

An Empirical Analysis on Urban Consumption Structure in Shandong Province, China

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Abstract

Purpose - The study on the consumption structure of urban residents can help us to understand demand law and to grasp the changing consumption trend of people. Consumption structure is an important indicator reflecting the people's living standard. It is of realistic significance to study urban consumption structure.

Research data and methodology - This study is carried out with data connected with urban residents from Shandong Statistical Yearbook for the period 2000-2010 analyzing eight commodity groups. The almost ideal demand system (AIDS) is one of the important models related to consumption structure.

Results - This paper shows that firstly gives a brief introduction to AIDS. Then it makes an empirical analysis on the urban residents' consumption structure in Shandong province, China on the basis of AIDS model.

Conclusions - the authorities are supposed to control the prices of HC, Foodstuff and Housing and encourage the consumption of HC, Housing, EE accordingly. At the same time, local government should increase the supply of goods connected with housing, HA, HC, and EE so as to attract more consumption from the urban residents in Shandong.

Keywords : Consumption Structure, Urban Residents, AIDS Model.

JEL Classifications: C12, C51,D12.

1. Introduction

According to the relevant economic theory, consumption is one of the main driving forces of economic growth. Consumption structure is an important indicator reflecting the people's living standard. The study on the consumption structure of urban residents can help us to understand demand law and to grasp the changing consumption trend of people. It is of realistic significance for the establishment of poli-

cies related to consumption and for the coordinated development of production and consumption. With the development of Shandong economy, the contribution rate of consumption to economic growth has raised constantly, up to 41.5% in 2010. Consumption is playing a more and more important role in the growth of Shandong economy. However, there are few relevant research papers on the urban consumption structure in Shandong province. On the basis of the related data and results from AIDS model, this paper is to study the expenditure elasticities of different commodity groups and to exam the interactions with the changes of prices in Shandong province. Lastly, this paper gives some suggestion to regulate consumption structure.

2. Methodology

2.2.1. An Introduction to AIDS Model

There are many demand system models to analyze the consumption structure, such as the Almost Ideal Demand System (AIDS), (Deaton and Muellbauer 1980), Linear Expenditure System (LES), (Stone 1954) and Extended Linear Expenditure System (ELES), (C.Lluch 1973). The data used in the AIDS model are relative indices, which effectively reduce errors caused by similar trend data in statistical analysis. As a result, the coefficients estimated through the AIDS model have specific economic meanings and higher robustness. The related calculated elasticities can reflect consuming willingness and paying capacity exactly, which helps to explain the problems studied in this paper. Due to its overall advantages over other models, this paper decided to use the AIDS model. The derivation of the AIDS model is described briefly as below:

Suppose consumer behavior satisfies the hypothesis of PIGLOG (Price Independent Generalized Log), Expenditure function is as follows:

$$\log(C(u, p)) = (1-u)\log(a(p)) + u\log(b(p)) \quad (1)$$

Where

$$\log(a(p)) = a_0 + \sum_{i=1}^n a_i \log(p_i) + \frac{1}{2} \sum_{i=1}^n \sum_{j=1}^n r_{ij}^* \log(p_i) \log(p_j) \quad (2)$$

$$\log(b(p)) = \log(a(p)) + b_0 \prod_{i=1}^n p_i^{b_i} \quad (3)$$

Put (2) and (3) into (1), we obtain

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$$\log(C(u, p)) = a_0 + \sum_{i=1}^n a_i \log(p_i) + \frac{1}{2} \sum_{i=1}^n \sum_{j=1}^n r_{ij}^* \log(p_i) \log(p_j) + ub_0 \prod_{i=1}^n p_i^{b_i} \tag{4}$$

$$w_i = a_i + \sum_{j=1}^n r_{ij} \log(p_j) + b_i \log(X / P) \tag{7}$$

$$\log P = \sum_{i=1}^n w_i \log(p_i) \tag{8}$$

Any arbitrary cost function can be approximated by the above function, provided that $\sum_{i=1}^n a_i = 1, \sum_{j=1}^n r_{ij}^* = \sum_{i=1}^n r_{ij}^* = \sum_{i=1}^n b_i = 0$

2.2.2. Elasticity Formulae

The related demand elasticity can be calculated according to the estimated coefficients. The formulae are as follows:

Income Elasticity of Demand Formula:

$$\eta_i = 1 + \frac{b_i}{w_i} \tag{9}$$

Marshall Price Elasticity of Demand Formula:

$$\epsilon_{ij} = -\delta_{ij} + \frac{r_{ij}}{w_i} - \frac{b_i w_i}{w_j} \tag{10}$$

If $i = j$, then $\delta_{ij} = 1, \epsilon_{ij}$ is self-price elasticity of demand and if $i \neq j$, then $\delta_{ij} = 1, \epsilon_{ij}$ is cross-price elasticity of demand.

3. Data Base

This study is carried out with data connected with urban residents from Shandong Statistical Yearbook for the period 2000-2010 analyzing eight commodity groups. The commodity groups considered are: food, beverages and tobacco (Foodstuff) clothing and footwear (Clothing) furniture, furnishings and household equipments and operation (Household Appliance, HA) health expenses and medical care (Health Care, HC) transport and communication (TC) entertainment, education and cultural services (Entertainment and Education, EE) housing; miscellaneous goods and services. We adjust prices indices at price levels of 2000 and take their logarithms and calculate the different budget share of commodity groups according to the relevant data. Then we can get the data of log P using the above calculated results.

Where $\log(C(u, p))$ is the logarithm of the cost function, u is the level of utility, $0 \leq u \leq 1$, P is a vector of prices for various goods and services, and $a_0, a_i, r_{ij}^*, b_0, b_i$ are parameters. Any cost function has the fundamental property: $\partial C(u, p) / \partial p_i = a_i$, where a_i is the demand quantity of the i -th goods or service. From $\partial C(u, p) / \partial p_i = a_i$, we can obtain $\partial \log C(u, p) / \partial \log p_i = p_i a_i / C(u, p) = w_i$ where w_i is the budget share of the goods i . From this property, Deaton and Muellbauer (1980) derived the AIDS demand functions for the budget share of good i . The demand functions can be derived as follows:

$$w_i = a_i + \sum_{j=1}^n r_{ij} \log(p_j) + ub_0 \prod_{i=1}^n p_i^{b_i} \tag{5}$$

Solve u from (1) and (3) and put it into (5), we get

$$w_i = a_i + \sum_{j=1}^n r_{ij} \log(p_j) + b_i \log(X / P) \tag{6}$$

Where X is the actual expenditure of consumers, $P = a(p)$ and $r_{ij} = (r_{ij}^* + r_{ji}^*) / 2$

In the view of the difficulty of Calculation, Dealon pointed out P could be replaced by Stone Price Index. Then the estimated equation of AIDS model can be written as follows:

<Table 1> SUR Regression Results of AIDS Model

Classification	ri1	ri2	ri3	ri4	ri5	ri6	ri7	bi	_cons	R2	Chi2
Foodstuff	0.797293	0.725065	0.408648	-0.80482	0.643035	0.804696	-0.84919	-0.01081	-3.0487	0.8934	301.59
Clothing	-0.15598	0.914598	-0.0161	0.708642	-1.82911	-0.23796	0.413152	-0.07959	0.648721	0.9372	537.32
Household Appliance	0.075756	-0.44926	0.507268	-0.14654	0.573684	0.032346	-0.35825	0.021167	-0.41162	0.6699	73.06
Health Care	0.025977	-0.45657	0.188205	-0.32214	0.998264	0.348184	-0.14409	0.012603	-1.21455	0.7132	89.53
Transportation and Communication	-0.82042	0.159021	-2.35136	2.284508	-1.49703	-1.5421	1.648775	-0.02487	4.305163	0.7252	95.01
Entertainment and Education	-0.12008	-1.29035	1.094435	-1.06481	1.387359	0.243468	-0.62682	0.035047	0.887074	0.7147	90.19
Housing	0.292551	0.308884	0.210718	-0.67387	0.104351	0.531073	-0.25245	0.050758	-1.04328	0.7356	100.15

4. Results And Discussion

We use econometric analysis software STATA and adopt the analytical approach of SUR(Seemingly Unrelated Regression). In order to avoid the appearance of a singular matrix during data reconciliation which might exist in the algorithms, the data of miscellaneous goods and services are excluded. Regression results are as follows:

As shown in the Table 1, the regression results are significant on the whole. Almost each R2 is more than 70%, which indicates the model is well fitted by the sample data. So it could be accepted. We put the above results into (9) and (10), we obtain Table 2 and Table 3.

<Table 2> 2010 Expenditure Elasticity of Seven Commodity Groups in Shandong

Classification	Foodstuff	Clothing	Household Appliance	Health Care	Transportation and Communication	Entertainment and Education	Housing
Expenditure Elasticity	0.966277	0.401718	1.3034659	1.186598812	0.847551063	1.327918468	1.472569

In Table 2, we can observe that expenditure elasticities of seven commodity groups are very different, each of which has not changed substantially in the past decade according to the related statistical results. The results can be found in appendix. Besides housing whose value is greatest, HA(Household Appliance), HC(Health Care), and EE(Entertainment and Education) are more than 1, i.e. 1.3034659, 1.1865988 and 1.32792 respectively. This shows that the urban people in Shandong, China pay more attention to enjoyable consumption and development-oriented consumption. That is to improve the living standard and lift their human capital level. They are particularly keen to get better housing conditions. As income increases, they will put more money on the improvement of housing. Compared with the housing, the urban residents in Shandong are less concerned with Clothing. Perhaps, they would not like to pay more to clothes and makeup due to traditional culture.

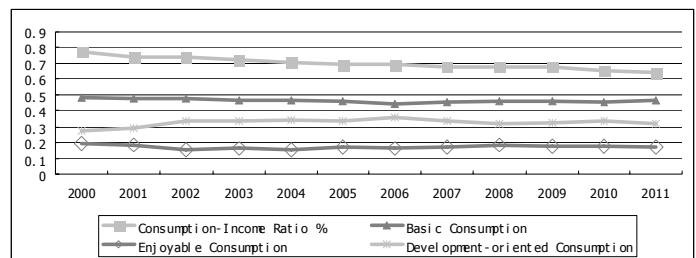
<Table 3> 2010 Price Demand Elasticity of Seven Commodity Groups in Shandong

Classification	Foodstuff	Clothing	Household Appliance	Health Care	Transportation and Communication	Entertainment and Education	Housing
Foodstuff	-0.73355270	0.2369623	0.1333764	-0.25577148	0.21167648	0.261612332	-0.2687
Clothing	0.17107736	-0.798752	0.0395889	0.134674397	-0.14571428	0.032288422	0.11922
Household Appliance	-0.0920156	-0.071704	-0.985785	-0.03071763	-0.009490475	-0.03017703	-0.0576
Health Care	-0.0580743	-0.055659	-0.000304	-1.03436088	0.036982786	0.003573648	-0.0298
Transportation and Communication	-0.0849596	0.0462211	-0.372955	0.382978809	-1.219347368	-0.23527685	0.28535
Entertainment and Education	-0.1179736	-0.181529	0.094096	-0.13595017	0.094780549	-1.00902576	-0.1022
Housing	-0.1200961	-0.029686	-0.010329	-0.10429791	-0.06588407	0.00653608	-1.0779

As shown in Table 3, Marshall self-price elasticities of necessities for life are less than 1, with Foodstuff, Clothing and HA being 0.7335527, 0.798752 and 0.985785 respectively. The correspondent values of other commodity groups are more than 1, of which TC is

the largest, i.e. 1.219347. The total negative influence on the other groups by the change of prices is in the order of HC(-0.526737), Foodstuff(-0.473119), Housing(-0.458223), HA(-0.383588), Clothing (-0.338578), EE(-0.265453), TC(-0.221089) according to the numbers. The prices of HC, Foodstuff and Housing will greatly affect the demands of other goods. The three groups play a relatively important role in daily life and take up a large proportion in People's Daily expenses. Meanwhile, the positive influence follows the order of HC(0.517653), Housing(0.40457), EE (0.343440), TC (0.304010), Clothing(0.283183), HA(0.267061) and Foodstuff(0.171077).

5. Conclusions



<Figure 1> Consumption-Income Ratio and Consumption Structure: 2000-2010

Generally speaking, consumption can be divided into three types, namely basic consumption (Clothing, Foodstuff), enjoyable consumption (HA, Housing) and development-oriented consumption (HC, TC, EE). As shown in Figure 1, the consumption structure of urban residents in Shandong, China has remained stable and experienced little fluctuation since 2000. However, consumption-income ratio shows a downward tendency, which will to some extent affect sustainable economic growth in Shandong. Besides the increased income, other necessary efforts should be taken to change consumption structure and promote rapid and sound growth of economy. According to the above analysis, the authorities are supposed to control the prices of HC, Foodstuff and Housing and encourage the consumption of HC, Housing, EE accordingly. At the same time, local government should increase the supply of goods connected with housing, HA, HC, and EE so as to attract more consumption from the urban residents in Shandong.

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APPENDIX

Expenditure Elasticity of Seven Commodity Groups in Shandong: 2001-2010

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Foodstuff	0.968472	0.968607	0.968008	0.96877	0.96791	0.966238	0.96714	0.967825	0.967149	0.966277
Clothing	0.403081	0.407574	0.389031	0.359478	0.359037	0.382283	0.378552	0.371595	0.382789	0.401718
Household Appliance	1.21284	1.298414	1.278625	1.30889	1.313593	1.340768	1.309566	1.289066	1.287324	1.303466
Health Care	1.202133	1.173022	1.172264	1.173629	1.16232	1.17103	1.171838	1.173402	1.171074	1.186599
Transportation and Communication	0.682399	0.741515	0.763494	0.792851	0.794462	0.820921	0.819779	0.805995	0.826302	0.847551
Entertainment and Education	1.23667	1.211085	1.228362	1.23792	1.251304	1.246901	1.284463	1.301845	1.31584	1.327918
Housing	1.603916	1.617899	1.558352	1.563137	1.503561	1.512915	1.477317	1.448034	1.476376	1.472569