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Empirical Study on Effects of Different Types of Urbanization on Consumption Structure of Rural Residents in China

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Abstract In the process of urbanization, there are problems of decline in rural population, shrinkage of rural area, and constant increase in the per-capita net income of rural residents. These problems have brought about new characteristics and changes to the consumption structure of rural residents. This paper divided the urbanization into population urbanization, industrial urbanization and land urbanization. Using the panel data of 31 provinces in 2004 - 2013, it established the dynamic panel model and analyzed the effects of different types of urbanization on the consumption structure of rural residents. Results indicated that population urbanization exerts a negative effect on development-oriented consumption expenditure of rural residents, while it exerts a positive effect on enjoyment consumption expenditure; the industrial urbanization exerts a negative effect on the consumption expenditure of rural residents, while it exerts a positive effect on clothing and transportation communication consumption of rural residents; land urbanization exerts a negative effect on medical care expenditure in enjoyment consumption of rural residents. In view of these problems, it came up with recommendations, including stimulating the development of rural consumer market, liberating the consumption potentiality of rural areas, making clear emphasis points of different types of urbanization, avoiding promoting the urbanization in a blind manner, and adjusting the development of different types of urbanization on the basis of the consumption demands of rural residents.

Key words Rural residents, Consumption structure, Population urbanization, Land urbanization, Industrial urbanization

1 Introduction

Compared with western developed countries, China's modern urbanization process started late. With near 20 years of development, the average annual urbanization just rose from 0.86% to 1.35%. Since 2004, China's urbanization has entered the rapid development period. According to statistics, China's population urbanization rate rose from 41.76% in 2004 to 53.73% in 2013 with average annual growth rate of 2.84%. The continuous advancement of urbanization exerts a far-reaching influence on the development of China's rural areas, mainly manifested in the impact on the income level, income source and consumption concept, to bring about changes in rural resident consumption behavior and consumption structure of rural residents. China's rural consumer market has been sluggish. Since the global financial crisis in 2008, the low consumption rate China in the context of high investment has been a distinctive characteristic in the stage of economic new normal. Foreign researches about the consumption structure were mainly based on western classical theory of consumer economics. Foreign scholars often made model improvement in combination with practical situations and studied effects of different factors on consumption structure. On the basis of the model introduced by Beckmann McPherson in 1970, Hubert Beguin made a hypothesis that urban productivity determines the city size distribution and found that the consumption structure and labor productivity determine the city size distribution[1]. Francisco Alvarez-Curdrado *et al.* studied the influence of different assumption conditions on the neoclassical economic development model, and found that the dynamic structure, the adjustment path and the convergence speed of the model are different under the assumption of comparative consumption and living habits[2]. Based on the closed function proposed by Alessie and Guariglia *et al.*, Rob Alessie and Federica Teppa stated the current savings as lagging savings and functions of other regression variables. Using the panel data of Dutch DNB family household in 1993 - 1998, they studied the effects of living habits on Dutch household saving behavior, and found that living habits exert a positive influence on Dutch household saving behavior, but the influence coefficient is very small, and the income uncertainty is still main factor influencing the household saving behavior[3]. Compared with foreign researches in the consumption structure, domestic scholars cared more about the effect of urbanization level on the consumption structure. In the first place, some scholars analyzed the effects of urbanization level on the consumption structure using the vector autoregressive model, but failed to reach a consensus. According to the conclusion of Xiao Zhongyi and Liao Jinzhong, urbanization and consumption structure are mutually interactive[6-7]. Jiang Yong held that there is a one-way causal relationship between urbanization and industrial structure and consumption structure, and results of variance decomposition also indicate that urbanization has extremely significant positive effect on industrial structure and consumption structure upgrading[8]. Besides, some scholars use other research methods to delve this issue. Using the gray correlation method, Wang Dianru and Zhao Xinbo analyzed and found that the living consumption constantly increases with the growth in the urbanization rate, while there is no significant increase in development-ori-

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ented consumption and enjoyment consumption[9]. Du Huazhang also applied the linear regression model and gray correlation method to analyze the effect of urbanization in Jiangsu Province on different types of consumption structure, and the conclusion indicates that the urbanization rate has the largest effect on the medical care, followed by cultural education, entertainment and services, both showing high or extremely high correlation[10]. From the theoretical point of view, Wang Yan analyzed the effect of urbanization on consumption of rural residents, and stated that urbanization brings changes in consumer psychology, consumption habit, and consumption ability, and accordingly influencing the consumption structure of rural residents[11]. In this study, we focused on the concept of urbanization, and strictly defined the three dimensions of urbanization, and tried to draw more scientific and reasonable conclusions through analyzing the consumption structure of rural residents under the multi-dimensional urbanization.

2 Study methods and variable setting

2.1 Study methods

2.1.1 Model building. In this paper, we studied the effects of three types of urbanization on the consumption structure of rural residents. Through consulting the literature, we selected variables including the per capita net income of rural residents, income gap between urban and rural areas, elderly dependency ratio, and the percentage of social security expenditure to the local GDP as control variables, to minimize the possibility of missing variables. In addition, the American economist J. S. Dusenberry found that the current consumption is not dependent on the consumer's current absolute income level, but dependent on the relative income level[4]. The current consumption of consumers will be affected by the previous consumption. This is the so-called "ratchet effect", thus independent variables in the model should include the first lag phase of dependent variables, to reflect the "ratchet effect" of the consumption. In the model, for variables such as the consumption expenditure and net income of farmer family, we took the logarithm, to reduce the heteroscedasticity.

In combination with the above discussions, we built the following dynamic panel model:

$$lny_{it} = \beta_0 + \beta_1 Urb_{it} + \beta_2 lnAI_{it} + \beta_3 IG_{it} + \beta_4 AG_{it} + \beta_5 SS_{it} + \beta_6 lny_{it-1} + \mu_i + \varepsilon_{it} \quad (1)$$

where i denotes the *i-th* province, t is the year, y is the eight types of consumption expenditure of rural residents, *Urb* denotes the urbanization level, including land urbanization, industrial urbanization and population urbanization, μ_i denotes regional effect, and ε_{it} is the disturbance term. The definition and unit of variables in the model are listed in Table 1.

Table 1 Definition and unit of variables in the model

Variable	Definition	Unit
LU	Land urbanization	Ratio
IU	Industrial urbanization	Ratio
PU	Population urbanization	Ratio
LnAI	Logarithm of rural per capita net income	Yuan/person
IG	Income gap between urban and rural areas	Ratio
AG	Elderly dependency ratio	Ratio
SS	Social security expenditure rate	Ratio
LnFd	Logarithm of rural per capita food expenditure	Yuan/person
LnClothe	Logarithm of rural per capita clothing consumption expenditure	Yuan/person
LnRsdc	Logarithm of rural per capita living expenditure	Yuan/person
LnEqpmt	Logarithm of rural per capita family equipment and service expenditure	Yuan/person
LnTrspt	Logarithm of rural per capita traffic and communication expenditure	Yuan/person
LnEdu	Logarithm of rural per capita education and cultural entertainment service expenditure	Yuan/person
LnMeds	Logarithm of rural per capita medical care expenditure	Yuan/person
LnOthers	Logarithm of rural per capita other commodity and service expenditure	Yuan/person

2.1.2 Estimation method. For the endogenous problem, the system generalized method of moments (GMM) is widely used. The principle is to find such instrumental variable Z satisfying Z is highly correlated with the explanatory variable, and Z is not correlated with the individual effect. Then, it can generate a new explanatory variable which is highly correlated with old explanatory variable, but not correlated with the individual effect, so as to solve the endogenous problem of the model.

Consider such a general dynamic panel model:

$$y_{it} = \alpha + \rho y_{i,t+1} + \beta x_{it} + \delta z_i + \mu_i + \varepsilon_{it} \quad (t = 2, \cdots, T) \quad (2)$$

where z_i denotes the variable not changing with the time. After the first order difference, the individual effect μ_i is removed, obtained:

$$\Delta y_{it} = \rho \Delta y_{i,t-1} + \beta \Delta x_{it} + \Delta \varepsilon_{it} (t = 2, \cdots, T) \quad (3)$$

The Equation (2) is also called the horizontal equation, and Equation (3) is the difference equation. Blundell and Bond (1998) combined the difference equation with the horizontal equation, and took it as an equation system to make GMM estimation, which is the system GMM[5]. The advantage of the system GMM: due to the combination of the horizontal equation and the difference equation, effective instrumental variables available in the entire system increases, and it greatly increases the estimation efficiency; besides, due to inclusion of the horizontal equation, the system GMM can estimate the coefficient of variable z_i that does not

change with the time. The System GMM combines the horizontal equation and difference equation, the number of instrumental variables increases, the prediction ability of the model is strong, so it has better limited sample property[12].

2.2 Variable setting and indicator selection In this study, we selected the panel data of 31 provinces in 2004 – 2013. The data mainly came from *China Statistical Yearbook* (2005 – 2014). Because the population data of some provinces were missing in 2004, we used the data in *China Statistical Abstract* (2005) to substitute related data. The indicators of the relevant variables are as follows: (i) Income gap between urban and rural areas (IG): calculated from per capita disposable income of urban residents divided by the per capita net income of rural residents. (ii) Aging level (AG): expressed by the elderly population dependency ratio, we classified people elder than 65 years old as the elderly, and the 15 – 64 years old of people as labor population. (iii) Social security level (SS): expressed as the ratio of government social security and employment investment to the local GDP. (iv) Industrial urbanization level (IU): expressed by the ratio of output value of secondary and tertiary industries to local GDP. (v) Land urbanization level (LU): expressed by the percentage of urban built-up area to the total area of the region. (vi) Population urbanization level (PU): expressed by the percentage of urban population to the total population of the region.

In order to eliminate the effects of price, all the data related to expenditure and income have been converted to the price level of the year 1978 in accordance with the price index of that price. Descriptive statistics of variables are listed in Table 2.

Table 2 Descriptive statistics of variables

Variable	Observed value	Mean value	Standard error	Min.	Max.
LU	310	0.015905	0.028768	0.000059	0.157532
IU	310	0.878836	0.061371	0.631070	0.994000
PU	310	0.488549	0.147325	0.200000	0.896000
LnAI	310	8.367031	0.456846	7.450980	9.589762
IG	310	3.039814	0.594580	2.034117	4.892291
AG	310	0.121919	0.024026	0.067100	0.203100
SS	310	0.023941	0.017757	0.001508	0.140331
LnFd	310	7.217264	0.359643	6.531431	8.288695
LnClothe	310	5.296548	0.522783	4.018723	6.773927
LnRsdc	310	6.309249	0.551394	4.424727	7.559122
LnEqpmt	310	5.052921	0.547267	3.725211	6.507173
LnTrspt	310	5.747656	0.610388	3.364879	7.309761
LnEdu	310	5.574411	0.598257	3.330417	6.900338
LnMeds	310	5.505479	0.590206	3.633367	7.303082
LnOthers	310	4.263629	0.557139	3.047850	5.925218

3 Model test and result analysis

Through establishing the dynamic panel model, we studied the effects of three types of urbanization on the consumption structure of rural residents, made estimation using the system GMM method, and the estimation results and corresponding model test results are shown in Table 3.

3.1 Model test

3.1.1 The overall significance test of the model. For the multiple linear regression model, it is necessary to test the significance of the entire regression model before making the significance test of each regression coefficient. Generally, the *F* test is applied. In this paper, the dynamic panel model is a special multiple linear regression model. When doing the system GMM estimation, STATA12.0 also first gives the corresponding F value of the model. The *F* test value of the model is 0.000, indicating that the significance of the model is very high.

3.1.2 Autocorrelation test of the disturbance term. The system GMM estimation method covers the difference equation, while the differential GMM can be established on the premise that the disturbance term ε_{it} is not autocorrelation, thus it is necessary to conduct the autocorrelation test for the disturbance term. However, the difference term of the disturbance term will not have second order or higher order autocorrelation. In general, through observing the value of *AR* (1) and *AR* (2) returned by software in STATA, we could easily determine whether there is autocorrelation in the disturbance term of the model. The results show that for values of *AR* (1) and *AR* (2) at the 5% level, the model accepts the original hypothesis that the disturbance term has no autocorrelation, indicating that the model passes the disturbance term autocorrelation test.

3.1.3 Excessive identification test of instrumental variables. One of the characteristics of the System GMM estimation method is the use of lag multi-phase data in the model as an instrumental variable, which inevitably brings the problem of excessive identification of instrumental variables. At present, when making the system GMM estimation, STATA will return two *p* values of statistics, to determine whether the model passes the excessive identification test, that is, Sargan statistic and Hansen statistic. In this study, we used Hansen statistic to make the excessive identification test of instrumental variables. The original hypothesis of the test is "all instrumental variables are valid". The results show that the Hansen statistic accepts the original hypothesis at the 5% level, indicating that there is no excessive identification problem in the model. The above test shows that the estimation results of the model are valid and consistent.

Table 3 System GMM estimation results of effects of three types of urbanization on the consumption structure of rural residents

Explanatory variable	Explained variable							
	LnFd	*LnClothe*	*LnRsdc*	*LnEqpmt*	*LnTrspt*	*LnEdu*	*LnMeds*	*LnOthers*
LI	0.371**	0.575***	0.524***	0.627***	0.178***	0.448***	0.399***	0.515***
	(2.15)	(7.98)	(5.88)	(5.99)	(3.15)	(4.76)	(5.09)	(4.48)
LnAI	0.510***	0.386***	0.632***	0.541***	0.891***	0.0513	1.069***	0.636***
	(3.46)	(3.98)	(3.82)	(3.89)	(8.92)	(0.44)	(6.33)	(5.34)
LU	0.0827	−0.431	−1.341	−0.51	−0.204	1.241	−3.819**	−1.025
	(−0.54)	(−0.90)	(−1.47)	(−1.48)	(−0.27)	(−1.17)	(−2.47)	(−1.48)
PU	0.205	−0.322	−0.103	−0.451***	0.223	1.040**	0.758	0.303
	(0.84)	(−1.24)	(−0.28)	(−2.98)	(0.63)	(2.18)	(0.93)	(1.07)
IU	−0.651**	1.706***	0.0304	0.301	0.788**	0.890	−0.234	−0.289
	(−2.39)	(4.58)	(0.05)	(1.14)	(2.28)	(1.66)	(−0.20)	(−1.10)
IG	0.116**	−0.0253	0.114	0.0818**	0.0521	−0.120	0.279**	0.0766
	(2.32)	(−0.52)	(1.88)	(2.33)	(1.12)	(−1.47)	(2.56)	(1.53)
AG	−0.288	0.643	1.119	0.912	0.510	1.725	2.656	−0.501
	(−0.59)	(1.04)	(0.84)	(1.32)	(0.61)	(1.34)	(1.74)	(−0.54)
SS	−0.327	0.488	−1.411	0.873	0.188	−5.532**	−0.742	−0.259
	(−0.75)	(0.79)	(−0.55)	(1.00)	(0.23)	(−2.19)	(−0.25)	(−0.30)
_cons	0.446	−2.25***	−2.629**	−2.982***	−3.67***	1.718**	−6.88***	−3.22***
	(1.14)	(−3.92)	(−2.29)	(−3.38)	(−5.34)	(2.26)	(−4.74)	(−4.09)
F test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR (1)	0.000	0.003	0.001	0.000	0.179	0.071	0.001	0.007
AR (2)	0.061	0.103	0.709	0.336	0.079	0.486	0.577	0.271
Hansen test	0.711	0.736	0.821	0.773	0.792	0.700	0.826	0.739
N	279	279	279	279	279	279	279	279

Note: parenthetic values are t value, *, **, and *** denote significant variables at 10%, 5%, and 1% significance level.

3.2 Result analysis

3.2.1 The effect of population urbanization on the consumption structure of rural residents. The coefficient of effect of population urbanization on rural per capita family equipment and service expenditure is −0.451, it is significant at 1% level, indicating that with the advance in the population urbanization process, the increase in rural per capita family equipment and service expenditure is restricted. This is possibly because there are semi-urbanization people in the process of population urbanization. The coefficient of population urbanization on rural per capita education and cultural entertainment service expenditure is 1.040, it is significant at 5% level, indicating that in the context of constant deepening of the population urbanization, the increase in education and entertainment expenditure of rural residents is promoted. This is possibly because settlement and job of rural elite people play the exemplary role for neighbors. Under the encouragement of excellent example, education and entertainment play a higher and higher role in the awareness of rural residents. Thus, the population urbanization exerts a positive effect on the education and entertainment and service expenditure.

3.2.2 The effect of industrial urbanization on the consumption structure of rural residents. The industrial urbanization exerts a negative effect on rural per capita food expenditure, the coefficient is −0.651 and it is significant at 5% level, indicating that the higher the degree of urbanization, the higher restriction on food expenditure of rural residents. This is possibly because industrial urbanization significantly increases non-agricultural income of rural residents, the food expenditure is reducing accordingly. Industrial urbanization exerts a positive effect on rural per capita clothing consumption expenditure, the coefficient is 1.706 and it is significant at 1% level. Industrial urbanization also exerts a positive effect on rural per capita traffic and communication expenditure, the coefficient is 0.788, and it is significant at 5% level, indicating that industrial urbanization promotes the traffic and communication consumption expenditure of rural residents.

3.2.3 Effect of land urbanization on consumption structure of rural residents. The effect of land urbanization is not significant on the eight categories of consumption expenditure of the rural residents, it only has significant effect on the per capita health expenditure of rural areas, and the coefficient is −3.819, it is significant at the 5% level, indicating that in the process of land urbanization, the health care expenditure of rural residents is restricted. This is possibly because in the process of rural residents become urban residents, the expansion of urban circle and national rural cooperative medical care is helpful for solving the medical treatment, leading to reduction of rural residents in medical care expenditure.

4 Conclusions and recommendations

4.1 Conclusions The empirical results show that the effects of the three types of urbanization are different on the eight categories of consumption expenditure in the consumption structure. From the consumption level, the significance of effects of three types of urbanization is different. Population urbanization exerts a certain

effect on the development and enjoyment consumption, industrial urbanization exerts a certain effect on the living and development of consumption, and land urbanization only exerts a significant effect on the enjoyment of consumption. In the direction of effect, different types of urbanization have different directions of effects. The population urbanization exerts a negative effect on development-oriented consumption, and the development of population urbanization leads to reduction of development-oriented consumption expenditure, while it exerts a significantly positive effect on education and cultural entertainment and service expenditure of enjoyment consumption; industrial urbanization exerts a negative effect on food consumption expenditure in living consumption, while it exerts a positive effect on the clothing consumption expenditure and it exerts a positive effect on the traffic and communication expenditure in development-oriented consumption; land urbanization exerts a negative effect on the medical care expenditure in enjoyment consumption, and the development of land urbanization can reduce the medical care consumption expenditure of rural residents. It can be seen that no matter in emphasis of effects or direction of effects, we could not treat effects of different types of urbanization on the consumption structure of rural residents as the same.

4.2 Recommendations (i) It is recommended to make clear emphasis points of different types of urbanization, avoid promoting the urbanization in a blind manner, and adjust the development of different types of urbanization on the basis of the consumption demands of rural residents. The government should control the development of different types of urbanization through macro-control, adapt to the changes in consumption structure of rural residents, formulate the development priorities of population urbanization, industrial urbanization and land urbanization, so as to stimulate the development of rural consumer market more effectively and liberate the consumption potential of rural areas. (ii) It is recommended to establish a long-term mechanism to increase the income of rural residents. From the perspective of population urbanization, it is recommended to gradually remove the system threshold, so that the urbanization in the development can absorb a large number of rural population, so as to gradually remove the semi-urbanization phenomenon. In the context of development of land urbanization obviously ahead of other two types of urbanization, land urbanization can promote the increase in income of rural residents, which should be further delved. (iii) It is recommended to improve the government transfer payment system. In this study, we selected the percentage of social security expenditure to GDP as the indicator of government transfer payment, we found that this indicator only exerts a significant effect on education, culture, and entertainment expenditure of rural residents, but it exerts a significant effect on other consumption items. Therefore, it is recommended to improve the government transfer payment system. On the one hand, it is recommended to increase the transfer payment, further narrow the gap between urban and rural areas in social security. On the other hand, it is recommended to gradually set up the non-agricultural employment security system for rural residents, establish the wage compensation system, wage payment monitoring system, and rural residents re-employment training system, to ensure the increase in the income of rural residents.

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(From page 29)

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