

Analysis of Economic Factors Affecting Luxury Goods Sales in China

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Abstract: Affected by the epidemic, the global luxury market is weak, but the Chinese market is rising against the trend. The economic factors behind this deserve our attention. Through regression modeling, this paper explores the impact of digital consumption (IDC) urban-rural income gap (URIG), consumer price index (CPI), residents' disposable income (RDI) and logistics level (LL) on the total sales of luxury goods, so as to make suggestions for consolidating the stability of China's luxury goods market.

Keywords: Total sales of luxury goods; Digital consumption; Theil index; CPI; Disposable income of residents

1. Introduction

Affected by the epidemic, the global luxury market is weak, but the Chinese market is rising against the trend. On January 20, the consulting firm Bain released the 2021 China luxury market report, which said that China is expected to become the world's largest luxury market by 2025. In 2021, the scale of China's personal luxury market doubled from 2019, and is expected to grow by 36% year-on-year in 2021, reaching nearly \$73.6 billion (about 471 billion yuan). The huge consumer market is growing rapidly in China, and the economic factors behind it deserve our attention [1-3].

China pays more attention to the impact of psychological factors such as purchase motivation on luxury consumption, and integrates sociology, management, psychology, marketing and other disciplines to sort out the factors affecting consumption supply and consumption psychology. In economics, Liu Rui [4] pointed out that economic growth is the reason for luxury consumption, and the role of luxury consumption in promoting economic growth is relatively limited. Yuan Wenqing [5] logically demonstrated that factors such as the increase of disposable income, the insignificant redistribution effect, the decline of savings rate and the expansion of purchase channels have promoted the development of the luxury market.

From the perspective of economy, combined with econometric analysis, this paper demonstrates the economic reasons that affect luxury consumption from the perspective of data.

2. Model establishment and data description

2.1 Model design

In order to explore the impact of IDC, URIG, CPI, RDI and LL on luxury consumption, this paper constructs the following basic model:

$$\ln Y = a + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \varepsilon \quad (1)$$

Among them, $\ln Y$ represents the total sales of luxury goods, X_1 , X_2 , X_3 , X_4 and X_5 represent IDC, URIG, CPI, RDI and LL respectively, and a is a constant term, β is a parameter with estimation, ε is a random error term. This paper deals with the logarithm of variables and uses OLS method to model to explore the impact of economic factors on the total consumption of luxury goods [6].

2.2 Data source and data analysis

The total sales of luxury goods are measured by the total sales of luxury goods in China from 1997 to 2021. Luxury consumption data were collected by the author from the report on China's luxury consumption market released by McKinsey over the years (Table 1).

Table 1: Consumption digitalization measurement system and weight

Variable name	Measurement index
Consumption Digitalization	Mobile phone penetration (0.1515)
	Internet penetration index (0.0832)
	Export bandwidth index of domain (provincial) network (0.0285)
	Fixed express penetration index (0.5212)
	Average rate index of fixed broadband port (0.2156)

The URIG is difficult to be accurately measured by a single index. There are rich studies on the measurement of this index. This paper uses the Theil index for analysis. Theil index is calculated by Theil using the concept of entropy in information theory. It is an index proposed by Theil to calculate the income gap between individuals or regions. The formula is as follows:

$$T_t = \left(\frac{P_{1t}}{P_t}\right) \ln\left(\frac{P_{1t}}{Z_{1t}}\right) + \left(\frac{P_{2t}}{P_t}\right) \ln\left(\frac{P_{2t}}{Z_{2t}}\right) \quad (2)$$

T_t refers to the Theil index in t period, P_{1t} and P_{2t} refers to the disposable income of towns and villages in t period, which is obtained by multiplying the total population of towns and villages in each year by the corresponding per capita disposable income, P_t refers to the total disposable income in t period, Z_{1t} and Z_{2t} refer to the urban and rural population in t period, and Z_t refers to the total population in t period. The data are from China Statistical Yearbook from 1997 to 2021.

CPI adopts the annual CPI data of China Statistical Yearbook.

Since 1997, luxury sales have shown a significant growth trend, especially after 2014, the growth rate has become more rapid. In terms of growth rate, luxury sales showed a fluctuating trend before 2014, and steadily increased after 2014. In terms of total sales, the sales of luxury goods in China increased from 460million yuan in 1997 to 94.4 billion yuan in 2021, and has become the world's largest luxury sales market.

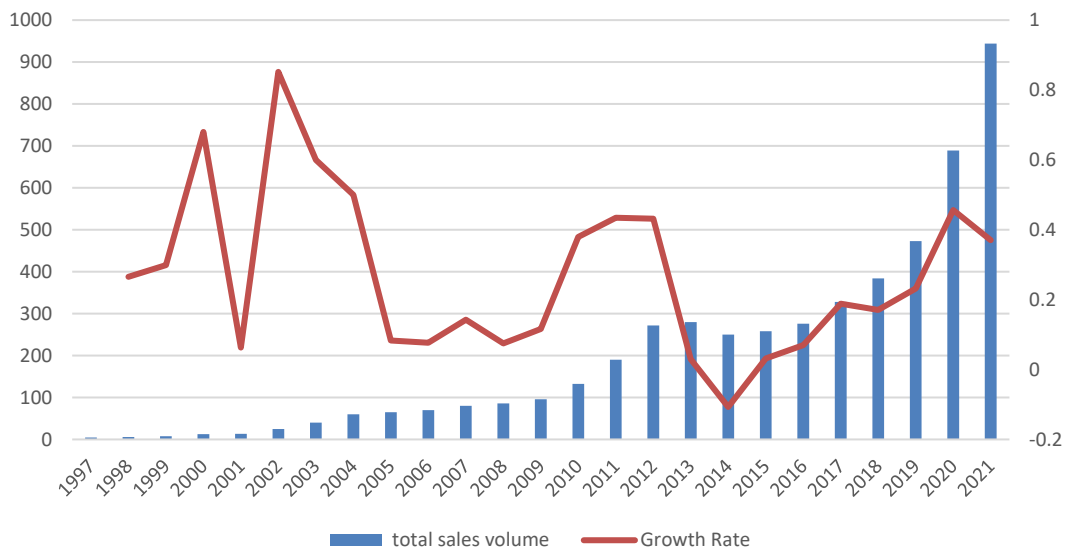


Figure 1: Total sales volume and growth rate of luxury goods in China from 1997 to 2021

Consumption digitalization has shown rapid development since 2013. E-commerce sales increased significantly in 2013, driving the rapid rise of measurement indicators (Figure 1).

Since 1997, the urban-rural income gap has shown a fluctuating trend, and China's economy has gradually developed from 1997 to 2008. After joining the WTO in 2001, foreign trade has become the biggest driving force to promote economic growth, and the income gap between urban and rural areas has also increased. After 2008, as the government began to reduce external dependence and carry out poverty alleviation through supply side structural reform and expanding domestic demand, the Theil index declined and the urban-rural income gap narrowed. After 2015, affected by economic fluctuations, the gap between urban and rural areas has increased (Figure 2).

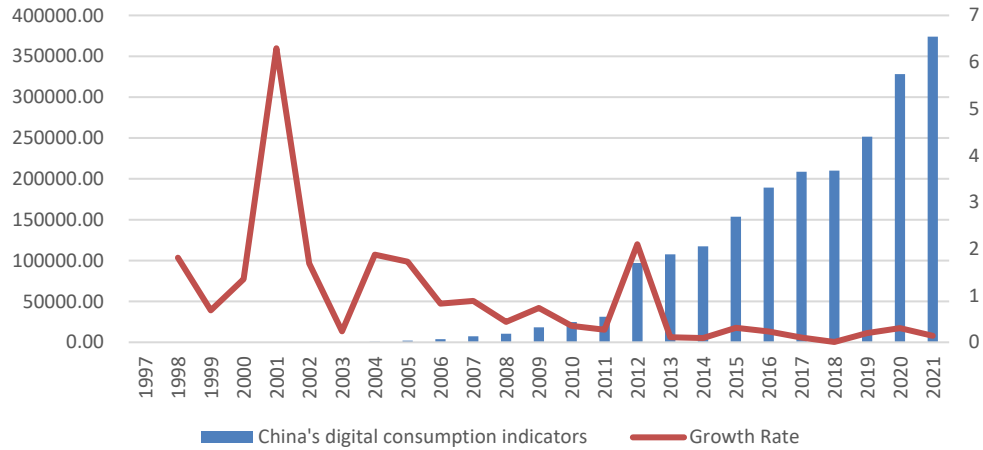


Figure 2: China's digital consumption indicators and growth rate from 1997 to 2021

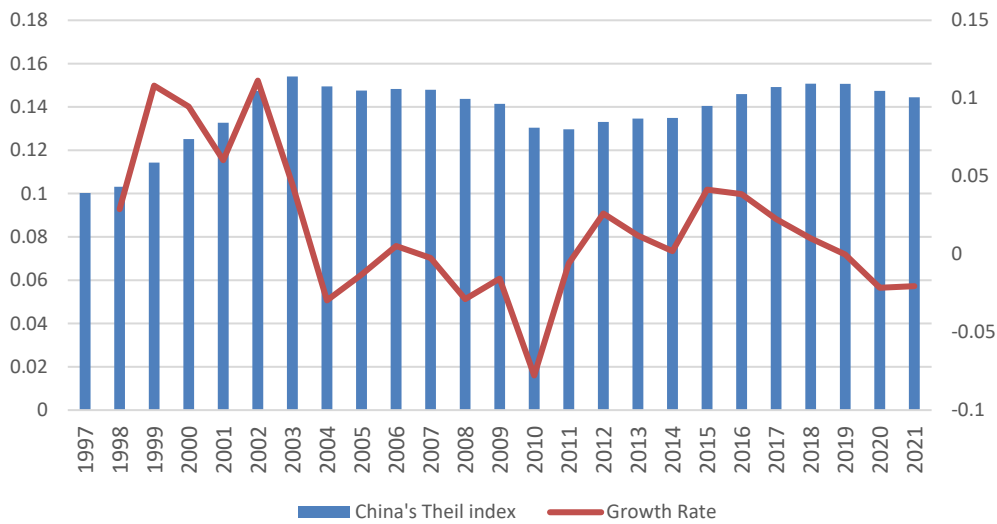


Figure 3: China's Theil index and growth rate from 1997 to 2021

CPI increased year by year, reaching 748.285 in 2021. The growth rate of CPI was relatively controlled at a low level and remained at 0.1 on the whole. Affected by the resumption of work after the epidemic in 2021, the growth rate reached the highest level in the past 25 years (Figure 3).

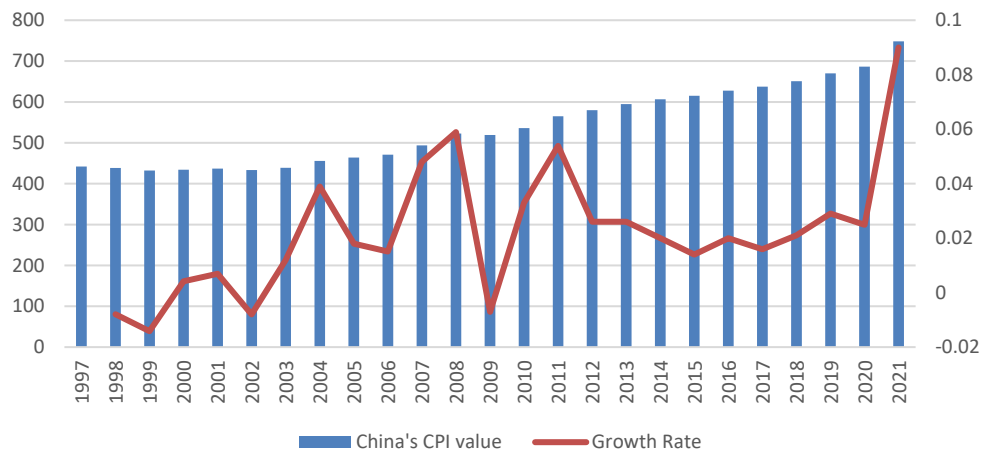


Figure 4: China's CPI value and growth rate from 1997 to 2021

The CPI has increased steadily since 1997, reaching 35128 yuan / person in 2021. In terms of growth

rate, the growth rate of disposable income of residents shows a fluctuating trend. The growth rate decreased significantly in 2020 due to the impact of the epidemic, and rebounded in 2021 (Figure 4).

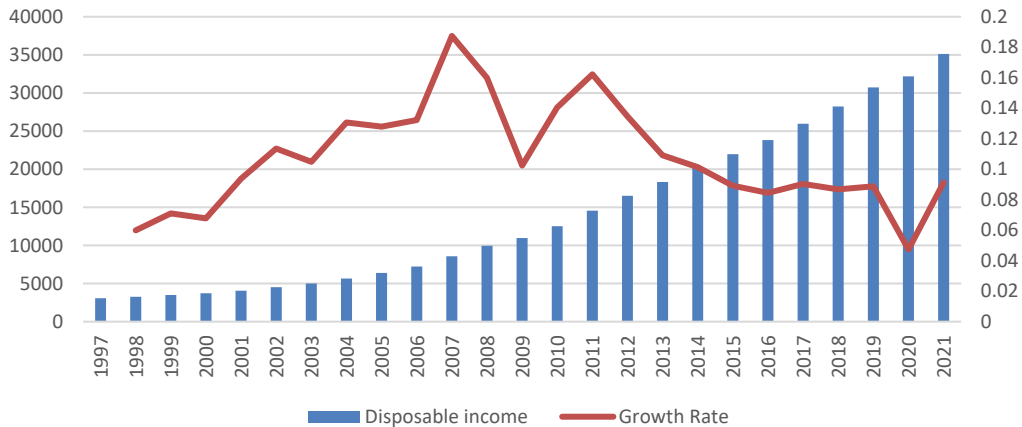


Figure 5: Disposable income and growth rate of Chinese residents from 1997 to 2021

Since 1997, the total amount of express delivery has been rising. Especially after 2009, the total amount of express delivery has increased rapidly, reaching 108.3 million pieces by 2021. The growth rate of express delivery volume showed a blowout rise in 2007, and then fell back to the normal level. After 2007, the overall fluctuation remained in the range of 0.2~0.6 (Figure 5, 6).

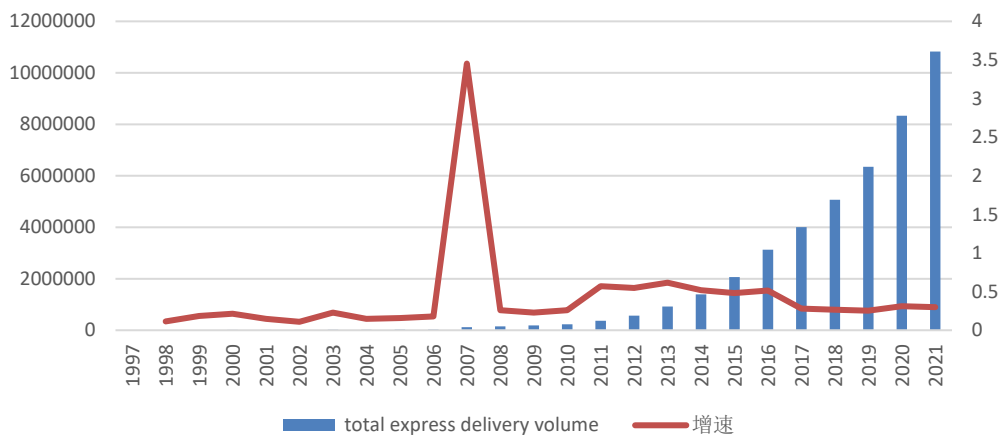


Figure 6: Total express delivery volume and growth rate in China from 1997 to 2021

3. Analysis of empirical results

3.1 Stability test [7, 8]

To establish relevant time series models, we need to experience the stationarity of the data to avoid the occurrence of false regression. Therefore, this paper uses the unit root test to test the stationarity of explanatory variables and explained variables.

According to Table 2, $\ln X_1$ and $\ln X_2$ are stationary time series, and other variables are non-stationary time series. Using OLS method to establish a multivariate linear model needs to modify the series to become a stable time series. However, due to the changes in the interpretation meaning of the transformed data, the significance of the model, the economic meaning of variable parameter estimation and the time relationship, this paper does not revise the data, and uses the original data to establish a double logarithmic regression model.

Table 2: Stability test

Variable	p-value	conclusion
	0.3249	
$\ln Y$	0.7011	Nonstationary
	0.9420	
	0.6820	
$\ln X_1$	0.0000	Stationary
	0.6056	
	0.0239	
$\ln X_2$	0.0021	Stationary
	0.4157	
	0.3149	
$\ln X_3$	0.9998	Nonstationary
	1.0000	
	0.1083	
$\ln X_4$	0.0633	Nonstationary
	0.9771	
	0.3275	
$\ln X_5$	0.9811	Nonstationary
	1.0000	

3.2 Statistical inspection

(1) Goodness of fit test

The closer the value of $\overline{R^2}$ is to 1, the better the goodness of fit of the model. On the contrary, the closer R^2 is to 0, the worse the goodness of fit of the model. According to the estimation results of regression parameters, the judgment coefficient after sample adjustment is $R^2=0.9906$, and 99.06% of the change of y value can be explained by five variables, indicating that the fitting degree of the model is excellent.

(2) Overall significance test

Make assumptions $H_0: \beta_1=\beta_2=\beta_3=\beta_4=\beta_5=0$, then H_1 : at least one β_i The value of I ($i=1,2,3,4,5$) is not equal to 0. P-value<0.05, reject the original hypothesis, and the model is significant.

(3) Variable significance test

Table 3: T-test statistics

Variable	T-test value	P-value	Unilateral test
IDC	1.6904	0.1073	0.05365
URIG	4.3486	0.0003	0.00015
CPI	3.1519	0.0053	0.00265
RDI	-3.4482	0.0027	0.00135
LL	1.603	0.1254	0.0627

For five different variables, the original hypothesis H_0 is made respectively: $\beta_j=0$, then alternative hypothesis $H_1: \beta_j \neq 0$. According to the data in Table 3, under the given significance level of 10%, the p-value of one-sided test of all variables is less than 0.1, rejecting the original hypothesis, and the variables are significant, indicating that the five variables of IDC, URIG, CPI, RDI, and LL have a significant impact on luxury sales respectively.

3.3 Econometric test [9]

(1) Multicollinearity test

Due to the close correlation between economic variables and the change trend in the same direction, the variables of the model often have a high degree of autocorrelation, which affects the later estimation and significance level of the model. Therefore, it is necessary to conduct a multicollinearity test on the variables.

Table 4: Multicollinearity test

Variable	VIF value
IDC	79.92459
Theil index	3.263494
CPI	117.6456
CPI	193.4084
LL	593.2247

According to Table 4, the VIF values of $\ln X_1$, $\ln X_3$, $\ln X_4$ and $\ln X_5$ are greater than 5, indicating that the model has serious multicollinearity.

The stepwise regression is adopted for correction, and the following model is obtained:

$$\ln \hat{Y} = -41.74453 + 0.235235 \ln X_1 + 8.554969 \ln X_2 + 2.220997 \ln X_3 - 0.412570 \ln X_4 \quad (3)$$

(2) Heteroscedasticity test

The random error items in econometric models often have heteroscedasticity, which affects the effectiveness and significance of the model estimators, resulting in the final prediction failure of the model. Therefore, it is necessary to test the heteroscedasticity of the model. In this paper, white is used to verify the model, and the following results are obtained:

Table 5: Heteroscedasticity test

Test statistics		Adjoint probability
F-statistic	0.93483	0.5518
Obs*R-squared	13.12239	0.4384
Scaled explained SS	5.727949	0.9555

According to the results in Table 5, the probability of nR^2 is $0.4384 > 0.05$, indicating that under the significance level of 5%, the original hypothesis is not rejected, and there is no Heteroscedasticity in the model.

Because the selected data cycle is long and the sequence has a certain business periodicity, in order to avoid the failure of the prediction of the model, it is necessary to test the sequence correlation of the model and use DW test for analysis. Make the original assumption $H_0: \rho = 0$, alternative hypothesis $H_1: \rho \neq 0$, then $DW = 1.7099$, $K = 5$, $n = 25$, at the 10% significant level, $d_L = 0.83$, $d_U = 1.52$. The results obtained are $1.52 < 1.7099 < 2.48$. Therefore, there is no sequence correlation in the model.

Therefore, the regression model of total luxury consumption is:

$$\ln \hat{Y} = -41.74453 + 0.235235 \ln X_1 + 8.554969 \ln X_2 + 2.220997 \ln X_3 - 0.412570 \ln X_4 \quad (4)$$

4. Economic forecast

4.1 Data inspection

According to Figure 7, it can be seen that the predicted value of the model is very close to the original data of total luxury sales, which shows that the accuracy and reliability of the model are high

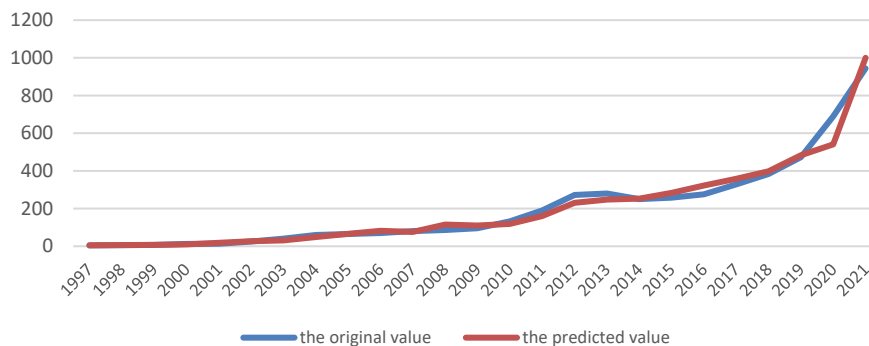


Figure 7: Comparison between the original value and the predicted value of total luxury sales

4.2 Extrapolation prediction

Through the statistics of each annual report of variables, the data of each variable in 2022 are obtained, and the numerical statistics are as Table 6:

Table 6: Specific values of variables in 2022

	2022 value		
Digital consumption	Theil index	CPI	Disposable income
433919.5903	0.147419283	800	12830000

By substituting into Eq. (4), it can be concluded that the consumption of luxury goods will reach US \$179.169.5 billion in 2022

5. Model feature analysis

According to the final model, the total consumption of luxury goods is jointly affected by IDC, URIG, CPI and CPI.

The improvement of digital level promotes the sales of luxury goods, which provides new sales methods for luxury goods sales, broadens sales channels, and promotes the rise of luxury consumption.

The income gap between urban and rural areas changes in the same direction as luxury consumption, and the larger the gap, the more conducive to luxury sales. This is because luxury goods face the consumption needs of high-income groups, and its rarity determines that it can meet the highlight and enjoyment psychology of residents, and can stimulate the demand of high-income groups for rare luxury goods that show "identity".

The increase of CPI promotes the positive growth of luxury consumption. When the price level of consumer goods rises, in order to maintain "luxury", luxury goods must also raise the price level to maintain the price space between the two.

Disposable income measures the overall income level of residents, and there is no stage division of income. Combined with the analysis of China's income proportion, at present, the proportion of middle-income and low-income groups in society is relatively high, and the proportion of high-income groups is relatively low. Therefore, the average value reduces the overall purchasing power level of luxury goods, which in turn affects the total sales of luxury goods.

6. Summary and suggestions

By establishing a multivariate linear model, this paper analyzes the impact of IDC, URIG, CPI, RDI and LL on the total sales of luxury goods. Through research, it is found that RDI, URIG, CPI and total sales show a positive correlation, and disposable income and total sales show a negative correlation.

Affected by the epidemic, the global luxury sales have been greatly impacted, while the Chinese market still maintains a stable growth trend. In terms of the current global epidemic situation, the impact of the epidemic is lasting, which is a great challenge to the global consumer goods market in the future. Therefore, it is of great significance to stabilize the global luxury market by consolidating the growth trend of the Chinese market and promoting the development of the Chinese market. In the future, luxury sales should integrate more online and offline sales channels, improve the digital process of luxury sales, track relevant price indexes, maintain the price range, maintain the "scarcity" of luxury goods, and improve the psychological satisfaction of major consumer groups. Combined with the analysis of China's current economic development trend, the level of urban-rural income gap will gradually decline in the future, and the disposable income of residents will gradually rise. Luxury goods sales should pay more attention to the adverse effects of the above factors, and through the development of low proportion and low price niche products to meet the transformation of China's economy, carry out the transition, and maintain the stability of China's luxury goods market.

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