# Comparison among the Consumption Structures of Different Income Groups of Urban Residents in Guangxi Based on ELES Model

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**Abstract** According to the household consumption data of urban residents in *Guangxi Statistical Yearbook* in the year 2009, the ELES (Extended Linear Expenditure System) is used to analyze the consumption structure, the propensity to consume, and the consumer flexibility of urban residents in Guangxi Zhuang Autonomous Region of China in the year 2008. Result shows that urban residents in Guangxi has relatively low propensity to consume. And their consumption, especially the middle and low-income families, is mostly concentrated in food, cloth, lodging and other basic necessities of life, which account for more than a half of their income. Based on this, corresponding suggestions are put forward to enlarge the consumption demand of urban residents in Guangxi, such as increasing the regulation of income redistribution, minimizing the gap between the rich and the poor, enhancing the overall consumption level, cultivating the consumption hot spots for the urban residents, and actively guiding the enjoyable consumption.

**Key words** Consumption structure, ELES Model, propensity to consume, Flexibility, China

Consumption is one of the three factors promoting the growth of economy. In recent years, increasing concern of consumption is paid due to its contribution to the economic growth of Guangxi Zhuang Autonomous Region of China. Since residents are the main consumers, grasping the changes in their consumption would be helpful to the policy making of the consumption in Guangxi during the Twelfth Five - year Plan period, as well as to the prosperity of the market and the further improvement of the life quality of residents. It is also of positive significance to inducing the resident consumption demand in other areas. Change of resident consumption demand structure and its variation tendency is one of the sources of external information necessary for the operation of enterprise MIS system, which is also an important starting point for the government to optimize the regional industrial layout, to accelerate the process of new industrialization and to achieve the goal of the all-round well-off society in China[1]. Therefore, intensive study on the consumption structure of urban residents in Guangxi is undoubtedly of great significance to promote the sound and fast development of economy in Guangxi.

## 1 Research method and data source

**1.1 ELES (Extended Linear Expenditure System) and the Estimation Theory** ELES is a demand function system put forward by the economist Luch in the year 1973 based on the LES Model (Linear Expenditure System) by an American econometrician Stone. LES Model describes the law of demand for consumer commodity; while ELES Model regards savings as an article, introduces the utility function and develops the LES Model. As for the design of models, ELES upgrades the LES in two aspects[2]. One is that ELES replaces the total consumption expenditure by disposable income; the other is that it substitutes the marginal consumption propensity for the marginal budget share. Its equation is

$$p_i q_i = p_i r_i + b_i(Y - \sum_{j=1}^{n} p_j r_j),\ i = 1, 2, 3, \cdots, n \quad (1)$$

where $p_i$ is the price of the $i$th article, $q_i$ is the consumption amount of the $i$th article, $r_i$ is the basic consumption number of the $i$th article, $p_i r_i$ is the basic consumption of the $i$th article, $Y$ is the per capita income level, $p_i q_i$ is the consumption of the $i$th article, $b_i$ is the marginal consumption propensity of consumer towards the $i$th article, $p_i$ is the price of the $j$th article, and $r_j$ is the basic consumption number of the $j$th article.

The basic economic meaning of equation (1) is that the demand of the $i$th article is equal to the sum of the following two parts: one is the basic demand, which is used to maintain their basic living; the other is the rest of gross budget that is used for the consumption of the $i$th article after the deduction of basic demand expenditure of all articles, which is related to the preferences of consumers.

(1) The basic formula. Let

$$a_i = p_i r_i - b_i \sum p_i r_i \quad (2)$$

According to model (1), we have

$$p_i q_i = a_i + b_i Y \quad (3)$$

The estimated values $\hat{a}_i$ and $\hat{b}_i$ of $a_i$ and $b_i$ are obtained by the ordinary least squares.

(2) Calculate the total expenditure on basic needs.

According to equation (2), we have $\sum p_i r_i = \sum a_i / (Y - \sum b_i)$, and its estimator is:

$$\sum p_i \hat{r}_i = \sum \hat{a}_i / (Y - \sum \hat{b}_i) \quad (4)$$

(3) Calculate the expenditure for basic demands. Based on equations (2) and (4), we have

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$$p_i\hat{r}_i = \hat{a}_i + \hat{b}_i \sum \hat{a}_i / (Y - \sum \hat{b}_i) \quad (5)$$

(4) Estimation results of ELES. The calculation result is

$$p_i\hat{q}_i = p_i\hat{r}_i + \hat{b}_i (Y - \sum p_i\hat{r}_i) \quad (6)$$

Direct estimation of model can be carried out by using the section data.

**1.2 Data source** Data are from the 2009 *Guangxi Statistical Yearbook*[3].

## 2 Result and analysis

**2.1 Establishment of the ELES Model of the consumption structure of urban residents in Guangxi**[4] The Least Square Method is used to estimate the parameters $a_i$ and $b_i$ in model (3). According to the characteristics of consumption objects and basic needs of the consumption of rural residents, consumption expenditure of rural residents can be divided into nine categories, such as food, clothes, accommodation, education, medical care, transport and communications, household equipment, entertainment and others. According to the section data of household consumption of urban residents in the 2009 *Guangxi Statistical Yearbook*, Eviews6.0 Software is used to estimate the model parameter. And Table 1 reports the result.

**Table 1 Linear expenditure system parameters of urban residents in Guangxi Zhuang Autonomous Region of China in the year 2008**

| Item | $\hat{a}_i$ | $\hat{b}_i$ | $R^2$ | *t* value of $\hat{b}_i$ | *F* value |
|---|---|---|---|---|---|
| Food | 2 297.969 0 | 0.123 780 | 0.885 132 | 6.207 10 | 38.528 1 |
| Clothes | 34.179 9 | 0.050 145 | 0.947 976 | 9.545 11 | 91.109 2 |
| Accommodation | 335.247 4 | 0.039 923 | 0.9794 62 | 15.441 80 | 238.450 5 |
| Education | 284.511 1 | 0.012 383 | 0.585 963 | 2.660 12 | 7.076 2 |
| Medical care | 237.388 5 | 0.019 337 | 0.730 147 | 3.678 13 | 13.528 6 |
| Transportation and communication | −1 094.171 0 | 0.180 300 | 0.843 841 | 5.197 94 | 27.018 6 |
| Household equipments | −85.030 61 | 0.049 554 | 0.949 369 | 9.682 65 | 93.753 7 |
| Entertainment | 167.804 1 | 0.062 947 | 0.957 044 | 10.554 55 | 111.398 6 |
| Others | −43.957 2 | 0.023 842 | 0.977 723 | 14.813 87 | 219.450 9 |
| Total | – | 0.562 211 | – | – | – |

Table 1 reports that the tests on the parameter estimates of all the categories of urban residents consumption are significant in Guangxi. Except the education and the medical care, the rest seven categories all have relatively high fitting degree of regression equation. Most of the coefficients of determination $R^2$ are greater than 0.9, indicating that there are highly significant linear correlation between the consumption expenditure and the per capita disposable income in all categories, which meets the conditions for further analysis.

**2.2 Analysis on the consumption structure of urban residents in Guangxi in the year 2008**

**2.2.1** Analysis on the marginal consumption propensity. In the year 2008, overall marginal consumption propensity of urban residents in Guangxi is 0.562 211, indicating that 0.562 211 yuan is used for the consumption expenditure in every 1 yuan increase of income. At present, food, entertainment, transportation and communication are the three consumption hotspots of the urban residents in Guangxi, and their marginal consumption propensities rank the top three. This indicates that except the foods, urban residents in Guangxi begin to pay attention to the food, the education of their children, and the transportation and communication. They want to strengthen the communication with the outside world. At the same, the marginal consumption propensities of the clothes and the household equipments are also relatively high, showing that urban residents in Guangxi pay attention to their personal appearance and are eager to improve their living conditions. Medical care is a relatively high-grade consumption based on the survival consumption. Under the current income level, urban residents have no high demands for medical care.

**2.2.2** Analysis on consumption structure. Table 2 reports the composition of per capita annual consumption expenditure of the urban households with different incomes in Guangxi in the year 2008.

**Table 2 Composition of per capita annual consumption expenditure of the urban households with different incomes in Guangxi in the year 2008**

Yuan

| Item | Lowest-income households | Low-income households | Middle and lower-income households | Middle-income households | Middle and higher-income households | High-income households | Highest-income households |
|---|---|---|---|---|---|---|---|
| Food | 2 534.47(55.3) | 3 023.70(43.1) | 3 612.85(37.4) | 3 877.13(30.0) | 4 591.48(27.1) | 5 863.11(26.0) | 5 711.98(17.7) |
| Clothes | 149.17(3.3) | 310.75(4.4) | 517.82(5.4) | 789.38(6.1) | 1 040.22(6.1) | 1 232.74(5.5) | 1 517.93(4.7) |
| Accommodation | 534.15(11.7) | 606.14(8.6) | 709.83(7.3) | 823.00(6.4) | 976.56(5.8) | 1 354.20(6.0) | 1 577.33(4.9) |
| Education | 233.82(5.1) | 399.04(5.7) | 358.46(3.7) | 544.87(4.2) | 651.98(3.8) | 456.73(2.0) | 660.09(2.0) |
| Medical care | 220.81(4.8) | 368.36(5.2) | 377.03(3.9) | 732.48(5.7) | 516.66(3.0) | 684.66(3.0) | 812.68(2.5) |
| Transportation and communication | 297.94(6.5) | 480.38(6.8) | 717.10(7.4) | 1 011.89(7.8) | 1 388.45(8.2) | 1 762.87(7.8) | 5 806.01(18.0) |
| Household equipments | 137.30(3.0) | 265.54(3.8) | 325.12(3.4) | 532.37(4.1) | 744.06(4.4) | 1 263.50(5.6) | 1 392.89(4.3) |
| Entertainment | 329.75(7.2) | 6 22.37(8.9) | 6 58.73(6.8) | 1 123.11(8.7) | 1 424.26(8.4) | 1 609.28(7.1) | 2 083.75(6.4) |
| Others | 72.11(1.6) | 111.71(1.6) | 165.41(1.7) | 295.63(2.3) | 321.14(1.9) | 553.62(2.5) | 701.48(2.2) |
| Per capita disposable income | 4 581.75 | 7 018.31 | 9 672.82 | 12 938.30 | 16 947.21 | 22 563.16 | 32 345.01 |

Note: Data in the brackets refer to the proportion of the consumption in the per capita disposable income, and their unit is %.

Table 2 shows that there are great differences in the income among different income groups. In the year 2008, per capita annual consumption expenditure of the lowest-income households is only 4 581.75 yuan in Guangxi in the year 2008; while that of the highest-income households reaches 32 345.01, which is more than 7 times of the former. Expansion of income gap indicates the growing wealth gap between the rich and poor in urban Guangxi, which is not conducive to the improvement of the overall consumption level. Secondly, there are significant differences in the consumption structure among different income groups in the aspect of consumption structure. Food, accommodation and entertainment take the first three places in the middle and lower-income households. Among them, food consumption accounts for as high as 55.3% of their overall income, indicating that the consumption level of this group is relatively low; and more than half of the income is used to solve the food and clothing problems. Education accounts for a relatively great proportion, indicating that the middle and lower-income households in Guangxi pay attention to the education of their children. Transportation and communication account for high proportions in the consumption of the middle and higher-income households and the high-income households. Especially in the high-income households, it reaches as high as 18%, which exceeds food consumption and becomes the largest consumption category. According to the actual situation, urban residents have to pay relatively high cost of transportation and communication in city life, and need to spend more to satisfy the basic needs of living, which belongs to high-grade consumption. However, the middle and lower-income households can not provide more transportation and communication fees to improve their status; and food and accommodation are their important expenditure categories.

**2.2.3** Analysis on the income elasticity of consumer demand. Income elasticity of demand refers to the percentage of demand changes of goods and services caused by 1% income change when the price remains unchanged. $\eta_i$ represents the income elasticity of the $i$th demand. The calculation equation is

$$\eta_i = \frac{\partial q_i}{q_i} \Big/ \frac{\partial Y}{Y} = \frac{b_i}{p_i q_i} \quad (7)$$

According to equation (7), Table 3 shows the income elasticity of various consumer demands of urban residents in Guangxi.

**Table 3 Income elasticity of various consumer demands of urban residents in Guangxi in the year 2008**

| Item | Lowest-income households | Low-income households | Middle and lower-income households | Middle-income households | Middle and higher-income households | High-income households | Highest-income households |
|---|---|---|---|---|---|---|---|
| Food | 0.223 8 | 0.287 3 | 0.331 4 | 0.413 1 | 0.456 9 | 0.476 3 | 0.700 9 |
| Clothes | 1.540 2 | 1.132 5 | 0.936 7 | 0.821 9 | 0.816 9 | 0.917 8 | 1.068 5 |
| Accommodation | 0.342 4 | 0.462 3 | 0.544 0 | 0.627 6 | 0.692 8 | 0.665 2 | 0.818 7 |
| Education | 0.242 6 | 0.217 8 | 0.334 1 | 0.294 0 | 0.321 9 | 0.611 7 | 0.606 8 |
| Medical care | 0.401 2 | 0.368 4 | 0.496 1 | 0.341 6 | 0.634 3 | 0.637 3 | 0.769 6 |
| Transportation and communication | 2.772 7 | 2.634 2 | 2.432 0 | 2.305 4 | 2.200 7 | 2.307 7 | 1.004 4 |
| Household equipments | 1.653 6 | 1.309 7 | 1.474 3 | 1.204 3 | 1.128 7 | 0.884 9 | 1.150 7 |
| Entertainment | 0.874 6 | 0.709 8 | 0.924 3 | 0.725 2 | 0.749 0 | 0.882 6 | 0.977 1 |
| Others | 1.514 9 | 1.497 9 | 1.394 2 | 1.043 4 | 1.258 1 | 0.971 7 | 1.099 3 |

Table 3 shows that the value of elasticity is positive, indicates that demand will increase with the improvement of income. In other words, income increases as the consumption enhances. Elasticity of transportation and communication takes the first place. It reaches as high as 2.772 7 among the lowest-income households, indicating that the growth rate of consumer demand of transportation and communication is significantly higher than that of income. Besides, household equipment, clothes, entertainment and other others have relative great elasticity. Food, education and medical care have relatively small elasticity, indicating that people need more consumer goods for entertainment and development as their income increases. There is sufficient competition in high-end furniture, modern transportation and communication with the enhancement of residents' income level. Therefore, there is steady growth in the communication and equipment, such as family car, computer, mobile phone, and air-conditioning.

## 3 Conclusion and suggestion

(1) Urban residents in Guangxi show relatively low propensity to consume; and most of the consumption is concentrated in clothes, food, accommodation and other survival consumption. Especially among the middle and low-income households, the consumption of these three accounts for half of their income. Thus, in order to promote the prosperity of consumer market, other channels should be opened up except the economic development.

(2) Increase the adjustment intensity of redistribution, minimize the gap between the rich and poor, and enhance the overall level of consumption. In recent years, the overall consumption level of urban residents is improved in Guangxi. But the gap between the rich and the poor shows a tendency to expand. We should make full use of the taxes and other economic levers, legal regulations, and other effective regulations, establish and improve the social security system, ban illegal income, adjust the highest income, enlarge the income of middle groups, promote the economic growth of the lowest-income families, and effectively enhance the consumer demand.

(3) Cultivate the consumption hot spot of residents in Guangxi, and actively guide the enjoy consumption. The rapid economic development of China has brought the substantial increase in household income. Therefore, we should actively guide the residents to pursue a high quality of life, cultivate new consumption hot spot, explore the potential consumption capability for residents, and promote the prosperity of consumption market.

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ies, if they want to engage in certain vocation, they have to be equipped with certain skills accordingly ahead, which can be achieved by receiving vocational education.

In modern society stressing ability, efficiency and benefits, rural people only receiving the nine-year compulsory education are far from readiness for competitions and challenges. That's why vocational education comes into existence and maintains. At present, rural labor is mainly transferred to processing, building and service industries where manual workers are in large demand. Therefore, vocational skill training, even in a short time, can improve their adaptability effectively. According to a survey, in Sichuan, rural labor receiving vocational skill training is easier to get a job and better-paid than those without the training in cities. The average annual income of the trained rural labor can reach 4 800 yuan while that of the untrained is only about 3 300 yuan. The former earned more than the latter by nearly 50%[12]. Obviously, it's urgent as well as necessary to train the transferred rural labor in their vocational skills.

**3.3 Improving the physical & mental quality of rural labor** Good physical and mental quality is not only the basis for people to finish vocational education and become qualified for their future job but also indispensable for rural labor to be healthy and all-round.

Physical quality refers to the state of physical structure and functioning, the basis for people to engage in activities. In vocational education, students of different ages & physiological characteristics are supposed to meet corresponding standards of physical exercises of the nation. Moreover, vocational education should help its receivers develop special physical abilities as required by certain particular occupation, such as construction where being capable of aerial & hard work and standing harsh weather are required of workers and restaurant services where the endurance of lower limbs are required. Given the current situation of productive forces in China, physical health remains essential in livelihood earning for rural labor.

Mental quality refers to the degree of the harmony between individuals' inner world and the outer world and whether individuals can adapt to social norms and meet vocational requirements. That is, individuals' psychological status. As the reform and opening up goes further and the society changes constantly, the pace of life is accelerating in China. However, deeply influenced by the traditional small-scale peasant economic system, rural labor tends to cling conservatively to the old system, stress agriculture over commerce, hate to leave his native land, believe in fate and have difficulties adapting to the transformation of society. Thus the vocational education serving prospective transferred rural labor is significant in changing its learners' concepts so that they can adapt themselves to the modern competitive market.

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