

An Empirical Analysis of the Influencing Factors of Consumption Expenditure of Urban Residents in the Context of Internet Based on Multiple Linear Regression

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Abstract

The development of mobile Internet has seriously affected the lives of modern people. In the context of mobile internet based on the analysis of the main factors affecting the consumption of urban residents in China, this paper uses the national statistics of urban residents's consumption from 2002 to 2019, selects the minimum disposable economic income per capita, the price index of retail products, the natural population growth rate, the Internet penetration rate and other information materials as explanatory variables, and establishes a multivariate linear regression model, which quantitatively analyzes the various factors affecting the living consumption expenses of urban residents throughout the year, And put forward the policy suggestion to the urban resident consumption more structured and rational.

Keywords

Mobile Internet; Consumption Expenditure of Urban Residents; Influencing Factors; Policy Recommendations.

1. Introduction

In recent years, with the rapid progress and development of socialist economy and information technology, people's living and consumption levels have been continuously improved and improved, and people's consumption, as the main driving force to promote the sustained and healthy growth of our society and economy, plays a vital role in economic development. After entering the 21st century, more Internet products poured into the market, and the consumption mode of e-commerce gradually became popular, providing more choices for residents' consumption. The popularity of e-commerce makes the consumption of residents more convenient, but at the same time, it also faces the problems of fake and inferior products emerge in endlessly, transportation damage and so on, which makes many residents have a resistance to Internet consumption. Under this background, this paper studies the consumption behavior of urban residents from the main influencing factors of Chinese urban residents' consumption expenditure, and provides policy suggestions for promoting urban residents' consumption.

2. Relevant literature reviews

Some domestic experts and scholars have made in-depth statistical empirical analysis on the main determinants of the influence of per capita commodity consumption income and fiscal expenditure income in some rural poor areas of China. Ren Yu, Song Yingchang [1] by collecting the data of urban residents and rural residents, this paper studies the changes of consumption structure of Chinese residents, and has reference significance for activating the domestic market after the new crown epidemic situation. Gao Yuying's [2] paper probes into the influence of consumer finance on residents' consumption behavior, and empirically analyzes the consumption structure and consumption quota of residents, and draws the conclusion that consumer credit will stimulate residents' consumption growth. Li Yiqian' [3] paper analyzes the

factors that affect the consumption expenditure of urban residents in Hebei Province, and obtains the model that affects the consumption expenditure level of urban residents in Hebei Province. Wen Zhiyue [4] Based on the consumption function model, this paper studies the influence of per capita disposable income of urban residents in Inner Mongolia on consumption expenditure and makes an empirical analysis, and obtains a linear regression model. Wen Wangyue, Meng Wanrong [5] based on the data of China's integrated social survey, this paper studies the household consumption upgrading of urban residents, and draws the conclusion that the Internet plays a role in promoting consumption upgrading and the Internet has heterogeneity in consumption upgrading. Gong Zhimin, Yang Menghan [6] use AIDS model is used to compare the upgrading of consumption structure by region. Ye Mengxiang [7] evaluated the price level of residents in West Africa through a capital verification analysis of my country's consumer price index from 2001 to 2012. It is concluded that the factors that affect the price level of residents are daily necessities factor, life security factor and life service factor. Zhou Yang and Shi Xinxuan [8] analyzed the influencing factors of the information consumption level of Beijing residents based on the segmental linear regression model, and obtained the different effects of each factor on the information consumption level. Based on economic consumption theory, Peng Siwei [9] adopts econometric analysis methods to estimate and test the parameters of factors that affect the consumption level of residents, and put forward policy recommendations. Jiang Jin, Tang Meng [10] and others studied the influencing factors of French students' online consumption psychology, and used SPSS to build the influencing factors model of College Students' online consumption psychology. The results showed that perceived usefulness, social demand, commodity factors, individual economic factors and college students' online shopping expenditure were positively correlated, perceived risk, time factors, social demand factors and individual economic factors were positively correlated There is a negative correlation between consumption rationality and college students' online shopping expenses. It also puts forward some suggestions on the consumption psychology of college students. The current popularity and development of e-commerce in China make network consumption a new trend. Through the review and analysis of the literature review, few scholars have discussed the influencing factors of urban residents' consumption behavior under the current Internet background. It is of great significance to promote the development of urban residents' consumption expenditure.

3. Model building

3.1. Establishment of an indicator system

Combined with the current national conditions of our country and the research of scholars, this paper selects four indexes, the total per capita minimum disposable economy of urban residents, the logistics price index of retail commodities, the natural population growth rate and the Internet popularization rate, to be included in the measurement research.

The per capita disposable income of urban residents is the household income used for daily expenditure. Retail price index measures the average price index of consumer goods and services purchased by residents. The natural growth rate of population refers to the ratio of the growth rate of population to the average growth rate of population under natural conditions in a certain period of time. Internet penetration refers to the proportion of Chinese Internet users in China's total population.

3.2. Model building

In order to better reflect the relationship between the explanatory variables and the explained variables, we use the metrological model as follows:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \mu_i \quad (1)$$

Of which, Y is the per capita consumption expenditure of urban residents (unit: yuan), X_2 per capita disposable income on behalf of urban residents₃For retail commodity price index (unit:%), X_4 Represents the natural population growth rate (unit :%;), X_5 Represents Internet penetration rate (unit:%). The following figure is a flow chart of econometric modeling.

3.3. Data processing and description

3.3.1. Data sources

The collected data are from the official website of the National Bureau of Statistics and China Economic Information Network, the data sources are true and reliable.

3.3.2. Data processing

First of all, T test, the model is OLS regression, from the following table can be obtained, the coefficient of determination is 0.9985, the corrected coefficient of determination is 0.9980, we can see that the model fitting degree is good.F the statistical data are 2141.675, the integrity of the regression equation below 95% confidence is obvious. t test evidence shows that X_2X_5 have a significant effect on Y . But X_3X_4 test failed, indicating that there may be multiple collinearity in the model. The results of parameter estimation are shown in the table below.

Table 1. Parameter estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1550.999	12675.59	-0.122361	0.9045
X_2	0.410212	0.081227	5.050207	0.0002
X_3	43.78683	120.8217	0.362409	0.7229
X_4	196.8504	359.0571	0.548243	0.5928
X_5	99.85559	35.29074	2.829513	0.0142
R-squared	0.990060			15099.28
Adjusted R-squared	0.987002	Mean dependent var		7231.817
S.E.of regression	824.4920	S.D. dependent var		16.49755
Sum squared resid	8837231.	Akaike info criterion		16.74487
Log likelihood	-143.4779	Schwarz criterion		16.53165
F-statistic	323.7223	Hannan-Quinn criter.		0.919398
Prob(F-statistic)	0.000000	Durbin-Watson stat		

Secondly, the correlation coefficient matrix is obtained by EViews, and it can be found that the correlation coefficient between the explained variables is greater than 0.8, which indicates that the model has serious multiple collinearity. So we use stepwise regression to deal with the problem of multiple collinearity.

Finally, the multiple collinearity is corrected, and each independent variable is detected by stepwise regression method, and the model is estimated separately. The model is estimated after excluding the variables that can not pass the goodness of fit test, and the Y of per capita consumption expenditure of urban residents is X_2 with the per capita disposable income of urban residents X_5 Internet penetration rate,which correlation between these two variables is large, and the other two indexes are eliminated.

4. Evidence-based analysis

4.1. Parameter estimates

Through the analysis of the calculation model estimation data obtained by EViews software, the OLS method (least square method) is used to test and estimate the estimated parameter data in the model. The chart of the estimated model data test estimation results obtained by the analysis is shown in figure 2 below.

Table 2. Estimated parameters

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3370.096	379.6262	8.877406	0.0000
X2	0.439408	0.052855	8.313411	0.0000
X5	89.07980	25.93884	3.434224	0.0037
R-squared	0.989804			15099.28
Adjusted R-squared	0.988445	Mean dependent var		7231.817
S.E. of regression	777.3936	S.D. dependent var		16.30078
Sum squared resid	9065113.	Akaike info criterion		16.44918
Log likelihood	-143.7070	Schwarz criterion		16.32124
F-statistic	728.0833	Hannan-Quinn criter.		0.758610
Prob(F-statistic)	0.000000	Durbin-Watson stat		

Therefore, the model of consumption expenditure of urban residents in China is:

$$Y = 2990.427 + 0.385X_2 + 8137.817X_5 + \mu \quad (2)$$

$$t=(20.6508)(20.0408)(12.5227)$$

$$R^2= \text{Adjusted R } 0.9984^2=0.9881$$

$$F=4709.451 \text{ DWF}=01.3709$$

4.2. Model testing

4.2.1. Economic Significance Test

According to the analysis of the estimated results of the regression equation, the per capita minimum disposable wage income of urban and rural residents is determined (X_2) and its Internet penetration on our Internet (X_5). It shows the positive relation between the per capita consumption income of Chinese urban residents, and shows that with the increase in the per capita income of Chinese urban residents and the increase in China's Internet penetration rate, it is possible to greatly increase the per capita consumption income and expenditure of urban and rural residents.

4.2.2. Statistical inference tests

(1) Good fit test

The good fit test is a multiple linear regression model used to analyze and evaluate the average consumption expenditure of urban residents and the correlation between the collected data. Based on this, we can establish a solvable coefficient R^2 to analyze and determine the simulation fit of the model. R^2 The expression is:

$$R^2 = \frac{ESS}{TSS} = 1 - \frac{\sum e_i^2}{\sum (Y_i - \bar{Y})^2} \quad (3)$$

The results obtained from the OLS regression formula $R^2=0.998$, table 2 shows that the revised decision coefficient is 0.9884, which indicates that the sample model has a high accuracy in the secondary proposed comprehensive calculation of other sample model data. On the whole, the accuracy of the secondary proposed comprehensive calculation of other sample model data is better.

(2) F inspection

F test is mainly used to determine the relationship between the explained variables in the linear regression model. It can also judge whether there is a linear relationship between urban residents' per capita consumption expenditure and Internet penetration rate and urban residents' per capita consumption expenditure in the model. Calculation F Statistics Formula:

$$F = \frac{ESS/(k-1)}{RSS/(n-k)} \sim F(k-1, n-k) \quad (4)$$

The F test results show that the critical value of (1,16) is 246, because $F=728.0833 > 246$, the regression equation is more significant. That is, the combination of "per capita disposable income of urban residents" and "Internet penetration rate" has a significant impact on per capita consumption expenditure of urban residents.

(3) t inspection

Multivariate linear regression is not only established to obtain the model with high fitting degree or the overall significance level of the observation equation, but also to estimate the explained variables in the population. As a result, it is necessary to test the significance of each variable of the model. According to the observation data t the expression of the test is

$$t = \frac{\hat{\beta}_j}{\sqrt{\hat{\sigma}^2 c_{jj}}} \quad (5)$$

$\alpha = 0.05$ The critical value is 2.120 when the degree of freedom of the t distribution table is 12, which can be X_2 from the above data X_5 The corresponding t statistics are 8.3134 and 3.4342 respectively, which indicates that at the significant level, the X_2 is X_5 and have a significant effect on Y.

4.2.3. Econometric tests

1) multiple collinearity test: after modifying the model variables, the results of stepwise regression can reduce the multiple collinearity, but the X_3 of factors reflecting the retail commodity price index X_4 factors of natural population growth But culling from the model may lead to set deviations.

2) heteroscedasticity test: Parker test

Table 3. Heteroscedasticity test table

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	15.71075	17.83893	0.880700	0.3924
LOG(X2)	-0.634626	2.290618	-0.277054	0.7855
LOG(X5)	0.723031	1.470344	0.491743	0.6300
R-squared	0.039914			11.86097
Adjusted R-squared	-0.088097	Mean dependent var		1.722532
S.E. of regression	1.796805	S.D. dependent var		4.160909
Sum squared resid	48.42764	Akaike info criterion		4.309305
Log likelihood	-34.44819	Schwarz criterion		4.181371
F-statistic	0.311802	Hannan-Quinn criter.		1.037634
Prob(F-statistic)	0.736759	Durbin-Watson stat		

As can be seen from the graph, log (X_2) and log (X_5) . it can be considered that the model can pass the test without heteroscedasticity.

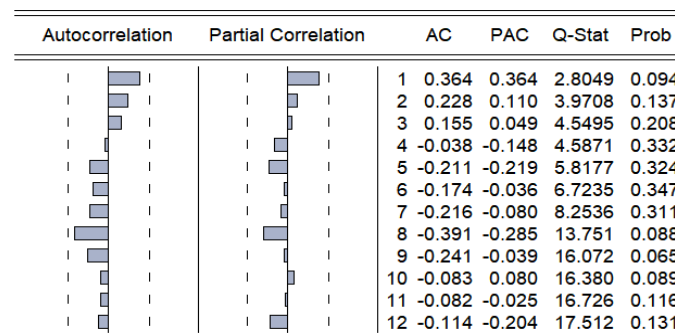


Figure 2. Partial correlation coefficient diagram

3) autocorrelation test: partial correlation coefficient test

According to the above formula and the above figure, the correction coefficient is multiplex collinearity, including X_2 , X_5 and in the regression results of the model of explanatory variables, the partial correlation coefficient test is passed, so there is no autocorrelation.

5. Conclusions and recommendations

This paper studies the main influencing factors of consumption expenditure of urban residents in China under the background of mobile Internet, and draws the following conclusions: (1) this paper adopts the total per capita disposable economy of urban residents, the material price index of retail goods, the natural population growth rate and the Internet popularization rate as explanatory variables to establish a multivariate linear regression model. (2) After eliminating the multiple collinearity, we can clearly see that the combination of the two variables of "per capita disposable income of urban residents" and "Internet penetration rate" has a vital impact on "per capita consumption expenditure of urban residents", and is positively related to "consumption expenditure of urban residents".

Based on the above conclusions, this paper believes that there is room for improvement in the following areas in the future.

5.1. Government

First, maintain sustainable and healthy economic growth and increase the income of urban residents. The amount of income is the final determinant of expenditure, and the income of residents will directly stimulate the need for consumption, thus stimulating economic growth. Second, strengthen Internet infrastructure services to provide protection for residents' consumption. Speed up the construction of logistics industry, improve the speed of distribution. Strengthen the knowledge and skills training for Internet practitioners to bring customers a better service experience. Purify network security, protect users' personal information, and increase residents' trust in Internet consumption.

Third, improve the social security system and improve residents' consumption expectations. By reducing residents' expectations of future uncertain expenditure and improving their ability to deal with risks, the current consumption expenditure is increased.

Fourth, strengthen the supervision of the operating sales service industry, severely crack down on all kinds of illegal acts. Regulators should severely punish operators and businesses that manufacture fake and inferior products in accordance with the law, so as to avoid worries about residents' consumption, rectify some business manufacturers that disrupt market order by improper means, urge them to reform or order them to close down, and make the sales market a fair place for formal manufacturers.

5.2. Enterprises

First, improve market acumen and understand the needs of residents. Carry on the consumer satisfaction survey regularly, understand the influence of the purchase time, place, way and other factors on the consumer's purchase intention, so as to adjust the production and management plan, make the product more suitable for the market demand.

Second, improve the performance and price ratio of products. Strengthen the quality monitoring in the process of product production, improve product quality. At the same time, the product should be integrated into the design concept in line with the public aesthetic, and the product should be priced reasonably, so that the product price can attract more consumers while protecting its own profits.

Third, improve the operation of enterprises and formulate appropriate sales policies. Under the premise that the quality and price are guaranteed, the correct marketing policy is formulated,

and the consumer's affordable psychology is used to attract consumers through discounting, buying and giving activities and so on.

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