Figure 1. Per capita income and expenditure of rural residents in various cities

From Figure 1, we can see that from the perspective of income, the income levels of Maanshan, Wuhu and Hefei are relatively high. Ma'anshan is rich in iron ore resources and is gradually developing into a new steel industry city. And its geographical location is located in the intersection of Jiangsu and Anhui. It is deeply affected by Nanjing Economic Circle and plays a

role in regional economy. Wuhu and Hefei, the provincial capital, also rely on their own excellent geographical location. As a key city for the integrated and high-quality development of the Yangtze River Delta, the economy has developed rapidly. Even for rural residents, the consumption level is higher than that of several other cities. From the perspective of expenditure, the consumption level and income level of Hefei, Bengbu, Wuhu and Ma'anshan are significantly different, which shows that there is an imbalance between consumption and savings among rural residents. The reason is that the consumption concept of rural residents is too old, they are more inclined to save rather than consume their own income, and have a high degree of trust in banks. High savings is to avoid external risks caused by economic system reform, but high savings is not conducive to improving the income level of rural residents. Excessive savings reduce the short-term consumption of rural residents. To a certain extent, production lacks more investment, limits the expansion of scale, and thus inhibits the increase of income.

3.2. Analysis of Consumption Expenditure Structure

From Figure 2 and Figure 3, we can see that the expenditure on food, tobacco and alcohol of rural residents in various cities of Anhui Province is much higher than the other seven consumption indicators. The consumption quality of rural residents mainly depends on the Engel coefficient, that is, the proportion of food consumption to the overall consumption. The higher the Engel coefficient, the higher the consumption of rural residents to meet the basic food and clothing needs. In recent years, the relevant data released by the National Bureau of statistics show that the Engel coefficient of rural residents' consumption generally shows a downward trend, which shows that the national poverty alleviation policy has achieved remarkable results. However, at present, the Engel coefficient of all cities in Anhui is maintained at about 30%, and the living consumption of food, tobacco and alcohol, housing, transportation and communication still accounts for a large proportion, of which the expenditure on food, tobacco and alcohol accounts for more than 30%, which shows that there is still room for further improvement of the quality of life and consumption of rural residents in Anhui Province. Combined with the data in Table 1, it can be seen that there is a large difference between the living consumption such as food, tobacco and alcohol expenditure among the cities in Anhui Province, while the difference between the enjoyment and developmental consumption such as education, culture and entertainment is relatively small.
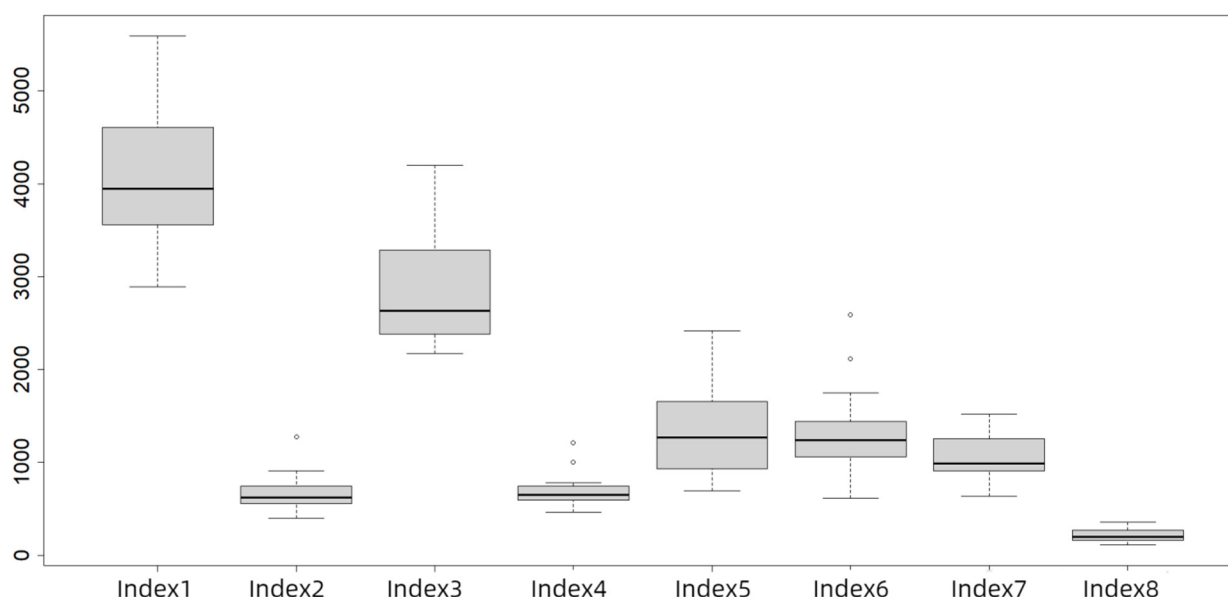

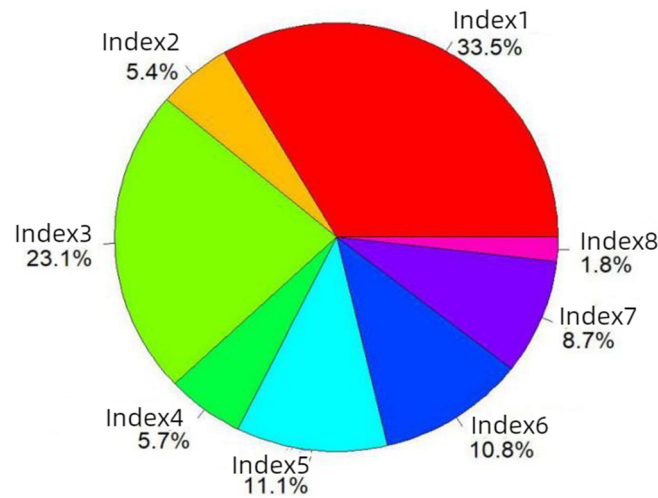**Figure 2.** Eight consumer expenditure box lines of rural residents in various cities

Figure 3. Eight consumption expenditures pie graph of rural residents in various cities

4. Cluster Analysis of Rural Residents' Consumption in Various Cities of Anhui Province

4.1. Cluster Analysis Principle

Cluster analysis [10] is a statistical method to divide the research objects according to individual characteristics. The idea of cluster analysis is to measure the distance between different research objects, and divide the two objects with the smallest distance into one class, so as to cycle until they are finally combined into one class. By using the method of cluster analysis, this paper explores the consumption level of rural residents in 16 prefecture level cities in Anhui Province, so as to study the regional differences and similarities of rural areas in Anhui Province. This paper adopts the hierarchical clustering method, and uses the Euclidean distance as the standard to measure the distance. The Euclidean distance is defined as:

$$EUCLID(x, y) = \sqrt{\sum_{i=1}^{k} (x_i - y_i)^2} \tag{1}$$

In the definition formula, x_i and y_i represent the i variable value of samples x and y respectively. There are many methods to define the distance between classes. The commonly used methods are: single linkage method, complete linkage method, average linkage method, centroid method and ward method. The definition of distance by these five methods is shown in the Table 2.

Table 2. Five hierarchical clustering methods and definitions

methods	Distance definition
single linkage	The minimum distance between a point and another
complete linkage	The maximum distance between a point and another
average linkage	The average distance between a point and another
centroid	The distance between the centroids in the two classes
Ward	The sum of the squares of the ANOVA for all variables

4.2. Empirical Results

In order to have a comprehensive understanding of the consumption of rural residents in various cities in Anhui Province, this paper uses five methods of hierarchical clustering to analyze and compare, so as to get the most reasonable division. When the Euclidean distance is determined as the measurement standard, the corresponding system clustering diagram is obtained by single linkage method, complete linkage method, average linkage method, centroid method and ward method.
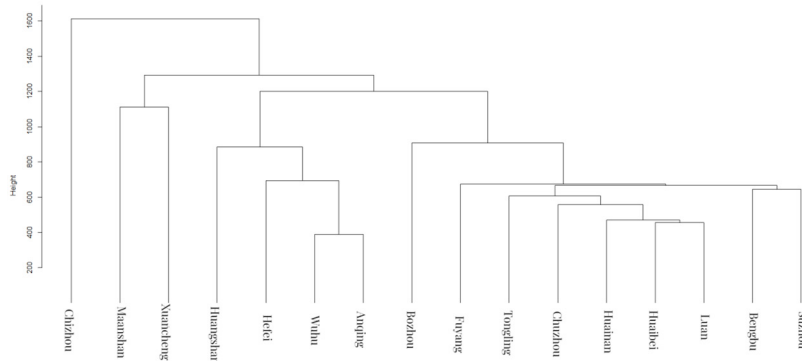

Figure 4. Single linkage method of consumption level of rural residents in various cities
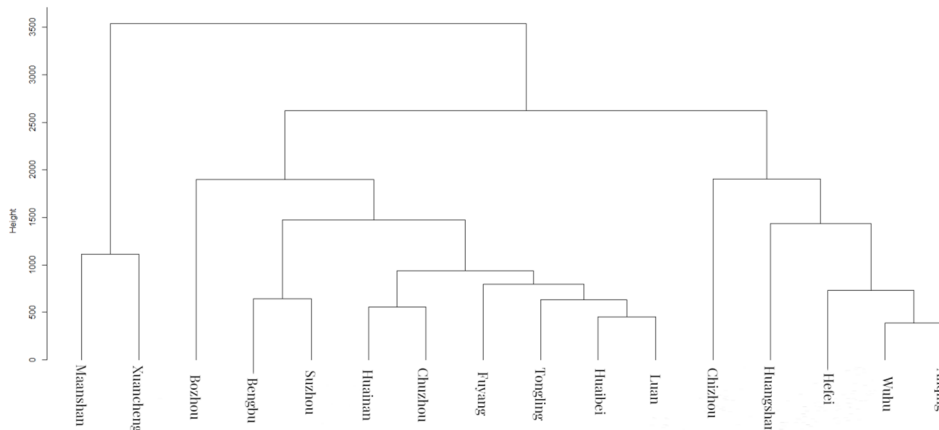

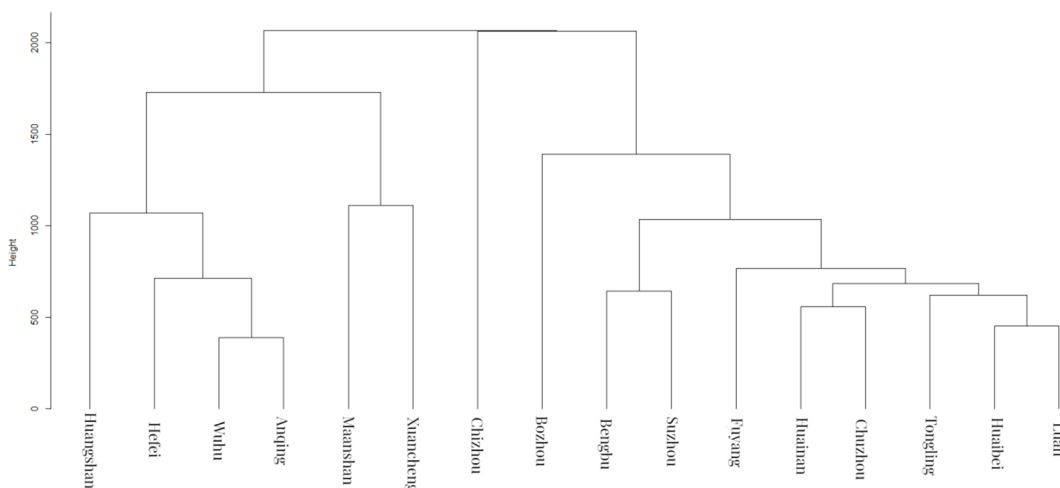**Figure 5.** Complete linkage method of consumption level of rural residents in various cities

Figure 6. Average linkage method of consumption level of rural residents in various cities
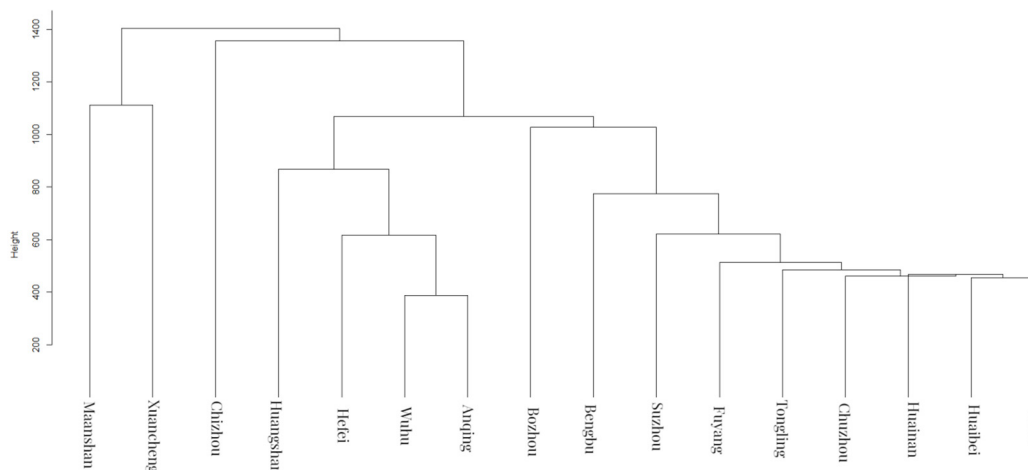
Figure 7. Centroid method of consumption level of rural residents in various cities
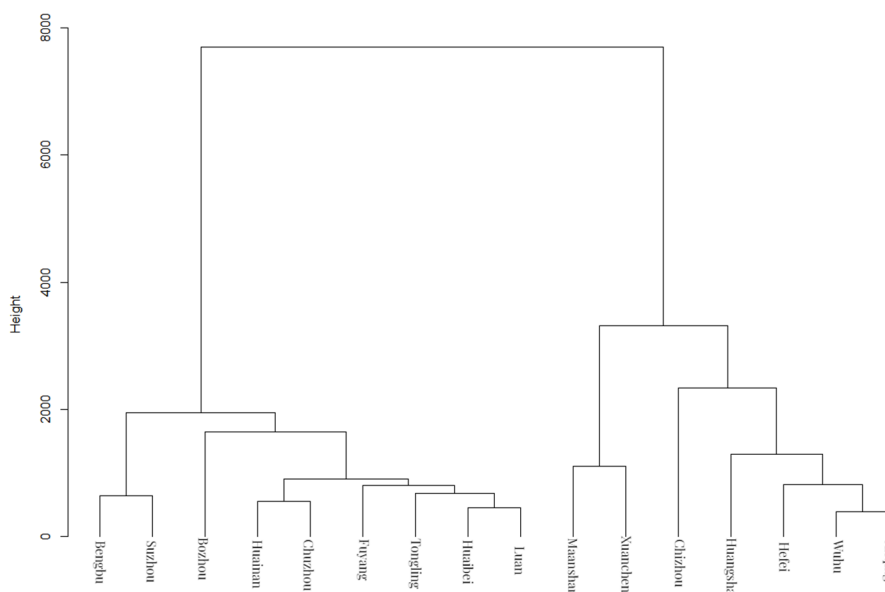

Figure 8. Ward method of consumption level of rural residents in various cities

The clustering results obtained by the five clustering methods are shown in Table 3. We can see that no matter which method, Huangshan, Hefei, Wuhu and Anqing are in the same category, all located in the central and southern regions of Anhui; Huainan, Chuzhou, Fuyang, Huaibei, Lu'an and Bengbu are mostly in the same category, all located in the central and northern part of Anhui Province. Ma'anshan and Xuancheng are in the first category, which are located in the central and southern part of Anhui Province. It can be seen that the distribution of consumption level in various cities in Anhui Province presents the phenomenon of spatial aggregation. Ma'anshan and Xuancheng belong to southern Anhui. Relying on the radiation of the Yangtze River Delta economic circle, the cities in southern Anhui have a high comprehensive level of economic development in various regions of Anhui Province, so the consumption level of rural residents in this region is generally high. Ma'anshan City and Xuancheng City belong to the intersection of Jiangsu and Anhui. With the in-depth promotion of regional integration and the development of their own characteristic industries, the economic growth momentum is rapid and occupies a leading position in Anhui. Huangshan, Hefei, Wuhu, Anqing and other cities belong to central and southern Anhui, while Huainan, Chuzhou, Fuyang and other cities with low consumption level of rural residents mostly belong to northern Anhui. It can be seen that

the consumption level of rural residents in various regions of Anhui Province is the highest in southern Anhui, followed by central Anhui, while northern Anhui is slightly backward.

Table 3. Clustering results of five systematic clustering methods

classify	region						method
Divided into four	One	Two	Three			Four	single linkage, centroid
	Maanshan, Xuancheng	Chizhou	Bozhou, Bengbu, Suzhou, Fuyang, Tongling, Chuzhou, Huainan, Huaibei, Luan			Huangshan, Hefei, Wuhu, Anqing	
Divided into five	One	Two	Three	Four		Five	complete linkage, average linkage
	Maanshan, Xuancheng	Chizhou	Bengbu, Suzhou, Fuyang, Tongling, Chuzhou, Huainan, Huaibei, Luan	Bozhou		Huangshan, Hefei, Wuhu, Anqing	
Divided into Six	One	Two	Three	Four	Five	Six	Ward
	Maanshan, Xuancheng	Chizhou	Huainan, Chuzhou, Fuyang, Tongling, Huaibei, Luan	Bengbu, Suzhou	Bozhou	Huangshan, Hefei, Wuhu, Anqing	

5. Comprehensive Evaluation of Consumption Level of Rural Residents in Various Cities of Anhui Province

In the research of existing scholars, the principal component analysis method and entropy method are mostly used to comprehensively evaluate the living consumption level of residents. In the research process of the author, it is found that the comprehensive evaluation of principal component analysis can not fully consider the weight relationship between expenditure components, while the entropy method only uses the existing data to obtain the weight between expenditure components, which is lack of consideration under the actual economic background, which affects the authenticity of the evaluation results. Therefore, this paper refers to the consumption structure weight calculation method of consumer price index (CPI) and combines the weighted TOPSIS method to comprehensively evaluate the current situation of rural residents' living consumption expenditure in various cities of Anhui Province, so as to make the research results more authentic and effective.

5.1. Calculation of Expenditure Composition Weight

At present, there are many methods to calculate the weight of each sub item of CPI, among which the optimization method is widely used. The basic principle of the optimization method is to use the eight items of CPI consumption in a fixed period to form the month on month data. Under the constraints, with the minimum mean square error as the optimization objective, the Lagrange method is used to obtain the optimization weight result. The mathematical formula is:

$$\min \frac{1}{2} \sum_{i=1}^{n} (CPI_i - CPI_i^{sp} \cdot W)^2 \tag{2}$$

$$st \quad 0 < W < 1; \quad \sum W = 1 \tag{3}$$

In the above linear optimization model, the consumption composition weight of CPI can be obtained by finding the optimal solution by Lagrange method. CPI consumption composition

weight is a dynamic data, which will change according to the selected period, but it basically fluctuates in a certain range. This paper selects the CPI consumption composition weight data in 2019 as the research period, and points out the composition weight of eight items of consumption. The results are shown in Table 4.

Table 4. The weight of residents' consumption expenditure

consumption expenditure	weight
Index1	0.3128
Index2	0.0883
Index3	0.1973
Index4	0.0592
Index5	0.1136
Index6	0.1045
Index7	0.0905
Index8	0.0339

5.2. Weighted Score of Consumer Spending by City

By multiplying the raw data of the consumption expenditure composition of each city and the weight vector, the score and ranking results of each city are obtained, as shown in Table 5.

Table 5. Weighted composite scores and rankings by city

Region	Score	Rank
Hefei	2646.168	4
Wuhu	2746.478	3
Bengbu	1655.265	16
Anqing	2644.132	5
Bozhou	2266.589	8
Suzhou	1814.178	15
Fuyang	1988.486	13
Huainan	2201.750	9
Chuzhou	2171.275	10
Maanshan	2936.386	2
Xuancheng	3077.238	1
Tongling	1955.985	14
Chizhou	2432.627	7
Huangshan	2643.365	6
Huaibei	2104.938	12
Luan	2154.874	11

5.3. Topsis Scores for Consumer Spending by City

TOPSIS is another commonly used comprehensive evaluation method, which can make full use of the information of the original data to get the ranking of the advantages and disadvantages among the evaluation objects. The basic process of TOPSIS method is that after normalizing the original data matrix, the cosine method is used to find out the best scheme and the worst scheme in the existing schemes, and the relative distance between each evaluation object and the best scheme is calculated as the basis for ranking. The consumption expenditure data of each city are analyzed by TOPSIS method, and the results are shown in Table 6.

Table 6. Weighted composite scores and rankings by city

Region	Distance (D+)	Distance (D-)	Score	Rank
Hefei	843.981	1199.239	0.587	4
Wuhu	749.396	1331.253	0.64	3
Bengbu	1964.085	97.642	0.047	16
Anqing	865.862	1173.573	0.575	5
Bozhou	1355.603	855.631	0.387	8
Suzhou	1797.579	239.862	0.118	15
Fuyang	1614.83	417.336	0.205	13
Huainan	1369.207	669.105	0.328	10
Chuzhou	1404.227	720.178	0.339	9
Maanshan	787.343	1651.393	0.677	2
Xuancheng	627.636	1715.165	0.732	1
Tongling	1629.41	413.902	0.203	14
Chizhou	1244.296	1021.041	0.451	7
Huangshan	966.069	1260.341	0.566	6
Huaibei	1465.734	574.858	0.282	12
Luan	1385.175	629.048	0.312	11

Based on the results in Table 5 and Table 6, we can see that the calculation results of the two comprehensive evaluation methods are almost similar, so it can be judged that the results have certain reliability. In the comprehensive score ranking, Xuancheng City, Maanshan City, Wuhu City and Hefei city rank at the top, indicating that the consumption level of rural residents in these cities is high. Fuyang City, Tongling City, Suzhou City and Bengbu City rank lower, indicating that the consumption level of rural residents in these cities is low and needs to be improved. And most of these cities belong to northern Anhui, which further verifies that there are regional differences in the consumption level of Anhui Province, which is basically consistent with the previous cluster analysis results.

6. Conclusions and Recommendations

6.1. Conclusion

The level of consumption expenditure varies greatly in different regions. The overall consumption level of urban rural residents in southern Anhui, represented by Ma'anshan City, Xuancheng City, Chizhou City and Anqing City, is high; The overall consumption level of rural residents in cities in southern and central Anhui, such as Hefei, Wuhu and Huangshan, takes the second place; The overall consumption level of urban rural residents in Northern Anhui, represented by Fuyang City, Suzhou City and Bengbu City, is relatively backward. The reason is that the cities in southern Anhui benefit from the implementation of regional integration policy. With its excellent geographical location, it is greatly affected by the radiation range of the Yangtze River economic belt, and its consumption concept is updated rapidly. In particular, cities located in the intersection of Jiangsu and Anhui are driven by the Nanjing metropolitan area and the Yangtze River Delta economic belt. With their geographical location and their own characteristic industries, their economy is developing rapidly and their consumption level is also among the top. Due to the geographical location of cities in Northern Anhui far away from the economic circle and other reasons, the consumption structure or consumption concept of rural residents is relatively backward, the imbalance between consumption and savings ratio is prominent, and residents are more willing to save rather than choose short-term consumption, resulting in the backward consumption level.

The consumption structure of rural residents is uncoordinated. It can be seen from the current consumption situation of rural residents in Anhui province that survival consumption still accounts for a large proportion in the composition of expenditure, of which food, tobacco and alcohol expenditure accounts for more than 30%. It shows that rural residents are more inclined to use their income to meet basic food and clothing needs. The social structure of Anhui Province is relatively backward. Affected by its old consumption concept, many rural residents are afraid to spend money, ignoring the enjoyment and developmental consumption of education, culture and entertainment.

6.2. Recommendations

Narrow the urban economic gap and promote regional coordinated development. There is a big gap in the level of economic development in southern Anhui, central Anhui and Northern Anhui. The government should take effective measures to promote regional coordinated development. The economic development of Southern Anhui is superior and in a leading position. The government can make full use of its development momentum to radiate to the surrounding areas, drive the development of surrounding cities, and constantly narrow the gap between surrounding cities and southern Anhui cities; Central Anhui has developed transportation and rich tourism resources. The government can actively attract foreign investment and promote the economic development of central Anhui; By changing the mode of agricultural growth and the level of local agricultural industrialization, the government of Northern Anhui can fine tune grain prices, promote the diversified development of local agricultural economy such as rural tourism and service industry, and call on graduates to return to the village, fundamentally improve the local agricultural economic model and increase the income of rural residents.

Improve residents' consumption environment and guide the transformation of consumption ideas. The government should attach importance to the education level of rural residents, improve the infrastructure, improve the environment and quality from the three aspects of culture, education and entertainment, so as to increase the happiness of rural residents, so as to change their consumption concept and make a major breakthrough from "unwilling" to "willing", such as building leisure and entertainment places such as libraries, shopping malls and cinemas in rural areas, looking for innovation and breakthroughs in education and employment, enriching the lives of rural residents, Deeply improve personal consumption demand, change the consumption view of rural people from the spiritual level, and make it scientific and autonomous.

Accelerate rural modernization and promote economic innovation and transformation. The backward social structure in Anhui Province has caused the current situation that rural residents are afraid to consume and unwilling to consume to a certain extent. Accelerating the construction of modern cities in rural areas will help to promote the reform of social structure, narrow the gap between urban and rural development, and finally realize the integration of urban and rural areas. With the improvement of local development level and the reduction of the gap between urban and rural areas, their inherent consumption concept will be changed under the influence of the new environment, thus imperceptibly changing the consumption structure. At the same time, rural urbanization will make the local industrial chain innovative, and the upgrading of industries will attract local young consumer groups, further optimize their consumption ideas, and help promote the revitalization of rural construction.

References

[1] R. li: Quantitative analysis of consumption structure of rural residents in China, China's Rural Economy, (2003), No.5, p.12-17+44.

[2] B. C. Wang, H. Wang,: Inter provincial comparative study on consumption structure of rural residents in China based on cluster analysis, Journal of Guangdong University of Administration, 25(2013), No.3, p.68-72.

[3] F. Q. Li, J. Yang: Research on the impact of rural financial development on rural residents' consumption, Consumption Economy, 31(2015), No.4, p.25-29.

[4] S. Fang: Study on urban household consumption expenditure based on factor analysis and cluster analysis, Modern Economic Information, (2017), No.6, p.13-14.

[5] Q. He: Analysis on the current situation of rural residents' consumption in China, Times Economy and Trade, (2018), No.27, p.8-9.

[6] G. Dai: Evaluation of comprehensive economic development level of urban areas in Jiangsu Province Based on principal component analysis, Economic Research Guide, (2018), p.47-48.

[7] J. Du, M. Fang: An empirical study on the influencing factors of rural residents' consumption under the background of Rural Revitalization -- Based on China's panel data from 2000 to 2017, Jiangsu Agricultural Sciences, 49(2021), No.8, p.22-30.

[8] S. M. Xu: Research on the relationship between local financial expenditure for agriculture and rural residents' consumption in Anhui Province Based on VAR model, Journal of Science in Normal Universities, 41(2021), No.2, p.25-29.

[9] W. Q. Liu: Research on consumption structure of inter provincial urban residents based on principal component and cluster analysis, Journal of Chongqing University of Arts and Sciences, 36(2017), No.2, p.133-140.

[10] X. M. He: Modern statistical analysis methods and Applications (Renmin University of China Press , China 2005).