

# *An Empirical Analysis of the Influencing Factors of Chinese People's Consumption Demand under the Double Cycle Pattern*

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**Abstract:** In May 2020, China launched the "double cycle" development strategy to improve the domestic demand structure and the quality of national consumption. Compared with other countries, China's national consumption rate is low and still has great potential for making further progress. Therefore, this paper used sample data from 31 provinces in China from 2016 to 2020 for empirical analysis. Divide national consumption into two categories: survival-oriented and development-oriented, and concentrate on the study of the major influencing factors of national consumption demand. Finally, propose corresponding countermeasures to promote the further development of China's consumer market.

**Keywords:** "Double cycle" pattern, consumption demand, survival-oriented consumption, development-oriented consumption

## **1. Introduction**

In recent years, the international situation has become increasingly tense, the COVID-19 has spread all over the world and the phenomenon of anti-globalization has begun to emerge. In the past, China's economy was highly dependent on exports and foreign markets. At the same time, relevant research shows that the consumption of Chinese residents only accounts for 29% of GDP, while the consumption rate of American residents is as high as 80%. There is still much room for improvement in China's internal market consumption. Therefore, China is speeding up the new development pattern of "building a domestic circulation as the main body and promoting domestic and international double circulation"[1].

With the rapid development of China's economy, the consumption demand of Chinese residents has changed significantly from 2016 to 2020. Therefore, it is of great theoretical and practical significance to analyze the main factors of the change of China's national consumption demand and study the change trend of consumption structure under the current "double cycle" pattern[2].

Consumption demand can be divided into many types. Based on the eight classifications of residents' consumption by the National Bureau of Statistics, this paper divides national consumption demand into two categories: survival-oriented type and development-oriented type [3]. Among them, survival-oriented consumption refers to the consumption necessary to compensate workers for their necessary labor consumption, including food, tobacco and alcohol expenditure, clothing expenditure and housing expenditure; Development-oriented consumption is necessary for expanding

reproduction, including education, culture and entertainment expenditure, living goods and services expenditure, medical care expenditure, transportation and communication expenditure and other goods and services expenditure.

From an empirical standpoint, this paper will use the method of measurement to investigate the impact of the number of urban residents at the end of the year, the urban registered unemployment rate, the real interest rate, per capita disposable income, the age structure, and housing price on survival- and development-oriented consumption.

## 2. Methodology

### 2.1. Select Variables

Select the explanatory variables and arrange them as follows[4][5][6]:

Table 1: BASIS/DEVELOP variable selection.

Variable properties	Name	symbol	definition	Estimated relevant direction
Explained Variable	survival-oriented consumption / Develop-oriented consumption	BASIS/ DEVELOP	consumption mainly on food, clothing and housing/ consumption mainly focusing on living goods and services, transportation and communication, education, culture and other services	
Explanatory Variables	population	POPULATION	Proportion of urban population at the end of the year	+
	unemployment rate	UNEMPL	Urban registered unemployed	-
	actual rate of interest	INTEREST	One year weighted average interest rate - consumer price index	-
	income	INCOME	Per capita disposable income	+
	age structure	AGESTRU	Ratio of elderly and juvenile dependency	-
	House price	HOUSEPRICE	Unit residential commodity price	-

### 2.2. Data Collection and Processing

For the above indicators, this research collected relevant data in the National Statistical Yearbook and the Financial Statistical Yearbook [7][8]. From these data, two explanatory variables will be summarized, namely, BASIS and DEVELOP.

The trend chart and box chart of each variable are drawn as follows:

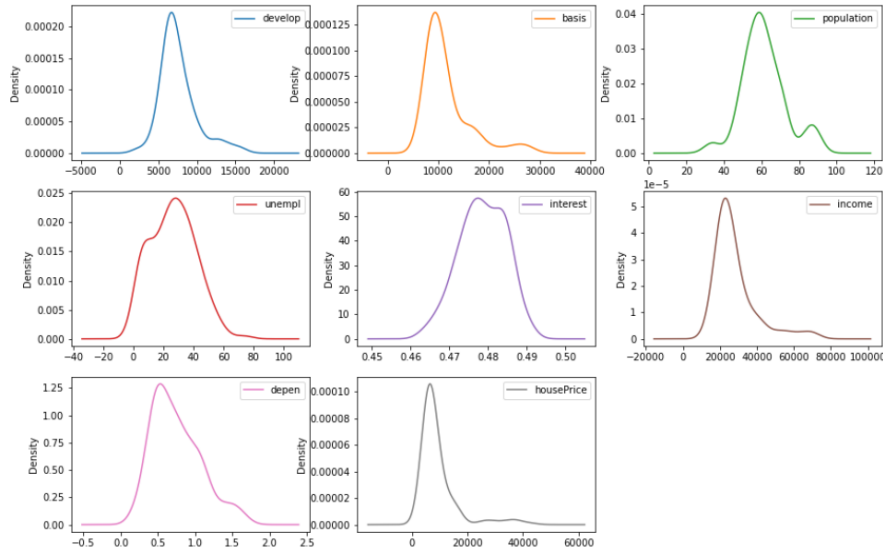


Figure 1: Trend chart.

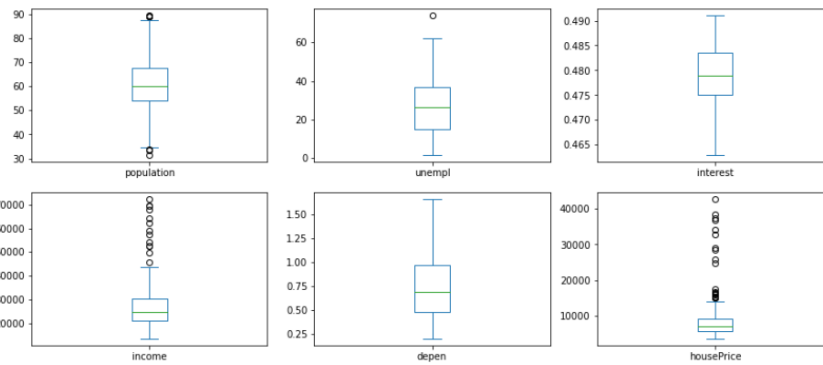


Figure 2: Box chart.

It can be found that the four variables, development, basis, income and house price, differ greatly from other variables in quantity. Consider logarithmizing them as follows:

For variables with too large value, take logarithmic treatment:

$$\begin{aligned} \ln_{\text{basis}} &= \log(\text{basis}) \\ \ln_{\text{develop}} &= \log(\text{develop}) \\ \ln_{\text{income}} &= \log(\text{income}) \\ \ln_{\text{houseprice}} &= \log(\text{houseprice}) \end{aligned}$$

For variables with large values, divide by 10:

$$\begin{aligned} \text{population2} &= \text{population}/10 \\ \text{unempl2} &= \text{unempl}/10 \end{aligned}$$

For variables with smaller values, multiply by 10:

$$\begin{aligned} \text{agestru2} &= \text{agestru} \times 10 \\ \text{interest2} &= \text{interest} \times 10 \end{aligned}$$

The trend chart after variable preprocessing is shown in Figure 3:

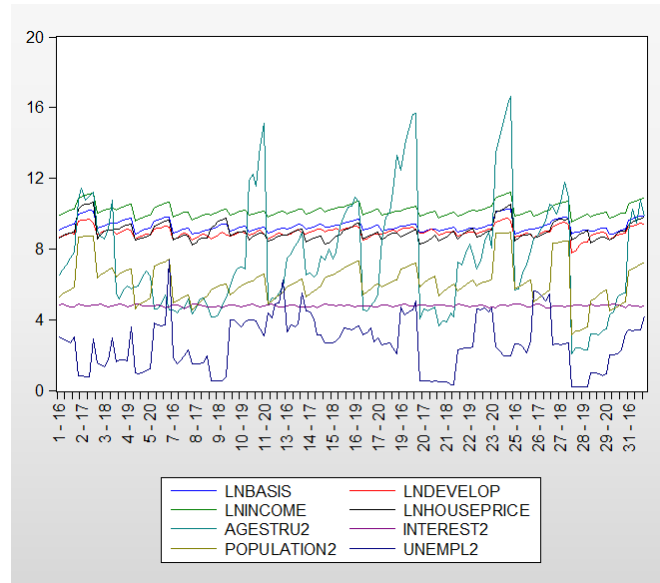


Figure 3: Trend chart.

### 2.3. Rescreen Variables by Stepwise Method

In order to avoid too many explanatory variables and the possibility of increasing the multicollinearity of variables, we will preliminarily screen these similar variables through OLS least square estimation.

#### 2.3.1. Survival-oriented Consumption Model

Step1. Estimating the Model by the Common Least Squares Method, the result is as follows:

Table 2: Result.

Variable	Coefficient	Std.Error	t-Statistic	Prob.
C	0.062491	0.724519	0.086251	0.9314
UNEMPL	0.000334	0.000466	0.716444	0.4748
POPULATION	0.001564	0.001327	1.178650	0.2404
INTEREST	0.856179	1.047945	0.817008	0.4152
AGESTRU	-0.052785	0.026940	-1.959337	0.0520
LNINCOME	0.734550	0.060660	12.10926	0.000
LNHOUSEPRICE	0.142342	0.028275	5.034229	0.000

It can be found that the p value of such variables as UNEMPL, POPULATION and INTEREST is significantly higher, indicating that there is an obvious multiple collinearity between explanatory variables.

Step2. Test correlation coefficient

Scatter plot of interactions between variables is as follows (figure 4):

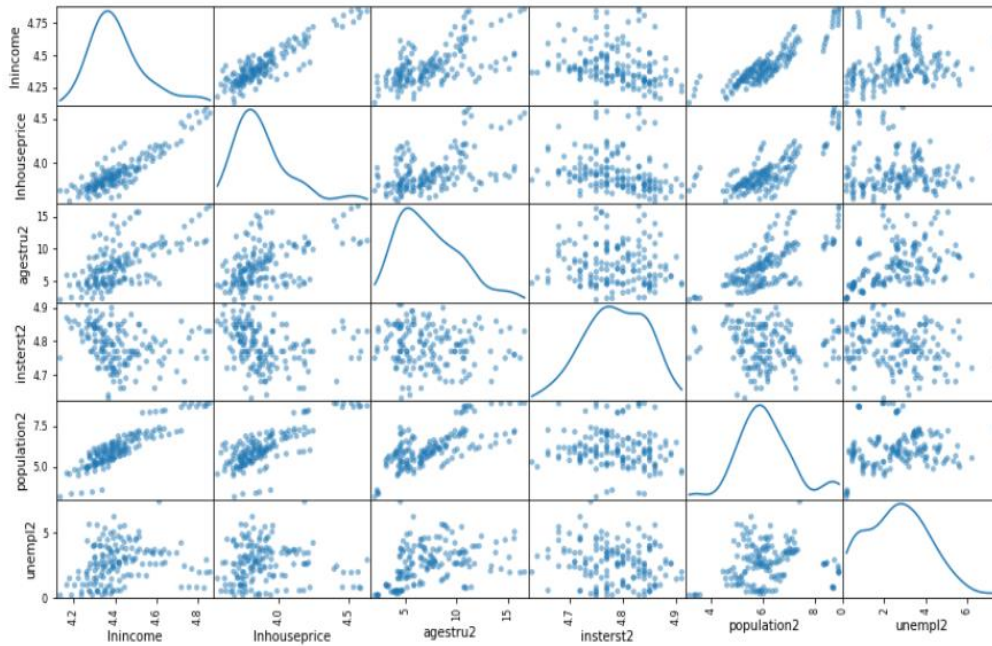


Figure 4: Scatter plot.

The correlation coefficient between explanatory variables is shown in the table 3:

Table 3: Correlation coefficient.

	LNINC OME	LNHOUSE PRICE	AGEST RU2	INTER EST2	POPULA TION2	UNEM PL2
LNINCOME	1.000	0.898	0.624	-0.242	0.902	0.178
LNHOUSEPRICE	0.898	1.000	0.500	-0.235	0.781	-0.011
AGESTRU2	0.624	0.500	1.000	-0.079	0.708	0.374
INTEREST2	-0.242	-0.235	-0.078	1.000	-0.097	-0.191
POPULATION2	0.901	0.781	0.708	-0.097	1.000	0.154
UNEMPL2	0.178	-0.011	0.374	-0.191	0.154	1.000

The heatmap of the correlation of each explanatory variable is as follows:

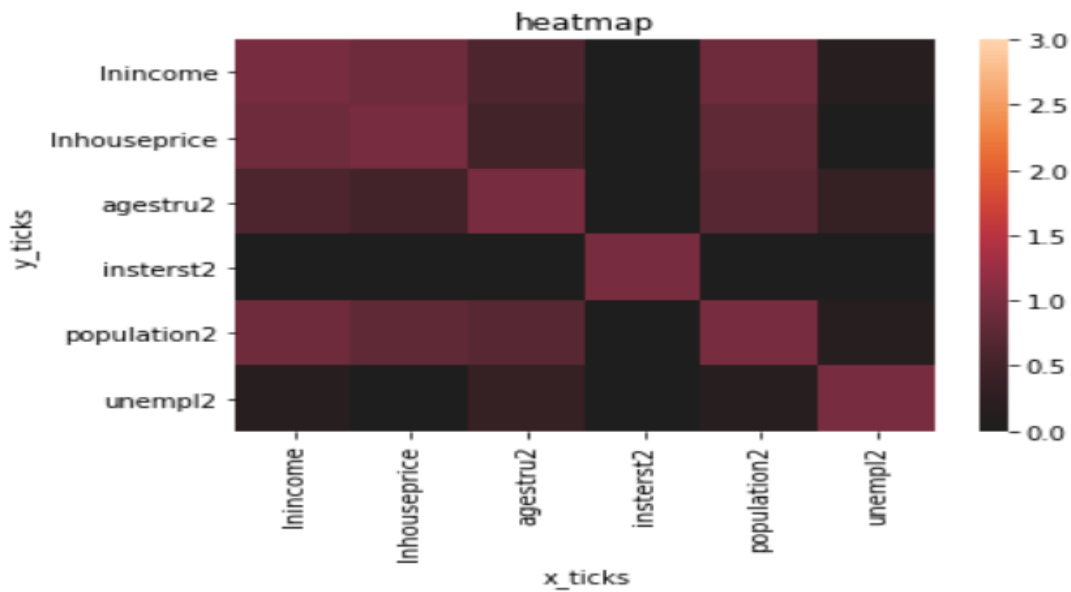


Figure 5: Heatmap.

The above figure shows that POPULATION is highly correlated with INCOME, HOUSEPRICE and AGESTRE. And INCOME is highly correlated with HOUSEPRICE and AGESTRE.

Step3. Use the simplest regression form to find the best explanatory variable

Regress the six explanatory variables respectively. The goodness of fit of linear regression of UNEMPL2, INTEREST2 and AGESTRU2 is small; The goodness of fit of POPULATION 2, LNINCOME and LNHOUSE PRICE is greater than 0.7, so the effect is good. The p value is small, the F value is large, and the effect of each parameter is good.

While the goodness of fit of the LNINCOME is 0.945, the p value is 0.000, and the F value is 2649.256, so the parameter effect is better. So the explanatory variable LNINCOME is the best explanatory variable.

Therefore, the unitary regression model of LNINCOME is selected as the initial regression model.

Step4. Correction of multicollinearity by stepwise regression

Other explanatory variables are added to the initial regression model in order to find the best regression equation. After the variable HOUSEPRICE is introduced into the initial model, the goodness of fit of the model  $R^2$  is increased from 0.945401 to 0.954198. The parameter symbols are reasonable. It passed the t test with a significance level of 1%. So the variable LNHOUSEPRICE is retained.

Use the same method to introduce variables POPULATION2, UNEMPL2, INTEREST2 and AGESTR12 respectively. Observe the goodness of fit of the model  $R^2$ , parameter symbols and whether they pass the t test to determine whether to retain these variables. The table shows the process data of stepwise regression.

Table 4: The process data of stepwise regression (BASIS).

Coefficient (Prob.)	(1)	(2)	(3)	(4)	(5)	(6)
LNINCOME	0.941 (0.000)	0.756 (0.000)	0.731 (0.000)	0.759 (0.000)	0.758 (0.000)	0.784 (0.000)

Table 4: (continued).

LNHOUSEPRICE	0.138 (0.000)	0.140 (0.000)	0.136 (0.000)	0.139 (0.000)	0.132 (0.000)
POPULATION2		0.007 (0.555)			
UNEMPL2			-7.88e-4 (0.854)		
INTEREST2				0.089 (0.372)	
AGESTRU2					-0.003 (0.153)
R <sup>2</sup>	0.945	0.954	0.954	0.954	0.955
F-statistic	2649.256	1583.308	1051.137	1048.842	1054.432
				1063.641	

Therefore,  $BASIS = f(LNINCOME, LNHOUSEPRICE)$  is the best choice for the final survival-oriented consumption. The fitting results are as follows:

$$BASIS = 0.360 + 0.756LNINCOME + 0.138LNHOUSEPRICE$$

### 2.3.2. Development-oriented Consumption Model

Use the same method to regress the development-oriented consumption, the final development-oriented consumption is optimized by the following function:

$$DEVELO = f(LNINCOME, LNHOUSEPRICE, POPULATION2, INTEREST2)$$

The result is as follows:

$$DEVELOP = 6.277 + 0.522LNINCOME - 0.163LNHOUSEPRICE + 0.161POPULATION2 - 0.451INTEREST2$$

## 2.4. F-test and Hausman Test

### 2.4.1. F-test

F-test is usually used to determine whether there is individual effect in the model. That is to determine whether mixed estimation model or fixed effect model should be selected for estimation.

For LNBASIS variable, calculate the value of F statistic:

$$F = \frac{(SSE_r - SSE_f)/(N - 1)}{SSE_f/(NT - N - K)} \sim F(N - 1, NT - N - K)$$

$SSE_r$  is the sum of squares of the residuals of the mixed estimation model.  $SSE_f$  represents the sum of squares of the residuals of the fixed effect model.  $N$  represents the number of sections.  $T$  represents the number of time series.  $K$  represents the number of explanatory variables

Here we got  $SSE_r=0.766765$ ,  $SSE_f=0.078215$ ,  $N=31$ ,  $T=5$ ,  $K=2$

Substituting F-statistic formula, we got  $F=35.8001$

It is known that the molecular degree of freedom is 30 and the denominator degree of freedom is 122:

When  $\alpha=0.1$ ,  $F(30,122)=1.408$ ;

When  $\alpha=0.05$ ,  $F(30,122)=1.553$ .

Since F is greater than the value of the table, the original assumption is rejected. We believe that LNBASIS should adopt individual effect model.

Use the same method to analyze the LNDEVELOP variable and calculate the value of F statistic. We got  $SSE_r=1.541112$ ,  $SSE_f=0.552159$ ,  $N=31$ ,  $T=5$ ,  $K=4$

Substituting F-statistic formula, we got  $F=7.1643$

It is known that the molecular degree of freedom is 30 and the denominator degree of freedom is 122:

When  $\alpha=0.1$ ,  $F(30,120)=1.409$ ;

When  $\alpha=0.05$ ,  $F(30,120)=1.554$ .

Since F is greater than the value of the table, the original assumption is rejected. We believe that LNDEVELOP should adopt individual effect model.

### 2.4.2. Hausman Test

The Hausman test is to test whether the individual effect or time effect of the model is related to the explanatory variable. So as to determine whether the model chooses the form of fixed effect or random effect.

The p value of LNBSIS variable is 1, which is far greater than 0.05. So we accept the original assumption. Select the random effect model. Then analyze the LNDEVELOP model with the same method. Similarly, the P value is 1, which is far greater than 0.01. Accept the original hypothesis, that is, choose the random effect model.

## 3. Results

### 3.1. The Final Model

#### 3.1.1. Survival-oriented Consumption Model

Because the F-test for survival-oriented consumption rejects the original hypothesis and the Hausman test accepts the original hypothesis. So we use the random effect model. The final survival-oriented consumption model is:

$$\text{BASIS} = 1.004 + 0.796\text{LNINCOME} + 0.020\text{HOUSEPRICE} + [\text{CX} = \text{R}]$$

The random effects of each province are shown in the figure below (due to space constraints, some results are as follows):

Table 5: Random effects(survival-oriented).

CROSSID	Effect
1	0.040773
2	0.080907
3	0.035715
4	0.146497
5	0.059826
6	0.158116



Table 5: (continued).

CROSSID	Effect
7	-0.069738
8	-0.042885
9	0.033532
10	-0.039201
11	-0.056694
12	-0.087373
13	0.024604
14	0.001299
15	-0.046284
16	0.001416
17	-0.022044
18	-0.073979

Take Jiangxi Province as an example, which has the crossid of 17. Its survival-oriented consumption will decrease by about 2 percentage points due to its own characteristics. In the past decade, the proportion of survival-oriented consumption among the eight categories of consumer expenditure of Jiangxi residents has gradually declined. Since 2000, the proportion of food consumption per capita of Jiangxi residents in the total consumption of residents has generally declined year by year (except for several years), from 43.2% in 2000 to 39.8% in 2011 in urban areas and from 54.5% to 45.2% in rural areas. The proportion of other categories, especially enjoyment and service consumption, increased significantly[9].

### 3.1.2. Development-oriented Consumption Model

The regression results of LNDEVELOP are also obtained, therefore, the final development-oriented consumption is as follows:

$$\text{LNDEVELOP} = f(\text{POPULATION}, \text{INTEREST}, \text{INCOME}, \text{HOUSEPRICE})$$

The fitting results are as follows:

$$\text{LNDEVELOP} = 4.688 + 0.653\text{LNINCOME} - 0.144\text{LNHOUSEPRICE} + 0.118\text{POPULATION2} - 0.382\text{INTEREST2}$$

The random effects of some provinces are as follows:

Table 6: Random effects(development-oriented).

CROSSID	Effect
1	-0.039736
2	0.020668
...	...
17	-0.162384
18	0.054412

Take Jiangxi Province as an example. Due to its own characteristics, its development-oriented consumption will decrease by 16 percentage points on an average basis. The long-term low income of residents in Jiangxi Province has restrained the expansion of development-oriented consumption demand and hindered the structural upgrading. In 2011, the per capita annual consumption of urban households in our province was 11747.21 yuan and rural households was 4029.49 yuan, which is lower than the national average by 3413.68 yuan and 703.86 yuan respectively. Under the influence of low income levels, the consumption of urban and rural residents is not motivated enough, and structural upgrading is slow. Moreover, the relatively lagging development of the tertiary industry in Jiangxi's industrial structure also has a great impact on its development-oriented consumption[9].

### 3.2. Analysis Results

This paper uses the provincial panel data from 2016 to 2020 in China to examine the impact of different factors on the consumption structure of urban residents. Relevant variables are introduced to build a panel data survival-oriented consumption model and a development-oriented consumption model. The empirical analysis results are as follows:

1. The residents' income significantly affects the consumption demand structure of urban residents. The increase of per capita disposable income has the most significant positive impact on both survival-oriented consumption and development-oriented consumption, indicating that urban population consumption in China is mainly affected by income[10].

2. The housing price significantly affects the consumption demand structure of urban residents. It indicates that the rise of urban housing price in China has a wealth effect on the survival-oriented consumption and has a crowding out effect on the development-oriented consumption.

3. Urban population has a significant impact on urban residents' development-oriented consumption and has a small contribution to survival-oriented consumption. It indicates that the increase of urban population growth will increase the expenditure of residents' development-oriented consumption.

4. The rise of real interest rate has a significant negative impact on urban residents' development-oriented consumption and has a little contribution to survival-oriented consumption. In terms of development-oriented consumption, the substitution effect of China's interest rate policy on consumers' intertemporal choice is greater than the income effect.

5. In the future, in the context of liberalizing the third child policy, lowering interest rates, increasing income and regulating housing prices, the consumption structure of urban households will generally show the characteristics of stable and changing. Finally tend to become development-oriented consumption.

### 4. Discussion

According to the Fourteenth Five Year Plan and the Outline of the Vision Goals for 2035 and the research conclusions of this paper, the following suggestions are made for the formulation of urban consumption related policies in China:

1. Expand channels for increasing residents' income. In the context of slowing economic growth in China, it is necessary to help residents establish new consumption concept and to promote the continuous optimization of consumption demand and structure.

2. Improve the housing market system and the housing security system. The housing price slows down the upgrading of urban consumption structure in China. Therefore, it is expected to take effective policy measures to stabilize the housing price. For example, expand the supply of affordable rental housing and solve the housing problems of disadvantaged groups and new citizens[11].

3. Promote high-quality new urbanization. The higher the level of urbanization, the higher the level of development-oriented consumption of Chinese residents. Increasing the construction of new urbanization can expand infrastructure investment and stimulate domestic demand with investment.

4. Improve the mechanism for the formation and transmission of market-based interest rates. Lowering interest rates will help promote development-oriented consumption and optimize the consumption structure of residents. Relevant departments are expected to integrate various factors and reasonably adjust the level of interest rates to promote the upgrading of consumption structure by improving the central bank's policy interest rate system.

## 5. Conclusion

This paper selected the data of 31 provinces, cities, and autonomous regions in China from 2016 to 2020 from six aspects: the number of urban population at the end of the year, urban registered unemployment rate, real interest rate, per capita disposable income, age structure, and housing price. To determine the specific impact of these factors on development-oriented consumption and survival-oriented consumption, the econometrics software Eviews was used for empirical analysis and the Python language for auxiliary mapping. The model's economic significance is consistent with its practical economic significance, according to the model's conclusion. And the policy recommendations to effectively promote China's consumer market are put forward according to the conclusion.

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