On the Consumption Structure of Rural Residents in Xi’an City Based on AIDS Model

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Abstract Under the background of the financial crisis, expanding domestic demand for stimulating economic role is self-evident. As China has a large rural population, increasing rural residents’ income and expanding their consumer demand is becoming the pinnacle of expanding domestic demand. The urban residents have good conditions than more countryside dwellers. Since few articles are dedicated to the research of this group, this article selects rural residents of Xi’an as object, uses AIDS model to analyze the consumption structure of rural residents, and draw the conclusion that increasing cultural recreation, medical and health spending is the main way to increase their incomes.

Key words AIDS model, Consumption structure, Elasticity

In the quantitative research of consumption, some important theories appeared one after another, such as Duesenberry’s theory of relative income and consumption, Modigliani’s theory of life-cycle consumption and Friedman’s theory of permanent income and consumption, since Keynes developed the theory of absolute income and consumption in 1936. However, these studies can not provide information about the consumption structure, hindering playing the policy role of these studies. AIDS model, developed after the 1950s, analyzes the optimal choice for the consumer behavior from an economic perspective, providing effective data support for the decision-making departments, so it has been widely used.

Chinese scholars Zang Xuheng [1], and Gu Beiqing et al. [2] compare the consumption structure of rural residents and urban residents, and believe that social welfare and infrastructure are an important reason for consumption structure differences. Some scholars also analyze the consumption structure changes in rural areas in a certain period and differences in the rural consumption structure between the regions, and identify the main factors restricting the consumption needs of rural inhabitants [3–6]. In the qualitative research, the majority of scholars explore the factors that restrict rural consumption from low income of rural residents, heavy burden on farmers, low expected income, backward consumer attitudes, poor rural infrastructure, backward circulation environment, liquidity constraints and other angles. They also put forth the recommendations for promoting rural consumption [7–8].

Overall, the current studies are of positive significance to the optimization of consumption structure and the improvement of rural residents’ consumption level, but few of them touch upon the selection of focus of rural consumption expansion, and the researches are too general, making the relevant decisions lack a solid foundation. Based on the fitted econometric models, we analyze the consumption structure features of rural residents in Xi’an City, and at the same time, choose the consumption focus, in order to put forward a targeted reference for the relevant decisions.

1 Data sources and methods

1.1 Data sources and processing On the basis of fitting the econometric models, we analyze the characteristics of the consumption structure of rural residents in Xi’an City and select the consumption focus, in order to provide a more targeted and feasible reference for the relevant decisions.

1 Data sources and research methods

1.1 Data sources and processing We use the data in Xi’an Statistical Yearbook (1995–2010), including the consumer price index of rural residents in Xi’an City and the average amount of living consumption expenditures per person.

The specific method is as follows:

(i) First let the consumer price index take 1993 as the base period (p = 100) for adjustment, and then take the logarithm of it and calculate the expenditure share of eight categories of goods \( (w_i) \), using the sum of consumption of eight categories of consumer goods and total sum of consumption;

(ii) Put the results obtained above into the stone price index formula to calculate the stone price index \( P^* \);

(iii) Use the total consumer price index with 1993 as the base period to calculate the total actual spending each year, denoted as \( X \), calculate \( \ln(X/P^*) \), and put the relevant data into the AIDS model for fitting.

1.2 Research methods

1.2.1 AIDS model. Currently, the mainstream method for the study of consumption structure in the world is the demand system model, including LES, ELES and AIDS. The meaning of AIDS model coefficients is clear and the model data use the relative proportion indicator, reducing the errors due to similar trend data processing in the statistical analysis to a certain extent [9]. It is of high robustness, and its elasticity can accurately reflect the individuals’ willingness to consume and ability to pay for a com-

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modity. It can better describe the problem to be studied, so this model is used.

It is expressed as follows:

\[ w_j = a + \sum_{i=1}^{s} \gamma_i \ln p_i + b_i \ln (X/P^i) \]  \hspace{1cm} (1)

\[ \ln P^i = \alpha_i + \sum_{j=1}^{s} \alpha_{ij} \ln p_j + \frac{1}{2} \sum_{j=1}^{s} \sum_{k=j}^{s} \gamma_{ijk} \ln p_j \ln p_k \]  \hspace{1cm} (2)

The spending proportion sum of various types of consumer goods is 1, and the model is derived when meeting the utility maximization and expenditure minimization. In theory, it meets the homogeneous conditions of degree zero, summation conditions and symmetry conditions;

\[ \sum_{i=1}^{s} \alpha_i = 1, \sum_{i=1}^{s} \gamma_i = 0, \sum_{i=1}^{s} \beta_i = 0; \sum_{i=1}^{s} \gamma_i = 0; \gamma_i = \gamma_i \]

Since the AIDS model is nonlinear, it can be estimated, however, based on the complexity and freedom, and the stone price index is often used. The expression is as follows:

\[ \ln P^i = \sum_{i=1}^{s} w_i \ln p_i \]  \hspace{1cm} (3)

Formula (3) is substituted for formula (2), and we get the linear AIDS model, namely LA/AIDS model. It reduces the computational difficulty, and makes the estimation easy.

1.2.2 Elasticity calculation formula. The income elasticity of consumer demand is calculated as:

\[ \eta = 1 + \frac{b_i}{w_i} \]  \hspace{1cm} (4)

The price elasticity of demand is calculated as:

\[ \varepsilon_p = - \delta_{ij} + \frac{\gamma_{ij} w_i}{w_j} - \frac{b_i w_i}{w_j} \]  \hspace{1cm} (5)

When \( i = j \), \( \delta_{ij} = 1 \), and when it is in other cases, \( \delta_{ij} = 0 \). When \( i = j \), it is own-price elasticity, which means that the amount of consumption is changed due to the changes in the prices of one certain commodity; when it is in other cases, it is cross-elasticity, which refers to the impact of changes in the prices of other commodities on the amount of consumption of these commodities.

2 Results and analysis

According to the annual income and various consumer spending time series data, we use the econometric software Eviews 6.0 and SUR (Seemingly Unrelated Regression) method, to analyze the consumption structure of rural residents in Xi’an City.

To avoid singular matrix, one of the eight equations is removed for parameter estimation, and the coefficient values and significance values are derived. Then other seven equations are fitted once again to get the coefficient values and significance values of the first equation not to be estimated. The concrete results are shown in Table 1.

Table 1 shows that the overall results are significant, and the vast majority of \( R^2 \) is above 0.9, indicating that the degree of fitting is good. A small number of estimation results are not significant, possibly because the price fluctuations of one certain type of consumer goods may not have a large impact on the other types of consumer goods, or consumers deviate from the principle of maximizing the utility to a certain extent.

In summary, the estimated coefficients meet the requirements, and they can be substituted into the formula to calculate the income elasticity of demand and price elasticity of demand, and analyze the rural residents’ willingness to spend on and propensity to consume various types of consumer goods in Xi’an City on this basis.

The data in Table 1 are substituted into formula (4), to get the rural residents’ expenditure elasticity in Xi’an City (Table 2).

The results in Table 1 are substituted into formula (5) to get Table 3. Based on the size and sign of the values, we can judge that the estimated results are basically reasonable.

From Table 2, 3, it can be found that the rural residents’ consumption structure in Xi’an City shows the following characteristics:

(i) The comfortable standard of living has been achieved. Food accounts for 36.49% of consumer products, and according to the calculation standards for Engel coefficient, it reaches a well-off level. The expenditure elasticity is the lowest (0.4955), far less than 1, indicating that even if the income increases, the growth rate of rural residents’ consumption of it will not increase. According to the cross-elasticity, its price changes have a little impact on other commodities, indicating that the rural residents’ consumption in this area has reached a certain level in Xi’an City, with little space for rise.

(ii) The enjoyment-centric consumption has been gratified to some extent. According to Table 2, the two items with large values of expenditure elasticity are housing and home appliances, reaching 1.2266 and 1.3708, respectively. In terms of housing, the rural residents living in Xi’an have further requirements on housing, and they want to be able to live in the commercial residential building like the urban residents, and enjoy the convenience of city life. However, due to the limited income of rural residents, they desire to improve the living can not be met, so the expenditure elasticity is high. The elasticity of demand is negative ( -0.7478), and the absolute value is small, that is, the degree of sensitivity to housing prices is not high, and once the income increases, they will increase the share of consumption. In terms of the consumption of home appliances, the rural residents in Xi’an City have the ability and strong willingness to afford such spending. The own-price elasticity of home appliances in Table 3 is positive (2.4915), and from the cross-price elasticity, it has a great impact on other commodities, indicating that rural residents attach importance to these consumer goods, and have the ability to consume and strong willingness to pay.

(iii) The development-oriented consumption is not sufficient. Here the development-oriented consumption is to improve the personal capital stock through consumption, in order to move towards the consumption of higher level. The consumption in the areas of health care, culture and entertainment (including education and entertainment expenses) and transportation and communications, is able to improve personal capital stock and is conducive
to personal development. From the results in the table, it is found that the rural residents’ consumption on this type occupies a small share in Xi’an City, and the consumers’ willingness and ability to pay is also inadequate.

Table 1 AIDS model estimation results (SUR time series data)

<table>
<thead>
<tr>
<th>Category of consumer goods</th>
<th>( \alpha )</th>
<th>( \gamma_1 )</th>
<th>( \gamma_2 )</th>
<th>( \gamma_3 )</th>
<th>( \gamma_4 )</th>
<th>( \gamma_5 )</th>
<th>( b )</th>
<th>( R^2 )</th>
<th>( DW )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>1.0001</td>
<td>-0.0202</td>
<td>0.3313</td>
<td>0.2177</td>
<td>-0.2622</td>
<td>0.0857</td>
<td>0.0004</td>
<td>0.6866</td>
<td>0.0001</td>
</tr>
<tr>
<td>Clothes</td>
<td>-0.2839</td>
<td>0.0158</td>
<td>-0.0202</td>
<td>0.0058</td>
<td>0.1001</td>
<td>-0.0343</td>
<td>0.0004</td>
<td>0.3504</td>
<td>0.4353</td>
</tr>
<tr>
<td>Housing</td>
<td>-3.0991</td>
<td>-0.0184</td>
<td>-0.1256</td>
<td>0.0577</td>
<td>-0.0632</td>
<td>0.7779</td>
<td>0.0008</td>
<td>0.8974</td>
<td>0.5707</td>
</tr>
<tr>
<td>Home appliances</td>
<td>-0.8362</td>
<td>0.1179</td>
<td>-0.1653</td>
<td>-0.0051</td>
<td>0.2452</td>
<td>0.0058</td>
<td>0.0008</td>
<td>0.0008</td>
<td>0.0002</td>
</tr>
<tr>
<td>Health care</td>
<td>1.0945</td>
<td>-0.0269</td>
<td>0.06119</td>
<td>-0.0370</td>
<td>-0.0731</td>
<td>-0.0210</td>
<td>0.0008</td>
<td>0.2656</td>
<td>0.1039</td>
</tr>
</tbody>
</table>
| Transportation and
communications | 1.7762        | -0.0375        | 0.2389         | -0.0147        | -0.4454        | -0.1089        | 0.0008         | 0.0005         | 0.1895         |
| Culture and entertainment  | 2.4983        | -0.0948        | 0.0968         | -0.0543        | -0.2505        | -0.1748        | 0.0008         | 0.1868         | 0.3763         |
| Others                     | 0.3561        | -0.0443        | -0.0328        | -0.0433        | 0.1074         | 0.1078         | 0.1463         | 0.2612         | 0.584          |

Table 2 The rural residents’ expenditure elasticity of eight categories of consumer goods in Xi’an City

<table>
<thead>
<tr>
<th>Number</th>
<th>Category of consumer goods</th>
<th>Expenditure elasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Food</td>
<td>0.495 5</td>
</tr>
<tr>
<td>2</td>
<td>Clothes</td>
<td>1.030 5</td>
</tr>
<tr>
<td>3</td>
<td>Housing</td>
<td>1.226 6</td>
</tr>
<tr>
<td>4</td>
<td>Home appliances</td>
<td>1.378 0</td>
</tr>
<tr>
<td>5</td>
<td>Health care</td>
<td>0.837 3</td>
</tr>
</tbody>
</table>
| 6      | Transportation and
communications | 0.870 9                |
| 7      | Culture and entertainment | 0.578 9                |
| 8      | Others                    | 1.694 6                |

Table 3 The rural residents’ price elasticity of demand of eight categories of consumer goods in Xi’an City

<table>
<thead>
<tr>
<th>Category of consumer goods</th>
<th>Food</th>
<th>Clothes</th>
<th>Housing</th>
<th>Home appliances</th>
<th>Health care</th>
<th>Transportation and communications</th>
<th>Culture and entertainment</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>-0.8758</td>
<td>0.9576</td>
<td>0.7061</td>
<td>-0.6971</td>
<td>0.2824</td>
<td>-0.2375</td>
<td>0.1500</td>
<td>-0.6814</td>
</tr>
<tr>
<td>Clothes</td>
<td>0.2359</td>
<td>-1.3175</td>
<td>0.0844</td>
<td>1.5610</td>
<td>-0.5378</td>
<td>0.1614</td>
<td>-0.0465</td>
<td>0.0218</td>
</tr>
<tr>
<td>Housing</td>
<td>-0.1758</td>
<td>-0.6594</td>
<td>-0.7478</td>
<td>-0.3406</td>
<td>3.9765</td>
<td>-1.1813</td>
<td>2.7182</td>
<td>-1.5828</td>
</tr>
<tr>
<td>Home appliances</td>
<td>1.5572</td>
<td>-2.3965</td>
<td>-0.1466</td>
<td>2.4915</td>
<td>0.0511</td>
<td>0.0187</td>
<td>-0.8310</td>
<td>0.3771</td>
</tr>
<tr>
<td>Health care</td>
<td>-0.2584</td>
<td>0.7300</td>
<td>-0.4034</td>
<td>-0.8483</td>
<td>-1.2334</td>
<td>-0.5575</td>
<td>-0.9976</td>
<td>0.2443</td>
</tr>
</tbody>
</table>
| Transportation and
communications | -0.3350 | 2.4383   | -0.1240  | -4.5210         | -1.0963     | -0.2386                           | -0.7737                   | 0.0892  |
| Culture and entertainment  | -0.7006 | 0.8964   | -0.4053  | -2.2205         | -1.5341     | 1.0943                            | -3.4642                   | 1.5305  |
| Others                     | -2.5969 | -1.7837  | -2.4326  | 5.6503          | 5.6581      | -0.3779                           | -3.6073                   | 1.6907  |

Only the expenditure elasticity of transportation and communications is 0.8709, and the elasticity of demand of transportation and communications is -0.2386, suggesting that the rural residents’ demand for the consumption of the two items is met to some extent, and the expenditure share is relatively stable. As to the health care and culture and entertainment, the expenditure elasticity is 0.8373 and 0.5789, respectively, indicating that rural residents’ willingness to spend on these items is not high. The
own-price elasticity is \(-1.2334\) and \(-3.4642\), respectively, indicating that the willingness to spend on the two types of goods is sensitive to price changes. The cross-elasticity also indicates that the price changes of other commodities easily affect the demand for these two commodities. The insufficient development-oriented consumption will seriously affect the personal development and improvement of level of consumption.

3 Conclusions and recommendations

3.1 Conclusions Overall, the standard of living of rural residents in Xi’an City has reached a comfortable level, and is able to meet enjoyment-centric consumption to some extent. However, the enjoyment-centric consumption is still relatively weak. According to the evolution law of consumption structure and consumption hot spots, after the subsistence consumption is met, it should shift to enjoyment-centric and development-oriented consumption. However, except the transportation and communications in Xi’an City, the rural residents’ development-oriented consumption of health care and education is still not satisfied, and it is difficult to form circular cumulative effect, so it is necessary to depend on the development-oriented consumption to further enhance the level of consumption.

3.2 Recommendations The rural residents’ consumption in Xi’an City should be focused on health care and culture and entertainment (including education), so we should pay attention to the following two aspects to optimize the consumption structure of rural residents:

3.2.1 Increasing the rural residents’ income as the important foundation for the optimization of consumption structure.

(i) It is necessary to continue to strengthen efforts in agricultural support policies to help farmers;

(ii) It is necessary to use the favorable conditions of transportation, human resources and technology in Xi’an City to make farmers turn from the production of low value-added raw materials to the production of high value-added final products, and increase the personal income;

(iii) It is necessary to ensure rural residents’ wage income.

3.2.2 Focusing on the correct guidance of rural residents’ consumption behavior. In the process of urbanization, rural residents’ consumption in Xi’an City is turning from subsistence consumption to enjoyment-centric consumption, but there is not proper understanding of development-oriented consumption and sustainable consumption. So it is necessary to change the backward consumer awareness in rural areas, and guide them to establish the correct concept of consumption; increase the support policies, and encourage farmers to increase spending on health care, culture, education and entertainment; reduce arbitrariness and blind imitation of consumption, and pursue civilized and healthy lifestyle.

References


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