

An analysis of the impact of urbanization of Shiyan city on the consumption structure of rural residents

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ABSTRACT: In recent years, the urbanization of China has been very rapid, and the urbanization level directly affects the consumption structure of rural residents. By collecting the data from 2005 to 2014, this paper first gives a comprehensive indicator of the urbanization rate of Shiyan city, and then the urbanization rate and the consumption structure of rural residents are analyzed with grey correlation analysis. By comparing the gray correlation, the strong correlation is the food and transportation, communication consumption, while the weakest correlation is the clothing. Finally, the suggestions on the optimization of the consumption structure of rural residents were given.

Keywords: Shiyan city; urbanization; comprehensive index method; gray correlation analysis; rural residents; consumption structure

Shiyan City is located in the Qinba mountain area, relying on the automobile industry to develop. It has some advantage resources, such as the China's largest freshwater lake - Danjiangkou Reservoir, Taoist culture in Wudang Mountain, and Qinglongshan dinosaur sites. In recent years, the headquarters of Dongfeng Motor Corporation were moved to Wuhan, and some car bases were also moved away from Shiyan city; the South-North Water Diversion Project allows the residents along the reservoir to move to the city, which makes great changes in the demographic structure of Shiyan city. In this context, according to their own urbanization laws, Shiyan city used limited public resources to achieve a better effect in the process of promoting industrialization and urbanization. Therefore, the new urbanization in Shiyan city will also have a greater development space. It is necessary to study the influence of urbanization on the consumption structure of rural residents in Shiyan.

land utilization.

But now when the actual data are collected, the urban population and the non-farm population are not clearly distinguishable with the rapid development of urbanization, which bring some errors to the calculation data. So the calculated rate of urbanization will be higher than the actual value. Here we use the comprehensive index method, that is, by building a series of indicators, we give weight to each index and calculate the score, and ultimately get a comprehensive score.

Based on the existing researches, and the principle of selection of indicators, combining with the characteristics of modern cities, 12 indicators were selected from the aspects of population structure, economic development and social development. The urbanization rate of Shiyan city was measured using these 12 indicators. The following weight is based on existing research results, combining with the development characteristics of Shiyan city.

1 MEASURES OF URBANIZATION RATE

The current calculation methods of urbanization rate commonly include urban population/total population, non-agricultural population/total population and urban

Reflect the content	Specific indicators	Target value	Weights
population	Non - agricultural population	90%	9
	Natural population growth rate	2‰	6
	Million people have the number of college students (people)	400	5
	The proportion of the tertiary industry employment	70%	7
Economic development	Per capita GDP	20000US	19
	Per capita disposable income (yuan)	40000	11
	Engel coefficient	30%	9

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Social development	Per capita living area	33	7
	Per capita green area	10	4
	Per capita road pavement area	25	9
	Million people have the number of doctors	60	9
	Hundreds have the number of calls	200	5

Take the data from the *Shiyan Statistical Yearbook* from 2005 to 2014, compare each indicator with the corresponding target value, then multiplied by weight and aggregate to get a comprehensive indicator of urbanization.

The specific formula is

$$U = \sum S/T * f$$

Here U is the urbanization of comprehensive indicators, S is the actual statistical value, T is the target value, and f is the weight. Note that the value of S/T is calculated as 1 when it is greater than 1. The natural population growth rate and the Engel coefficient are two inverse indicators.

Substituting the original data into the above formula, we get the urbanization rate of Shiyan city from 2005 to 2014. The calculation results are shown in Table 1.

The calculated value of the comprehensive index method is significantly higher than the urbanization rate calculated by the traditional urban population ratio.

Table 1. The urbanization rate of Shiyan city from 2005-2014

Years	Urbanization rate
2005	34.84%
2006	33.57%
2007	35.34%
2008	35.54%
2009	36.79%
2010	39.93%
2011	40.27%
2012	45.38%
2013	47.14%
2014	48.65%

2 THE RELATIONSHIP BETWEEN THE URBANIZATION RATE OF SHIYAN CITY AND THE CONSUMPTION ORGANIZATION OF RURAL RESIDENTS

It can be seen from the *Shiyan Statistical Yearbook* that, from 2005 to 2014, the urbanization rate rose

from 34.84% to 48.65%, showing a steady upward trend, and the per capita consumption expenditure of rural residents also achieved a 2.5-fold increase. According to the consumption structure, food expenditure accounted for a larger proportion, but the proportion of expenditure showed a downward trend from 51.07% to 38.51% in 10 years, which indicated that, in general, the living standard of rural residents in Shiyan was promoted from a subsistence level to moderate prosperity, even a richer one.

The clothing expenditure has also been doubled from 4.92% to 11.49% with the increase in urbanization rate. After their basic demand of keeping warm was met, a higher level need began to render out and the rural residents have begun to pursue for clothing with higher quality in the new era. Spending on housing expenditure also showed an upward trend. Except the suddenly soaring property prices in Shiyan in 2010, and the housing expenditure reaching the maximum value in the same year, which is 24.35%, the housing expenditure increased steadily in other years, because houses are the basic means of livelihood. The proportion of expenditure on daily necessities and services is also steadily rising, indicating that rural residents pay more and more attention to the improvement of quality of life. That of traffic and communications consumption basically remained at about 7%, and the increase is related to technology development and social mobility. Cultural education and entertainment accounted for 6% to 8%. The proportion of health care is about 7% to 9.5%, and that of others is also about 2% to 3%. The results are shown in Table 2.

3 GRAY RELATIONAL ANALYSIS ON THE URBANIZATION AND THE CONSUMPTION STRUCTURE OF RURAL RESIDENTS

Gray correlation analysis method is a way to measure the correlation degree between factors according to the degree of similarity or difference of the development trend between factors, that is, gray correlation. It was used to analyze the correlation between the urbanization rate and the 8 items of expenditure in rural resident consumption structure.

The detailed calculation steps for gray relational analysis are as follows:

(1) Determine the analysis sequence

Table 2. 2005-2014 Urbanization rate of Shiyan City and consumption structure of rural residents (Unit: yuan/people %)

Year	Urbanization rate	Consumption	Food	Clothes	Housing	Daily necessities and services	Transportation and communication	Culture education and entertainment	Health care and insurance	Other commodities
2005	34.84%	1911	51.07%	4.92%	10.26%	3.82%	7.27%	11.46%	9.37%	1.83%
2006	33.57%	1992	50.20%	4.97%	9.99%	4.17%	7.78%	12.55%	7.73%	2.61%
2007	35.34%	2312	50.69%	4.93%	15.79%	3.89%	7.61%	8.69%	6.40%	1.99%
2008	35.54%	2642	51.44%	4.73%	17.94%	4.24%	6.93%	6.28%	6.96%	1.48%
2009	36.79%	2700	48.44%	4.85%	18.07%	4.85%	7.26%	6.07%	8.07%	2.26%
2010	39.93%	3100	43.58%	4.68%	24.35%	5.26%	8.03%	5.45%	6.65%	1.90%
2011	38.92%	3661	45.89%	6.20%	16.39%	6.64%	7.35%	4.75%	9.10%	3.61%
2012	45.38%	4013	44.41%	5.86%	15.05%	6.93%	7.68%	6.03%	10.89%	3.07%
2013	47.14%	4571	40.25%	11.27%	16.25%	6.52%	7.57%	8.51%	8.36%	1.27%
2014	48.65%	5224	38.51%	11.49%	16.46%	6.60%	7.87%	8.61%	9.09%	1.36%

This paper uses the urbanization rate calculating by the comprehensive index method as a reference index

$$X_0(t) = (X_0(2005), X_0(2006), \dots, X_0(2014))$$

The 8 items of rural residents' consumption expenditure (food, clothing, housing, daily necessities and services, transportation and communication, cultural education and entertainment, health care and insurance, and other commodities and services) were selected as the comparative series, which is

$$X_i(t) = (X_i(2005), X_i(2006), \dots, X_i(2014)) \quad i=1, 2, \dots, 8$$

(2) Variable dimensionless process

As the initial units are different, we should obtain the mean value.

Firstly, calculate the mean value $\bar{X}_i(t)$ of each sequence, and then divide the data in the sequence by the mean value to get the new sequence, thereinto:

$$x_i(t) = \frac{X_i(t)}{\bar{X}_i(t)} \quad i=1, 2, \dots, 8$$

(3) Calculate the correlation coefficient

The correlation coefficient between $X_0(t)$ and $X_i(t)$ is

$$\xi_{0i}(t) = \frac{\min_i \min_j \Delta_i(k) + \rho \max_i \max_j \Delta_i(k)}{\Delta_{0i}(t) + \rho \max_i \max_j \Delta_i(k)},$$

$$\Delta_i(k) = |X_0(t) - X_i(t)|$$

In general, the value of ρ is (0, 1). The smaller the value is, the greater the resolution. Usually let $\rho=0.5$.

(5) Calculate the gray correlation

$$r_i = \frac{1}{n} \sum_{t=1}^n \xi_{0i}(t) \quad i=1, 2, \dots, 8$$

According to the gray correlation coefficient in Table 3, the gray correlation degree is calculated as: $r_1=0.869585$, $r_2=0.641984$, $r_3=0.778801$, $r_4=0.664875$, $r_5=0.798242$, $r_6=0.757718$, $r_7=0.716791$, $r_8=0.721738$.

Table 3. Gray correlation coefficient

Years	$\xi_{01}(t)$	$\xi_{02}(t)$	$\xi_{03}(t)$	$\xi_{04}(t)$	$\xi_{05}(t)$	$\xi_{06}(t)$	$\xi_{07}(t)$	$\xi_{08}(t)$
2005	0.7729	0.5990	0.5789	0.5942	0.6943	0.9672	0.7603	0.6590
2006	0.8169	0.6280	0.5976	0.6417	0.7690	0.7919	0.7138	0.8995
2007	0.8943	0.6401	0.7765	0.6381	0.8059	0.9176	0.6682	0.7677
2008	0.9445	0.6663	1.0000	0.7138	0.8286	0.7671	0.7610	0.6859
2009	0.9651	0.6630	0.9928	0.7713	0.8507	0.7350	0.8473	0.9638
2010	0.9033	0.6519	0.6244	0.8637	0.9782	0.6923	0.7370	0.8380
2011	0.7975	0.9850	0.8207	0.6630	0.8500	0.7254	0.7418	0.4188
2012	0.8918	0.8566	0.9966	0.6449	0.8529	0.8261	0.6015	0.5092
2013	0.8968	0.3966	0.7641	0.6080	0.7505	0.6278	0.7638	0.6780
2014	0.8127	0.3334	0.6365	0.5101	0.6023	0.5267	0.5732	0.7973

(6) Sort the gray correlation

$$r_1 > r_5 > r_3 > r_6 > r_8 > r_7 > r_4 > r_2$$

In general, the value between 0 and 0.35 is weak correlation, that between 0.35 and 0.65 is moderate correlation, that between 0.65 and 0.85 is close correlation, and that greater than 0.85 is the strongest correlation.

(7) Result analysis

Judging from the sequence of relevance, the influences of urbanization on the rural resident consumption structure in Shiyan from 2005 to 2014 are, in order, food > transportation and communication > housing > cultural education and entertainment > other commodities and services > health care and insurance > daily necessities and services > clothing.

It can be seen from the above sequence that, the 8 items of expenditure have high correlation with the urbanization in Shiyan city, whose correlation are all more than 0.5.

Food has the most correlation with the urbanization level. Food expenditure is affected by economic development level, income and price, and the impact of the latter two was the most pronounced, in particular. From the data in Table 2, with the rise of economic development level and income, the proportion of residents' food consumption is declining, which is consistent with Engel's law. Simultaneously, as the level of urbanization continues to increase, people's demands increase, which will lead to price increase. Food expenditure will increase with the level of price increases, because it is a necessity which will not be reduced or only partially reduced residents, even though the expenditure of other consumptions may be reduced the with the increase in prices. So its correlation coefficient is the largest.

Transportation and communication consumption has more correlation with urbanization level. Shiyan is a prefecture city in the northwest of Hubei province, which is located in the Qinba mountain area with a typical mountain landscape. Its development can be regarded as the history of exploitation of mountain areas, and the urbanization process of Shiyan can actually be regarded as that of mountain area. From the aspect of spatial distance, the entire area of Shiyan city is equivalent to the distance from Shiyan to Wuhan which is the capital of Hubei, but its population density is the lowest in the province, which is also more scattered. Because of the support of automotive industry in the city, the people tend to focus on urban area. It is the geographical features of Shiyan that make urbanization significantly influence the expenditure on food, and transportation and communications consumption. On account of the South - North Water Diversion Project in recent years, a large number of immigrants moved into the city, which makes a lot of rural residents leave the countryside to the city. On the other hand, the mountain was pushed and new roads were built in the urban area, so there is more room for the construction of high buildings, which stimulates inhabitants' spending on housing.

From the above correlation, it also can be indicat-

ed that the rural residents are now pursuing material enjoyment after the basic living. More and more people pay attention to education and spiritual life. Because of the larger population of rural residents in Shiyan, the rural cooperative medical care is universal and is popularized earlier, so the proportion of health care spending is relatively stable from 2005 to 2014, which result in general impact of urbanization on expenditure on health care. It can be seen from Table 1 that, the proportion of daily necessities and clothing expenses doubled in 10 years. But from the gray correlation degree we can see that the urbanization rate has the least impact on them. This is mainly because the people's consumption patterns have changed a lot over the past 10 years. For example, the internet shopping enables people to buy better and cheaper living goods with the convenience of traffic. Although the proportions of daily necessities and clothing have increased, the correlation with the level of urbanization is the weakest indeed.

4 SUGGESTIONS ON OPTIMIZATION OF RURAL RESIDENTS' CONSUMPTION STRUCTURE IN SHIYAN CITY

(1) Improve the income of rural residents

From the correlation analysis above, we must pay attention to the hot spots of rural resident consumption, such as transportation and communication, housing, cultural and educational entertainment, and then actively increase them, so as to promote the process of urbanization. Meanwhile, the development of urbanization will lead the second and tertiary industries, so a large number of rural surplus laborers can get more employment opportunities and the previous single income sources of rural residents will also be changed, which will result in the increase of employment rate and income. The overall level of urban per capita consumption increased at last.

(2) Change the consumption behavior of rural residents

With the improvement of urban and rural infrastructure, such as traffic, network, etc., the convenience of consumption will be improved, the cost of consumption will be reduced, and the rural residents are more likely to consume in cities; as the social security system of China is gradually improved, more and more people have pension and medical care, which also drives other consumptions of residents; the emergence of credit consumption also breed a lot of consumer behaviors. More and more rural residents choose credit loans to buy a car or a house. The diversification of consumer behaviors also stimulates the level of expenditure.

(3) The positioning of urban functions drives consumer demand

There is no hope for the city without function. According to the functions, Shiyan city is currently posi-

tioned as five-city: automobile city, hydropower city, tourist city, eco-friendly city, and regional center city. It established five town zones: Shiyan city, Danjiangkou city, Yunxian city, Wudang Mountain special economic zone, Bailang economic development zone. Around the five districts, the city function should be developed well, and the economic development should be promoted, which can narrow the urban-rural dual structure, so as to rationally change the consumption concept of rural residents, and boost their consumption needs.

(4) Explore the new pattern of urbanization

The so-called new planning of urbanization emphasizes the optimal layout, which regards the urban agglomeration as the main form, to promote the coordinated development of cities and small towns. Urban planning emphasizes ecological civilization and cultural heritage, shifting attention away from the traditional land urbanization towards the population urbanization. So the migrants from rural areas can obtain equal public services. In turn, the permanent migration and full citizenization can be completed ultimately, so as to implement the upgrade of consumption and economic growth. If there are no enough jobs for urban people, it is difficult to prop up the function of the city. Therefore, rational distribution and layout of the industry can not only improve the consumption structure of rural residents, but also promote the steady progress of the new type of urbanization.

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