

# An Empirical Analysis on the Factors Related to the Influence of Consumption Level of Residents

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## Abstract

This paper analyzes the relationship between China's urban consumption level and China's urban consumer price index (previous year=100), per capita disposable income of urban residents, average wage of urban unit employees on the job, total population at the end of the year, and Engel's coefficient of urban residents based on the econometric basis and using Eviews9 statistical software for a total of 31 years from 1990 to 2020. The results of the study show that there is a long-run cointegration relationship between the per capita disposable income of urban residents, the total population at the end of the year and the consumption level of urban residents in China. A 1% increase in the per capita disposable income of urban residents in China will increase the consumption level of urban residents by 0.7205%, and a 1% increase in the total population at the end of the year will increase the consumption level of urban residents by 0.1316%.

## Keywords

**Consumption Level of Residents; Disposable Income Per Capita; Model Error Correction.**

## 1. Introduction

In 2021, 24 hours into the "Double Eleven" campaign, Tmall's "Double Eleven" turnover reached 540.3 billion yuan, an 8% increase compared to last year's 498.2 billion yuan. It is worth noting that the shopping carnival nowadays has become a new trend of leading consumption in a new era. Behind the grand shopping carnival, is the rational choice of consumers or the "herd effect" at work, which also led to relevant thinking. In life, there are very many conditional factors affecting the level of consumption of the residents, but the direction of the relevant factors and the degree of the influence effect need to be further explored, so this paper chooses to study about the factors affecting the level of consumption of the residents and the degree of the influence.

As one of the troika driving economic growth - the impact of consumption on the national economy has an irreplaceable role. There are many factors affecting the consumption structure of urban residents in China, such as the average wage of urban unit workers on duty, disposable income of urban residents, retail commodity price index, Engel's coefficient of urban residents, population structure, etc.

In this paper, through the study of variable index selection, model establishment and error correction, the corresponding econometric model is established based on the relevant data for 31 years from 1990 to 2020, the relationship between consumer price index (previous year=100), per capita disposable income of urban households, average wage of urban unit workers on the job, total population at the end of the year, Engel's coefficient of urban residents and consumption level of urban residents is studied. By using time series and econometric methods to establish economic models, we empirically analyze the current situation and future development trend of consumption level of urban residents in China and make suggestions for the sustainable and healthy development of China's economy.

## 2. Methodology

### 2.1. Variable Selection

#### 2.1.1. Explained Variables Selection

Based on the analysis of exploring the relevant factors affecting the consumption level of residents, the explanatory variable selected in this paper is the consumption level of urban residents.

#### 2.1.2. Explanatory Variable Selection

China's urban consumer price index (previous year=100), per capita disposable income of urban households, average wage of urban unit workers on the job, total population at the end of the year, and Engel's coefficient of urban residents are selected as several factors affecting the consumption structure of urban residents in China, and relevant quantitative indicators are selected. The per capita disposable income of urban residents, the average wage of urban unit workers on the job, and the total population at the end of the year should be positively correlated with the consumption level of urban residents. The price index (CPI) and Engel coefficient of urban residents should be negatively correlated with the consumption level of urban residents.

### 2.2. Model Setting

The econometric model designed to validate the correlation between the explanatory variables and the explained variables set above is.

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

Where Y is the national consumption level of urban residents (unit: yuan), X1 is the per capita disposable income of urban residents (unit: yuan), X2 is the average wage of urban unit workers on duty (unit: yuan), X3 represents the price index (CPI) (unit: previous year = 100), X4 represents the total population at the end of the year (unit: million), and X5 represents the Engel coefficient of urban residents (unit: %).

### 2.3. Data Acquisition

To estimate the model parameters, statistical data on relevant indicators were collected for the country from 1990 to 2020. Data source: iFinD Flush database.

## 3. Empirical Results

### 3.1. Model Construction

#### 3.1.1. Model Initial Estimation

Using Eviews software, data such as  $Y_i$ ,  $X_1$ ,  $X_2$ ,  $X_3$ ,  $X_4$ , and  $X_5$  were generated, and OLS regression of the model was performed using these data. The analysis of the corresponding indicators from the regression results shows that the coefficient of resolvability is 0.9991 and the corrected coefficient of resolvability is 0.9990, which indicates a good fit of the model. The F-statistic is 5793.653, indicating that the overall regression equation is significantly significant at the level  $\alpha = 0.05$ . t-test shows that  $X_1$  and  $X_2$  have a significant effect on Y. However, the t-test of  $X_3$ ,  $X_4$ , and  $X_5$  failed and the coefficients of  $X_2$  and  $X_3$  were opposite to expectation, indicating that serious multicollinearity may exist. And the correlation coefficient test was used to test for multicollinearity, and the correlation coefficient matrix was obtained as shown in Table 1: From the correlation coefficient matrix, it can be seen that the explanatory variables have high correlation coefficients with each other and there is serious multicollinearity.

**Table 1.** Correlation coefficient matrix

	X1	X2	X3	X4	X5
X1	1	0.997718	-0.29027	0.91314	-0.84637
X2	0.997718	1	-0.27589	0.891563	-0.82062
X3	-0.29027	-0.27589	1	-0.42545	0.48327
X4	0.91314	0.891563	-0.42545	1	-0.98314
X5	-0.84637	-0.82062	0.48327	-0.98314	1

**3.1.2. Correction of Multicollinearity**

multicollinearity problem by making a one-dimensional regression of Y on X1, X2, X3, X4, and X5, respectively, and the results are shown in Table 2.

**Table 2.** One-dimensional regression results

Variables	X1	X2	X3	X4	X5
Parameter estimates	0.794656	0.352294	-584.4311	1.229488	-1050.311
t-statistic	96.63964	45.40100	-1.706989	13.37480	-9.281285
R <sup>2</sup>	0.996904	0.986126	0.091303	0.860500	0.748138
Adjusted R <sup>2</sup>	0.996798	0.985648	0.059968	0.855690	0.739453

Among them, the adjustment determination coefficient of the equation adding X1 is the largest, based on X1, the other variables are added in order to gradually regress, and the correlation chart SCAT command is used to find that X1 is linearly related to Y, so a linear model is set.

**Table 3.** Regression results for adding new variables

Variables	X1	X2	X3	X4	X5	Adjusted R <sup>2</sup>
X1, X2	1.3404 (19.6065)	-0.2438 (-8.0012)				0.9990
X1, X3	0.7915 (93.0484)		-26.0659 (-1.2608)			0.9969
X1, X4	0.7251 (0.1269)			0.1269 (5.2057)		0.9983
X1, X5	0.7474 (64.1685)				-85.1403 (-4.7909)	0.9982

Upon comparison, the adjusted coefficient of determination increased with the new addition of X2, X3, X4, and X5, but the t-test for the X3 parameter was not significant. Although the coefficient of determination of the adjustment of the equation with the new addition of X2 was the largest, 0.9990, and the t-test for each parameter was significant, the economic significance test failed, so the largest improvement was selected among the remaining variables and X4 was retained.

Later, X2, X3 and X5 were continued to be introduced and the tests failed.

Therefore, the regression result after correcting for the effect of multicollinearity is :

$$\begin{aligned}
 Y &= -14141.1600 + 0.7251X1 + 0.1269X4 + u & (2) \\
 t &= (-4.7839) (49.5481) (5.2057) \\
 R^2 &= 0.9984 \quad \text{Adjusted } R^2 = 0.9983 \\
 F &= 8885.6810 \quad DW = 1.0263
 \end{aligned}$$

### 3.2. Model Testing

#### 3.2.1. Economic Significance Test

The results of the estimated model indicate that the consumption level of urban residents is positively correlated with the per capita disposable income of urban residents and positively correlated with the total population at the end of the year, which is in line with the general sense of economics, and the economic test is passed.

#### 3.2.2. Statistical Inference Testing

At the significance level of  $\alpha = 0.05$ , the model was obtained to be a good overall fit for the sample data by the goodness-of-fit test, F-test, and t-test, the variables "per capita disposable income of urban residents" (X1) and "total population at the end of the year" (X4) have a significant effect on "consumption level of urban residents" (Y).

#### 3.2.3. Econometric Tests

I. Multicollinearity test After modifying the model variables, the results of stepwise regression achieve the purpose of mitigating multicollinearity, but the factors X2, X3, and X5, which project the consumption level of residents, are removed from the model, which may bring setting bias.

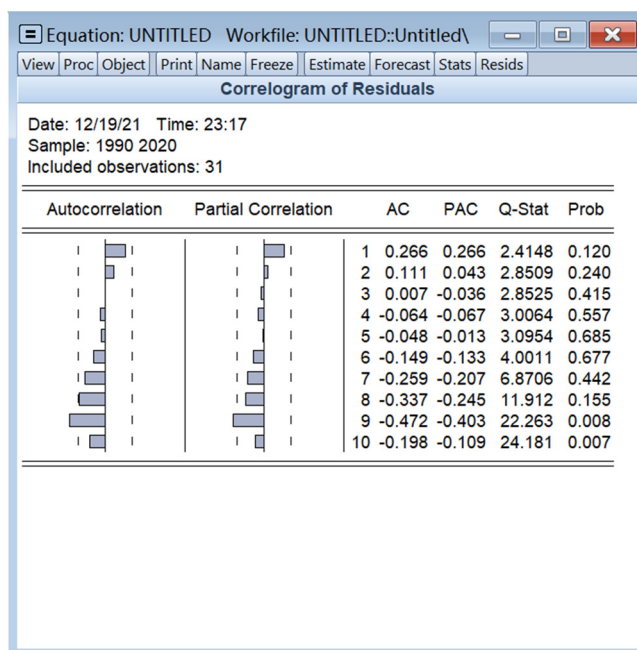


Figure 1. Plot of bias correlation coefficient test

II. Heteroskedasticity test The p-value obtained by the Park test for heteroskedasticity is greater than the significance level  $\alpha = 0.05$ , and it can be considered that it passes the test and there is no heteroskedasticity.

III. Autocorrelation test By the bias correlation coefficient test, the histogram of the 9th period bias correlation coefficient of the model exceeds the dashed part of the model at a lag of 10, indicating the existence of ninth-order autocorrelation in the model.

IV. Correction of autocorrelation Adjustment of autocorrelation: Add AR(9) to the LS command to estimate the model using iterative estimation method. According to the estimation results of the model with the inclusion of the AR term, the estimation process converges after 92 iterations; the adjusted model has DW=1.6766 because  $n=31, k=2$ , de-significance level  $\alpha = 0.05$ ,  $d_L = 1.297$   $d_U = 1.570$  because  $d_U < 1.6766 < 2$ , indicating that there is no first-order autocorrelation in the model, and then the bias correlation coefficient test, also indicating that there is no higher-order autocorrelation, therefore, the final modified model of urban residents' consumption level obtained is

$$Y = -14713.3000 + 0.7205X_1 + 0.1316X_4 \tag{3}$$

$$t = (-6.5316) (63.9974) (7.1044)$$

$$R^2 = 0.9994 \quad DW = 1.6765$$

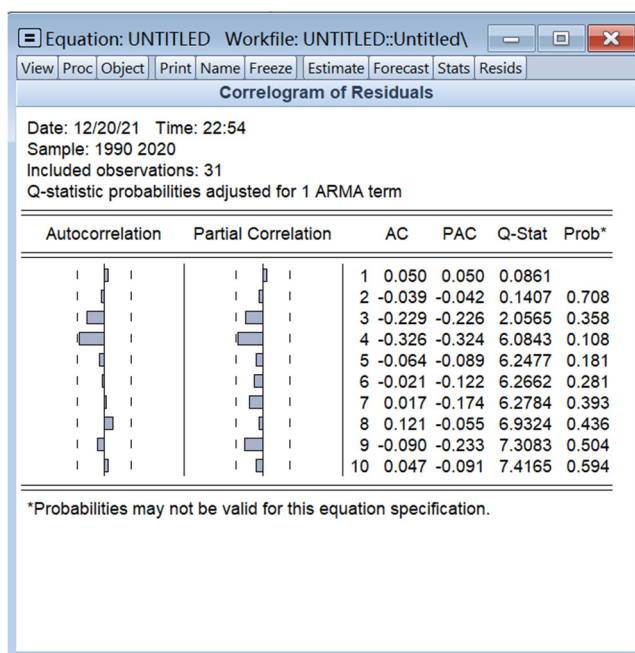


Figure 2. Results of model-adjusted bias correlation coefficient test

## 4. Conclusions and Recommendations

### 4.1. Conclusion

In the study of the factors affecting the consumption level of urban residents nationwide, based on the data for a total of 31 years from 1990 to 2020, excluding the relevant factors affecting the model multicollinearity as well as after model correction, it is found that the main factors affecting the consumption level of urban residents in China are the per capita disposable income of urban residents and the total population at the end of the year. Assuming other variables remain unchanged, the consumption level of urban residents will increase by 0.7205 yuan for every 1 yuan increase in the per capita disposable income of urban residents in China,

and the consumption level of urban residents will increase by 0.1315 yuan for an increase of 10,000 people in the total population at the end of the year. Based on the conclusions drawn from the econometric analysis, the following insights can be drawn: urban residents' consumption level is influenced by many factors, but the most significant influence on it is income, which is the basis and prerequisite for consumption. The urban consumer price index and the average wage of urban unit workers on the job also affect the degree of residents' consumption level. Assuming other things remain unchanged, the more disposable income people have, the greater their consumption of goods and services. Therefore, the prerequisite for ensuring the level of consumption is to increase people's income and improve their living standards. Population size and demographic structure is also one of the important factors affecting the level of consumption. It can be seen that population change affects the consumer demand, which in turn has an important impact on economic growth. The integrated solution to population issues includes promoting balanced population development, improving the quality of population, improving the employment structure of population and accelerating the urbanization process, which are important measures to promote the increase of consumer demand and contribute to the economic benefits. At the same time, some demographic factors have limited explanatory power on the consumption structure. However, these limited effects can also be fully utilized, using demographic trends to guide the direction of expanding domestic demand and optimizing the consumption structure, or to make appropriate adjustments to the demographic development trend according to the current economic growth requirements for domestic demand, and to implement demographic and economic policies that harmonize population and economy.

## 4.2. Recommendations

According to the pulling effect of consumption on economic growth, the government can promote economic development by increasing the consumption level of urban residents, and the government can take measures to increase the consumption level of urban residents through three influential aspects: residents' income, price index and population structure:

I. Guaranteeing normal wage increases in labor earnings. The government takes measures, such as adjusting the tax system, to adjust to reduce the differences in income distribution. Raise the income of the population without affecting business operations.

II. Stabilization of prices. Excessive inflation can limit the increase in the level of consumption of the population. Therefore, when there is an abnormal price increase and a large impact on consumption and investment storage decisions of various income groups in society, the government needs to take timely measures, such as adjusting social security measures, issuing subsidies, etc., and regulating the corresponding fiscal and monetary policies in real time with the economic and market situation, in order to stabilize market conditions and ensure the environment for residents' consumption levels and ensure that their living standards will not be lowered.

III. Promote the matching of fertility policies with related economic and social policies, focus on strengthening the policy construction of education, employment, income distribution and other systems related to fertility policies, pay attention to narrowing the differences in fertility policies between urban and rural areas, regions and ethnic groups, so that the total fertility rate of women nationwide is stabilized at a moderate level to maintain a reasonable labor force quantity and structure and provide more favorable demographic conditions for economic and social development.

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