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The Influence of Population Aging on the Consumption Level of Urban and Rural Residents

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Abstract: ***Based on the research on aging and consumption at home and abroad, this paper selected the urban and rural panel data of 31 provinces from 2002 to 2020, and used the fixed-effect model to analyze the impact of population aging on residents' consumption in urban and rural areas of each province. The results show that population aging has a significant inhibitory effect on the consumption level of urban residents and a significant promotion effect on the consumption level of rural residents, and there is obvious regional heterogeneity. Based on the above research, the paper finally puts forward some policy suggestions to promote the consumption of urban and rural residents.***

Keywords: Population aging urban, Rural consumption regional heterogeneity.

1. INTRODUCTION

After the founding of the People's Republic of China, China's family planning policy has been effectively implemented, and the age structure of the population has gradually changed, the birth rate has been declining, and the elderly population has been increasing. Data show that in 2000, the proportion of the elderly population over 65 years old reached 7.0%, reaching the general standard of entering the aging society stipulated by the United Nations, marking China's beginning to enter the aging society. China's existing social security system, health care conditions are not enough to meet the challenges of deepening aging, and the speed of economic growth is far less than the speed of aging. At present, economic development has entered a new normal and new momentum, and insufficient demand has become a major problem in economic development, especially in the lack of consumer demand. According to the life cycle hypothesis, the elderly population is a group whose consumption is greater than income, and the impact of the expansion of the elderly population on life, pension and other aspects will change the consumption structure of the whole society. In 2021, the old-age dependency ratio will reach 20.8%, and the deepening of the aging population is an important factor affecting urban and rural consumption, an important obstacle in the integration of urban and rural areas, and an objective existence affecting the new development pattern of double cycle. At the same time, with the aging process, the reduction of labor force, productivity and some demand will restrict economic growth, and then affect the consumption level of residents. Therefore, based on the accelerating of the aging process of population and the consumption level of urban and rural residents, this paper focuses on the impact of population aging on the consumption of urban and rural residents, and tries to find out the main reasons affecting consumption, which is of great significance for promoting the consumption of urban and rural residents in China.

2. LITERATURE REVIEW

Consumption plays an important role in the healthy operation of the national economy. Most of the research on the impact of aging on household consumption is based on the life cycle theory, which was first proposed by the American economist Modigliani. In order to maximize the utility of the whole life cycle, rational individuals will rationally arrange their consumption in each period according to their future income. In general, the consumption of children and the elderly population is high, and the ratio is significant; Middle-aged people consume less. For a long time, there are many researches on the influence of population aging on residents' consumption at home and abroad, and there are many viewpoints and various research methods.

2.1 The impact of aging on consumption

He Yunfei (2017), on the basis of understanding the historical changes and current situation of residents' consumption and population age structure in China, investigated the impact of population age structure on residents' consumption and its mechanism from macro and micro perspectives, from the positive and negative

aspects of consumption and savings. Lu Xiaofeng (2017) empirically concluded that aging has a positive correlation with rural residents' consumption and a negative correlation with urban residents' consumption. Using panel data from 1997 to 2016, Yu Yingying (2019) concluded that aging plays a significant role in promoting the consumption of both urban and rural residents. Jiang Xuehan (2020) studied and discussed the impact of population aging on the consumption structure of urban and rural residents, and through a complete theoretical narration, showed that if the consumption patterns and habits of the elderly were fully utilized, their consumption level could be better improved. Liu Qi (2021) explored that aging would cause the imbalance of urban and rural consumption, and there would also be the boost effect of savings effect. Jianping Liu and Huayue Rao (2021) adopted the CFPS survey data of 2010 and 2016 and used the Tobit model to make an empirical analysis of the impact of population aging on household consumption level and consumption structure. It is found that the increase of the old-age dependency ratio and the child dependency ratio has an inhibitory effect on urban and rural consumption, and has a greater impact on rural household consumption. Using the extended LA-AIDS model, Xu Guixiong, Zhao Xindong and Chen Lizhen (2021) found that population aging has a significant impact on the consumption structure of rural residents.

2.2 Regional characteristics of population aging affecting consumption

Zhang Le and Lei Lianghai (2011) found that the elderly dependency ratio and consumption rate showed a reverse change, and the inhibitory effect on the eastern region was higher than that on the central and western regions. Wang Zhibao, Sun Tieshan and Li Guoping (2013) found through a series of data analysis that China's population aging did not hinder economic development, which was related to China's economic transformation and opening up, and also in line with the general law of the evolution of global population aging, and aging also had an obvious correlation with regional development. Taking provincial administrative units as the research object, Wu Yuanyuan (2020) reveals the characteristics and existing problems of the effect of population aging on regional economic growth, and adopts quantitative analysis methods such as intermediary effect analysis, non-parametric estimation, threshold effect regression model and spatial econometric model as the research means. This paper examines the threshold effect and spatial spillover effect of China's population aging on regional economic growth, and clarifies the action path and mechanism of population aging on regional economic growth. Liu Chengkun (2021) constructed a spatial dynamic panel model and panel threshold model to study the influencing factors of urban-rural inversion of aging, and came to the conclusion that population aging has significant regional heterogeneity. Jin Hao and Li Yujia (2021) selected the population and economy panel data of 31 provinces from 2001 to 2018, and used the PVAR model to investigate the dynamic impact of population aging on the consumption level of Chinese residents by region, as well as the regional differences between East and West. From the overall level, it is concluded that aging has a significant negative effect on residents' consumption. Wang Zhisong (2022) used the provincial panel data from 2000 to 2019 to establish PVAR models for eastern, central and western regions respectively, and found empirically that the increase of the old-age dependency ratio mainly affects the eastern and central regions to widen the urban-rural income gap, and the increase of the child dependency ratio to narrow the urban-rural income gap mainly affects the western region.

2.3 Literature review

According to the research conclusions of relevant literatures, scholars have made rich achievements in the research on the influence of aging on consumption. However, the effect of population aging on the consumption level of urban and rural residents is still inconclusive, and there are still large differences. This may be caused by the differences in research objects, model construction, variables and data selection, so the impact of population aging on the consumption level of urban and rural residents in China needs to be further explored. In addition, considering that most scholars focus on the analysis of the overall level of China or the difference between urban and rural areas, few scholars have conducted research on the perspective of regional differences between East and West, nor have urban and rural areas been compared separately. There are many literatures using transnational panel data model to verify the impact of population structure change and aging on economic growth, while there are few literatures using China provincial panel data model to verify this topic. Therefore, this paper uses provincial panel data and previous experience to empirically analyze the impact of population aging on residents' consumption level from the perspectives of urban and rural areas, and analyzes the regional heterogeneity of aging to further compare the different impacts of Eastern and Western regions.

3. RESEARCH DESIGN

3.1 Model setting and variable selection

3.1.1 Setting of the model

This paper empirically analyzes the impact of population aging on the consumption level of urban and rural residents through the econometric model. The following model is constructed:

$$C_{it}=\alpha+\beta O_{it}+\delta X_{it}+u_i+\sigma_t+\varepsilon_{it}$$

Where, C is the dependent variable, representing the consumption level of residents; O is the main explanatory variable, representing the level of population aging; X is a series of control variables that may affect the per capita consumption level; u is the individual fixed effect; σ is the time effect; ε is the random error term; i is for different provinces; t is the year.

3.1.2 Selection of variables

3.1.2.1Dependent variable C. This paper directly uses the data of residents' consumption level for verification. The level of residents' consumption is a measure of the extent of residents' consumption in terms of survival, development and enjoyment needs. The current statistics have two indicators of urban residents' consumption and rural residents' per capita consumption level, and corresponding indicators are used in measurement.

3.1.2.2 Main explanatory variable O. The level of population aging is generally measured using the old-age dependency ratio, which is the ratio of the number of people over 65 to the number of people in the working population. The number of working population is the number of working age people aged 15-64. The dependency ratio of the elderly population is the main index reflecting the consequences of aging from the economic point of view. Since this study involves the aging of urban and rural population, the corresponding indicators of urban and rural areas are used in the study.

3.1.2.3 Control variable X. There are many variables that affect the consumption level of residents. This paper mainly studies the control of the following variables. Per capita income Growth rate (I) Modigliani believes that the real income level is not a factor affecting residents' consumption, but the per capita income growth rate will play a role in influencing residents' consumption. The per capita income growth rate is calculated as the proportion of the difference between the per capita income of the current year and the per capita income of the previous year; The proportion of the secondary industry (E), the ratio of the added value of the secondary industry to the gross regional product (GDP) is taken as its measurement index. The transformation and upgrading of industrial structure can promote regional economic development, effectively promote the income of urban and rural residents, and then increase consumption; Urbanization rate (U) refers to the proportion of urban population in the total population. Studies have shown that the higher the urbanization rate, the increase in household consumption; Child dependency ratio (CSR) is the proportion of the population aged 0-14 to the working population aged 15-64. It is found that the child dependency ratio will affect the structure of residents' consumption and have an impact on residents' consumption.

3.2 Data sources and descriptive statistical analysis

3.2.1 Data Source

The data in this paper are mainly derived from China Statistical Yearbook (2002-2020), China Population and Employment Statistical Yearbook (20022020), Wind consulting database and choice financial terminal, which are composed of original data and some data obtained through calculation and processing. Considering that factors such as social background, culture, policies, history and system will also have an impact on residents' consumption level, the sample in this paper does not involve relevant data from Hong Kong, Macao and Taiwan to solve the impact caused by unpredictable factors and differences in statistical caliber. In order to eliminate the influence of heteroscedasticity, the data of residents' consumption level are processed logarithmically and represented by lnC. Inter-provincial panel data of 31 provinces, autonomous regions and municipalities directly under the Central Government from 2002 to 2020 were mainly selected, and a total of 19 years of panel data of 31 provinces and cities were obtained as research samples.

3.2.2 Descriptive statistics of the data

According to the descriptive statistical results of each variable (see Table 1), the consumption level of urban residents exceeds that of rural residents in terms of mean, maximum and minimum values, which indicates that urban residents are the main force of China's consumer groups, and consumption in rural areas still has great room for growth.

Whether from the perspective of the elderly population ratio variable or the child dependency ratio variable, the degree of rural areas is higher than that of urban areas. The average proportion of the elderly population in urban areas is 0.121, while that in rural areas is 0.152. China's special urban-rural dual structure leads to the phenomenon of "urban-rural inversion" in China's population aging.
From the perspective of urban and rural per capita income growth rate, the average rural growth rate is higher than the urban per capita growth rate, but the maximum is opposite, which shows that the rural per capita income growth room is large.

Table 1: Descriptive statistics

Name	Variable Meaning	Observed mean	standard	Standard deviation	Min	Max
Explained variable						
lnC_1	Consumption level of urban residents	589	9.515	0.543	8.422	10.79
lnC_2	Consumption level of rural residents	589	8.609	0.707	6.958	10.02
Explanatory variable						
O_1	Proportion of elderly population in urban areas	589	0.121	0.0300	0.0430	0.229
O_2	Proportion of rural elderly population	589	0.152	0.0570	0.0660	0.446
Control variable						
CSR_1	Urban child support ratio	589	0.185	0.0440	0.0900	0.373
CSR_2	Rural child rearing ratio	589	0.281	0.0860	0.0270	0.506
I_1	Growth rate of urban per capita income	589	0.101	0.0350	-0.0510	0.247
I_2	Rural per capita income growth rate	589	0.110	0.0400	-0.00500	0.228
E	The proportion of secondary industry	589	0.423	0.0840	0.160	0.620
U	Urbanization rate	589	0.524	0.153	0.199	0.896

3.3 Model test

3.3.1 Model test

Before using panel data for empirical research, relevant data should be tested to avoid the inaccurate results caused by the mutual influence of variables, so as to ensure the stationarity of data and ensure that there is no linear relationship between data. The unit root test and co-integration test were carried out, and both passed the significance test. Finally, the collinearity test is carried out, and the results are as follows.

It can be seen from Table 2 that the VIF test value of the town does not exceed 10, so it is concluded that there is no multicollinearity between the town variables.

Table 2: City VIF test

Variable	VIF	1/VIF
O	1.07	0.932704
I	1.19	0.842062
E	1.01	0.987648
U	1.43	0.699342
CSR	1.47	0.682355

It can be seen from Table 3 that the VIF test value in rural areas does not exceed 10, so it is concluded that there is no multicollinearity between rural variables.

Table 3: Rural VIF test

Variable	VIF	1/VIF
O	1.15	0.867681
I	1.13	0.885766
E	1.01	0.986952
U	1.54	0.649480
CSR	1.54	0.648771

3.3.2 Model analysis

Generally speaking, panel data mainly consider two estimation methods, namely random effects model and fixed effects model. This article uses the Hausman test to determine the specific choice of the model. The Hausman test is a method for determining whether there is a significant deviation between an effective estimator and a consistent estimator. In general, we reject the null hypothesis and choose the fixed effect model. The null hypothesis is not rejected, the random effects model is selected, as long as the estimation model can be selected and set according to the P-value observations

4. EMPIRICAL ANALYSIS

4.1 Baseline regression analysis

4.1.1 Analysis of urban residents' consumption

4.1.1.1 The impact of each variable on urban residents' consumption. Through the hausman test, the P value is 0.0000, rejecting the null hypothesis, and finally deciding to use the fixed effect model for analysis. The results are shown in Table 4.

Table 4: Results of metrological analysis of urban data

	(1) OLS	(2) FE	(3) RE
O	2.374***	-0.753***	2.035***
	(0.603)	(0.314)	(0.502)
I	4.641***	1.125***	2.161***
	(0.551)	(0.205)	(0.353)
E	-1.537***	-1.357***	-2.126***
	(0.211)	(0.153)	(0.233)
U	-0.811***	-1.889***	-3.857***
	(0.137)	(0.105)	(0.147)
CSR	-4.921***	-1.108***	-4.108***
	(0.485)	(0.254)	(0.393)
_cons	10.743***	13.354***	12.728***
	(0.214)	(0.108)	(0.181)
N	589.000	589.000	589.000
r2	0.389	0.917	
r2_a	0.383	0.912	

Standard errors in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01

4.1.1.2 Result analysis. As shown in Table 4, there is a significant negative correlation between the elderly dependency ratio and the consumption level of urban residents. The consumption level of urban residents decreases with the increase of the old-age dependency ratio of urban population. From the coefficient point of view, every 1% increase in the old-age dependency ratio of urban residents, the consumption level of urban residents will decrease by 0.753%. The effect of other control variables is also significant at the 1% level. Among them, the proportion of secondary industry, urbanization rate and child dependency ratio are negatively correlated with the consumption level of urban residents. When the proportion of secondary industry, urbanization rate and child

dependency ratio increase by 1%, the consumption level of urban residents decreases by 1.357%, 1.889% and 1.108% respectively. The growth rate of per capita income is positively correlated with the consumption level of urban residents. Every 1% increase in per capita income growth rate, the consumption level of urban residents increases by 1.125%.

Based on the results of the old-age dependency ratio, the empirical results are contrary to the conclusions of Modigliani's life cycle hypothesis. The latter believes that the old-age dependency ratio is positively correlated with residents' consumption, but the empirical results show that the urban old-age dependency ratio is negatively correlated with the urban residents' consumption level. First, in the long run, the higher the old-age dependency ratio, the less social output for accumulation and investment, which will lead to a decline in the per capita capital stock, and further affect future output, and thus inhibit long-term household consumption. The aged population in the life cycle is a pure consumption population, which is not consistent with our national conditions. For example, the motivation to bequeathing children, uncertainty about the future and "gnawing behavior" will have a restraining effect on consumption, and this negative impact exceeds the positive effect of aging on consumption. Due to the imperfection of China's social welfare security system and pension system, many urban elderly people will take preventive savings into account of their future medical care and pension. At the same time, the behavior of the elderly also affects their children's expectations for the future. The current pension model in China is still dominated by family pension, and the increase of the elderly population in the family will increase the support burden of the next generation. Children estimate that aging will bring the burden of pension to the family, so they also reduce current consumption and increase savings to ease the pressure on the future pension. Combine these two and consumption levels fall. In addition, the elderly in urban areas tend to care for their children and will bequeath their inheritance to their children so that they can live a better life, which also inhibits consumption. Some children also make "gnawing behavior", which will also make the elderly reduce their consumption in order to provide for their life. To sum up, the influence of aging on the consumption of urban residents is not increasing but decreasing. It is common sense that the growth rate of per capita income has a positive impact on residents' consumption. When residents' income increases, consumption will also increase.

4.1.2 Analysis of rural residents' consumption

4.1.2.1 The impact of each variable on rural residents' consumption. Through the hausman test, the P value is 0.0000, rejecting the null hypothesis, and finally determining the fixed effect model for rural data analysis. The results are shown in Table 5.

Table 5: Results of quantitative analysis of rural data

	(1) OLS	(2) FE	(3) RE
O	6.420***	0.217***	5.028***
	(0.358)	(0.307)	(0.372)
I	1.997***	1.145***	1.428***
	(0.512)	(0.206)	(0.331)
E	-1.428***	-1.593***	-1.276***
	(0.230)	(0.192)	(0.266)
U	-1.192***	-1.788***	-4.040***
	(0.155)	(0.177)	(0.185)
CSR	-3.579***	-1.205***	-4.425***
	(0.275)	(0.231)	(0.284)
_cons	9.647***	13.540***	11.586***
	(0.211)	(0.165)	(0.223)
N	589.000	589.000	589.000
r2	0.573	0.932	
r2_a	0.569	0.927	

Standard errors in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01

4.1.2.2 Result analysis. As shown in Table 5, there is a significant positive correlation between the rural old-age dependency ratio and the consumption level of rural residents. The consumption level of rural residents increases with the increase of the old-age dependency ratio of rural population. In terms of coefficient, every 1% increase in the elderly dependency ratio of rural residents, the consumption level of rural residents will increase by 0.217%. The effect of other control variables is also significant at the 1% level. The proportion of secondary industry,

urbanization rate and child dependency ratio are negatively correlated with the consumption level of rural residents. When the proportion of secondary industry, urbanization rate and child dependency ratio increase by 1%, the consumption level of rural residents decreases by 1.593%, 1.788% and 1.205% respectively. The per capita income growth rate is positively correlated with the consumption level of rural residents. Every 1% increase in per capita income growth rate, the consumption level of rural residents increases by 1.145%.

The income source of rural residents is either to work in cities or to make a living by farming land, and there is no obvious retirement time limit for rural residents. As long as they are healthy and can still farm for income or daily necessities after old age, the income gap between rural residents in old age and young age is relatively smaller than that of urban residents. Most elderly people can only maintain the basic life and have a low quality of life when they are young, and they do not have enough ability to save enough money for their later life. Currently, relying on the support of family and children is still the main mode of old-age care in rural areas. Therefore, rural families with elderly people will increase their expenditure accordingly to meet the living consumption of the elderly. As a result, the propensity to consume will increase accordingly. At present, the elderly in China, whether in urban or rural areas, have a strong inheritance motive for their children. However, considering that the "aging phenomenon" in urban areas is much more serious than that in rural areas, and this situation has gradually become a major problem in China's cities, which may explain why China's urban population aging will inhibit residents' consumption, while the rural population aging will promote consumption.

No matter in urban or rural areas, the per capita income growth rate is positively correlated with the consumption level of residents, and the influence coefficient of the per capita income growth rate in rural areas is higher than that of urban residents, indicating that rural residents' consumption power will consider their income more. The proportion of the secondary industry and the urbanization rate are negatively correlated with the consumption level of residents. The possible reason is that with the process of regional economic development and urbanization, residents' income level has not been significantly improved, and the welfare security system has not been improved much, so they are negatively correlated. At the same time, the child dependency ratio is negatively correlated with the consumption of urban and rural residents. Children's consumption is investment in nature, so an increase in the number of children will lead to a decline in household wealth accumulation.

4.2 Robustness test

4.2.1 Replace variables

The aging rate was selected to replace the old-age dependency ratio. The regression results are shown in Table 6.

Table 6: Robustness test of alternative variables

	(1) Towns	(2) Village
aging	-0.291*	0.720**
	(0.181)	(0.478)
I	1.157***	1.163***
	(0.205)	(0.204)
E	-1.319***	-1.533***
	(0.152)	(0.192)
U	-5.831***	-7.698***
	(0.102)	(0.169)
CSR	-1.234***	-1.185***
	(0.248)	(0.225)
_cons	13.26***	13.42***
	(0.0972)	(0.172)
N	589	589
R^2	0.917	0.932
adj. R^2	0.912	0.928

Standard errors in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01

The empirical results are basically consistent with the results of baseline regression, which proves the validity of the model and the results of baseline regression are robust.

4.2.2 Endogeneity test

Because there are many factors that affect consumption and cannot be exhausted, the core explanatory variable may be related to the control variable and the error term at the same time, making the result inaccurate. Therefore, the explanatory variables and control variables in the model are processed with one-stage lag, and the obtained data is put into the model for testing, so as to overcome the possible endogeneity of the original model. The results are shown in Table 7. The results of one-stage lag are basically consistent with the regression results of the original model, which once again proves the robustness of the selected model.

Table 7: Lagging one-phase robustness test

	(1) Towns	(2) Village
L.O	-0.719*	0.930*
	(0.315)	(0.367)
L.I	1.303***	1.134***
	(0.215)	(0.206)
L.E	-1.413***	-1.590***
	(0.154)	(0.192)
L.U	-6.027***	-7.603***
	(0.115)	(0.185)
L.CSR	-0.657*	-1.366***
	(0.268)	(0.234)
_cons	13.35***	13.38***
	(0.109)	(0.171)
N	558	558
R^2	0.918	0.934
adj. R^2	0.913	0.929

Standard errors in parentheses. * p < 0.05, ** p < 0.01, *** p < 0.001

4.3 Heterogeneity analysis

Since the reform and opening up, there is a large gap in the level of economic development among different regions, and the aging of the population also presents a different pattern. Considering that the influence of the aging situation in different regions on the level of residents' consumption may be heterogeneous, heterogeneity analysis is conducted. According to the spatial geographical location and the level of regional economic development, the 31 provinces in China are divided into these two standards.

4.3.1 Urban heterogeneity analysis

4.3.1.1 Spatial and geographical location. The 31 provinces in the country were divided into three regions: east, middle and west. The regression results of urban data are shown in the table. As shown in columns (1) - (3) of Table 8, the influence of population aging on the consumption level of urban residents has obvious regional heterogeneity. Among the three regions, the deepening of population aging significantly inhibits the consumption level of urban residents in the eastern region, significantly promotes the consumption level of urban residents in the central region, and the influence coefficient is greater than 0 but not significant in the western region. This means that the impact of aging on urban consumption is more complex, and with the increase of income level, the inhibiting effect is more and more obvious. The western region itself has a relatively weak level of economic development, and the aging problem may not be an important factor affecting the consumption level of urban residents. The influence of aging on the consumption level of urban residents shows significant heterogeneity, so it is necessary to take into account the actual development level of different regions and adopt different targeted policies and measures to alleviate the problem of population aging and urban residents consumption.

4.3.1.2 Level of economic development. Comparing the per capita GDP of each region from 2002 to 2019 with the average level of China, the regions with per capita GDP higher than that of China are economically developed regions, and the rest are economically underdeveloped regions. As shown in columns (4) - (5) of Table 8, in economically developed areas, population aging has a significant inhibitory effect on the consumption level of urban residents, but for economically underdeveloped areas, the population aging coefficient is less than 0 but not significant. The income level in the economically developed areas is relatively high, and the cost of living is also

high. The elderly population in urban areas has a strong restraining effect on consumption due to factors such as the psychology of bequeath and the psychology of saving for the aged. In economically underdeveloped areas, the income level of residents is not high, but the increase in the proportion of the secondary industry promotes the upgrading of regional industrial structure and improves the degree of regional economic development, which may alleviate the inhibiting effect of some aging on the consumption level of urban residents.

Table 8: Analysis of urban heterogeneity

	(1)	(2)	(3)	(4)	(5)
	Eastern region	Central region	Western region	Economically developed area	Economically underdeveloped areas
O	-2.290***	1.557***	0.093	-1.099**	-0.383
	(0.510)	(0.541)	(0.407)	(0.445)	(0.325)
I	2.179***	0.645*	-0.097	2.676***	-0.232
	(0.397)	(0.352)	(0.228)	(0.370)	(0.182)
E	-1.380***	-0.467***	0.535**	-2.293***	0.395**
	(0.302)	(0.178)	(0.259)	(0.213)	(0.170)
U	-1.240***	-1.754***	-1.095***	-1.391***	-1.245***
	(0.246)	(0.171)	(0.114)	(0.192)	(0.091)
CSR	-1.902***	-2.724***	0.157	-1.881***	0.032
	(0.527)	(0.434)	(0.280)	(0.470)	(0.224)
_cons	14.919***	12.642***	11.821***	14.172***	11.972***
	(0.207)	(0.203)	(0.136)	(0.195)	(0.102)
N	209.000	152.000	228.000	285.000	304.000
r2	0.921	0.956	0.950	0.913	0.960
r2_a	0.914	0.952	0.947	0.906	0.957

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.3.2 Rural heterogeneity analysis

4.3.2.1 Spatial and geographical location. As shown in columns (1) - (3) of Table 9, the influence of population aging on the consumption level of rural residents has obvious regional heterogeneity. Among the three regions, the influence coefficient of population aging on the eastern region is negative but not significant, and it has a significant positive effect on the consumption level of rural residents in the central region and a significant negative effect on the consumption level of rural residents in the western region. This means that aging has a significant impact on the consumption of rural residents in the central and western regions with a greater degree of economic development, while the rural areas in the more developed eastern regions are not significantly affected by aging. This may be because the consumption level of rural residents in the eastern region is basically in a stable state, and does not change much with the income level, but will decrease with the increase of the proportion of secondary industry, urbanization rate and child dependency ratio.

4.3.2.2 Level of economic development. As shown in columns (4) - (5) of Table 9, in economically developed areas, the influence coefficient of population aging on the consumption level of rural residents is positive but not significant, while in economically underdeveloped areas, the influence is a relatively significant negative effect. Therefore, it is possible that the impact of aging on rural residents' consumption is first of all a significant promotion, but with the advancement of urbanization and other factors, the consumption level of rural residents may not keep up with the pace of economic development, and more attention is paid to practical problems such as savings for the elderly, and the impact will gradually change to a restraining effect.

Table 9: Analysis of rural heterogeneity

	(1)	(2)	(3)	(4)	(5)
	Eastern region	Central region	Western region	Economically developed area	Economically underdeveloped areas
O	-0.576	2.767***	-0.930***	0.401	-1.206***
	(0.473)	(0.611)	(0.339)	(0.423)	(0.379)
I	2.304***	1.334***	-0.089	1.947***	-0.311
	(0.366)	(0.334)	(0.235)	(0.300)	(0.219)

E	-1.252***	-0.663**	0.930***	-2.848***	0.390*
	(0.378)	(0.260)	(0.274)	(0.273)	(0.210)
U	-1.873***	-1.621***	-1.021***	-1.107***	-1.701***
	(0.320)	(0.337)	(0.190)	(0.309)	(0.178)
CSR	-2.368***	-2.085***	1.213***	-2.244***	0.126
	(0.361)	(0.383)	(0.283)	(0.342)	(0.236)
_cons	15.509***	12.092***	11.708***	14.686***	12.180***
	(0.287)	(0.314)	(0.180)	(0.281)	(0.158)
N	209.000	152.000	228.000	285.000	304.000
r2	0.930	0.951	0.970	0.923	0.967
r2_a	0.924	0.947	0.968	0.918	0.964

Standard errors in parentheses. * p < 0.05, ** p < 0.01, *** p < 0.001

5. RESEARCH CONCLUSIONS AND SUGGESTIONS

5.1 Research conclusions

Based on the panel data of 31 provinces from 2002 to 2020, this paper uses the fixed-effect model to make an empirical analysis of the influence of population aging on the consumption level of urban and rural residents in China. From the empirical results, the following conclusions can be drawn:

5.1.1 The old-age dependency ratio in urban areas has a significant inhibitory effect on residents' consumption level, while the old-age dependency ratio in rural areas has a significant promoting effect on residents' consumption level. Therefore, the government should vigorously develop the consumption potential of rural residents, and promote the growth of rural residents' consumption as the focus of consideration in future policy formulation. At the same time, we should take appropriate measures to solve the problem of "gnawed the old" in both urban and rural areas to promote consumption.

5.1.2 The per capita income growth rate has a significant positive impact on both urban and rural residents' consumption. The increase of per capita income growth rate reflects the improvement of per capita income level, which is consistent with Keynes' absolute income hypothesis. Therefore, reasonable improvement of residents' income level is the key to promote consumption.

5.1.3 The proportion of secondary industry has a significant negative impact on the consumption level of urban and rural residents. The proportion of secondary industry reflects the development of regional economic level. However, after the outbreak of the epidemic, attention should be paid to improving residents' living standards to avoid the phenomenon of inflation and insufficient social welfare security causing residents to reduce consumption in order to prevent future uncertainties.

5.1.4 Urbanization rate also has a significant negative impact on both urban and rural consumption levels. Therefore, we can consider delaying the urbanization process to ensure the quality of life of urban and rural residents. In the process of urbanization, it is necessary to formulate corresponding policies to promote the flow of population not only from the countryside to the city, but also from the city to the countryside. In addition, it is necessary to use the system to protect the rights of the floating population.

5.1.5Child dependency ratio has a significant negative impact on both urban and rural consumption levels. The government can formulate relevant encouragement policies from the perspective of child-rearing. We will improve laws and regulations related to childcare services, vigorously support the childcare industry, and ease the pressure on urban and rural families to raise children. Improve the social parenting environment and promote the concept of scientific parenting.

5.2 Policy recommendations

5.2.1 Expand the elderly market and promote the consumption of the elderly population

Since aging is an important problem facing our country until the middle of the century, in order to promote consumption, we should promote the consumption of the elderly population and develop the elderly market. Generally, the elderly are more inclined to consume in medical care, insurance, health, tourism and other aspects,

but there may not be enough consumer goods for the elderly in some areas to meet these needs, especially in rural areas with less developed economies Therefore, relevant departments can formulate policies to improve the elderly market such as medical tourism, meet the consumption demand of the elderly from the supply chain, and then release the consumption power of the elderly.

5.2.2 Increase residents' net income and change their consumption habits

Income is an important factor to determine the level of consumption, when the income level of residents increases, the consumption power will also increase. According to China's current national conditions, aging will restrain the consumption level of urban residents and promote the consumption level of rural residents, while rural residents are at a disadvantage in terms of total consumption and consumption structure. Therefore, it is necessary to eliminate or reduce the consumption gap between rural and urban areas and improve the income level of rural residents. We can increase policy subsidies for rural areas and formulate more policies that favor rural areas and agriculture. We will provide training to rural residents, develop new income channels for rural residents, and expand income channels. Income growth of rural residents can not only promote consumption, but also reduce the loss of young people in rural areas. At the same time, in terms of education, the government can provide free school opportunities for rural children, provide educational environment and resources, and take measures to fundamentally change the consumption habits of rural residents.

5.2.3 Improve the social security system and increase the spending power and willingness of the elderly

We will continue to improve the old-age care system for the elderly in rural areas, gradually raise the overall level of basic medical insurance and old-age insurance, accelerate the all-round coverage of urban and rural residents, and establish a fair and sustainable social security system. We will vigorously develop multiple pillars of old-age security, such as occupational annuity, enterprise annuity, commercial medical insurance, and personal savings pension insurance, further reduce people's worries about retirement consumption, and guide people to release their consumption potential. In view of the inevitable decline in the wages and incomes of the elderly after retirement, we can help the retired elderly who are willing to re-enter the labor market through education and training, employment promotion and health services.

5.2.4 Enhance the integration of urban and rural consumption markets and enhance the vitality of rural consumption

By taking advantage of technology and business model innovation, through "Internet +" and other models, new consumption formats, new business models, and new commodity circulation systems can penetrate in brand areas, making it an important means to shorten the gap between urban and rural consumption, expand the vast rural consumer market, and drive the coordinated development of urban and rural, eastern and central and western consumer markets. Efforts will be made to resolve the problem of unbalanced and inadequate regional development, so that the fruits of economic development will benefit more residents and promote the realization of the people's vision of a better life on a wider scale.

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