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Analysis of Consumption Trends of Chinese Cosmetics Based on the "Lipstick Effect"

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Abstract. This paper explores whether the classic lipstick effect exists in the cosmetics consumption sector during periods of economic uncertainty, taking the pandemic as a typical research context of economic volatility and market fluctuation. Based on systematic and authentic statistical data released by the National Bureau of Statistics of China, a rigorous empirical analysis is conducted to verify and sort out the obvious temporal and structural changes in China's cosmetics consumption market during the pandemic, including fluctuations in overall consumption scale, shifts in product category demand and minor changes in consumer purchase preferences. Based on the existence of lipstick effect after empirical testing of the category of cosmetics consumption, this study provides a strategic inspiration for whether China's cosmetics field can fully respond to the period of economic uncertainty. Similarly, it also provides a new analytical perspective for the impact and changes in the field of consumer goods under market sentiment. Quantitative research is carried out by quantitative methods to specify the driving effect on the field of cosmetics consumption under the changes in market sentiment, and correctly guide residents to form a positive and rational consumption concept under the background of the ever-changing market economy. It provides scientific practical guidance and reference basis.

Keywords: multiple linear regression, lipstick effect, consumption trends

1. Introduction

The COVID-19 pandemic has triggered pronounced economic uncertainty and market volatility worldwide, leading to profound shifts in household consumption patterns. During the past economic depressions in the United States, an economic phenomenon emerged, known as the "trend of preference for low-priced products", namely the "lipstick effect" [1]. That is, when the economy is in recession, people will still choose to buy some cheap but not very necessary goods to satisfy their own consumption desires [2]. As a kind of "cheap non-essential item", lipstick plays a comforting role for consumers at this time [3].

In existing research, the "lipstick effect" means that during the economic downturn, consumers are more inclined to buy non-essentials that are not expensive but can bring psychological comfort [2,3]. From a microeconomic perspective, it is mainly because the substitution effect is higher than the income effect - when people reduce bulk consumption, part of the budget will be diverted to those goods that can provide instant satisfaction [2,3]. At the same time, with the Great Recession as

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the background, Mac Donald and Dildar [4] discuss that consumers tend to buy economical cosmetics rather than extravagant clothing to satisfy their psychological comfort, which not only verifies the lipstick effect but also proves that the substitution effect is greater than the income effect. During the epidemic period, China's cosmetics industry will continue to grow steadily in 2022 [5,6] and become the second largest market in the world. The epidemic has also accelerated the transformation of the industry to the online market, and live e-commerce and online shopping marketing have gradually become the main driving forces for growth. In the meantime, domestic brands are rising rapidly with the help of these new channels and precise strategic marketing, and their market share continues to increase [5]. However, the "lipstick effect" is not just a macroeconomic phenomenon, but also closely related to the consumer psychology and social culture of individual consumers. Some sociological studies have pointed out that the cosmetics purchasing behavior of Generation Z young consumers is affected by multiple factors such as consumption symbols [7], feminist expression, and physical discipline. In recent years, studies have also found that the perfume market is gradually shifting from the "lipstick effect" to the so-called "olfactory economy" [8], and the epidemic has further accelerated this trend, making China one of the fastest growing perfume markets in the world. Of course, the epidemic has also suppressed the consumption level of Chinese residents as a whole, mainly reflected in the decline in income, the increase in preventive savings and changes in consumer psychology [8,9]. Therefore, the empirical study of the "lipstick effect" should not only stop at the level of economic variables, but also need to understand the complex social psychology and cultural motives behind it.

During the COVID-19 epidemic, Bahl et al [10]. observed that due to the persistence of the lipstick effect, online beauty product sales were also accompanied by a boom. However, it also reminds us that there are safety risks in home beauty procedures with insufficient supervision. Rogaten et al. [11] put forward the "self-centered lipstick effect" in the post-epidemic era on the basis of the lipstick effect, indicating that female consumers turn their beauty behavior more to self-identification and psychological comfort rather than simply seeking social affirmation of their appearance. At the same time, artificial intelligence technology is also changing the way consumers buy beauty products. Machine learning models can provide key features of color and texture such as lipstick eye shadow, which can be used to provide online product recommendations and virtual trials, making cosmetic shopping more convenient [12]. In addition, natural language processing research found that words related to lipstick often have gendered expression patterns. Existing debiasing methods only hide these biases, which cannot remove the deep social stereotypes completely [13]. Computer vision studies show that lipstick and heavy makeup are closely related facial attributes. Researchers use multi-task convolutional neural networks to identify these beauty attributes more accurately [14].

This study focuses on the existence and characteristics of the lipstick effect in China's cosmetics consumption sector during the pandemic. Using quarterly time-series data from 2018 to 2025 released by the National Bureau of Statistics of China, multiple linear regression models are constructed to investigate the impacts of per capita disposable income and total retail sales of consumer goods on three categories: cosmetics, clothing, footwear and textiles, and daily necessities. By comparing the consumption trends, volatility and driving mechanisms of the three categories, this study verifies the resilience of cosmetics consumption and tests the validity of the lipstick effect under pandemic-induced economic uncertainty.

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2. Materials

2.1. Data source

The study utilized a quarterly time-series dataset spanning from 2018 to 2025, comprising 32 observations. The data were obtained from the National Bureau of Statistics (NBS) of China (http://www.stats.gov.cn, accessed on 25 March 2026). Quarterly values were derived by differencing cumulative figures to better capture short-term fluctuations. The dataset includes quarterly current values of residents per capital disposable income (PDI) (measured in CNY), total retail sales of consumer goods (TRS) (100 million CNY), and retail sales of three consumption categories: cosmetics; clothing, footwear, hats, and textiles; and daily necessities (all measured in 100 million CNY).

2.2. Methods

2.2.1. Variables

In this study, the dependent variables represent retail sales in three consumption categories, namely cosmetics (Y_1), clothing (Y_2), and daily necessities (Y_3). The explanatory variables include disposable income of residents per capital (X_1) and the total retail sales of consumer goods (X_2). All variables are quarterly observations from 2018 Q1 to 2025 Q4, with a total of $n = 32$ observations.

2.2.2. Model specification

MLR construct a linear relationship between the response and explanatory variables. The three separated multiple linear regressions for the corresponding categories are specified as follows:

$$Y_{jt} = \beta_{j0} + \beta_{j1}X_{1t} + \beta_{j2}X_{2t} + \varepsilon_{jt}, \tag{1}$$

where $j = 1,2,3$ denotes the three consumption categories, $t = 1, \ldots, n$ indexes the quarterly observations, and ε_{jt} is the random error term. The matrix form is given by

$$Y_j = \begin{bmatrix} y_{j1} \\ y_{j2} \\ \vdots \\ y_{jn} \end{bmatrix} = X^T\beta_j + \epsilon_j = \begin{bmatrix} 1 & x_{11} & x_{12} \\ 1 & x_{21} & x_{22} \\ \vdots & \vdots & \vdots \\ 1 & x_{n1} & x_{n2} \end{bmatrix} \begin{bmatrix} \beta_{j0} \\ \beta_{j1} \\ \beta_{j2} \end{bmatrix} + \begin{bmatrix} \varepsilon_{j1} \\ \varepsilon_{j2} \\ \vdots \\ \varepsilon_{jn} \end{bmatrix}. \tag{2}$$

2.2.3. Estimation

The fitted values of the three categories of consumption, given the estimated regression coefficients:

$$\hat{y}_{jk} = \hat{\beta}_{j0} + \hat{\beta}_{j1}x_{1k} + \hat{\beta}_{j2}x_{2k}, \quad j = 1,2,3, \quad k = 1, \ldots, n, \tag{3}$$

where the estimated coefficients are obtained from the OLS, i.e.,

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$$\hat{\beta}_j = \operatorname{argmin}_{\beta_j} \frac{1}{2} \sum_{k=1}^{n} \left(y_{jk} - \hat{y}_{jk}\right)^2 \tag{4}$$

with the solution given in matrix form

$$\hat{\beta}_j = (X^T X)^{-1} X^T Y_j, \quad j = 1,2,3. \tag{5}$$

2.2.4. Hypothesis testing and model evaluation

To verify the "lipstick effect" during the pandemic, hypothesis testing is conducted on each coefficient to determine the statistical significance of income and total consumption on different categories of retail sales. Take the first covariates as example, the null and alternative hypotheses are given by

$$H_0 : \beta_{j1} = 0, \quad V.\ S. \quad H_1 : \beta_{j1} \neq 0, \tag{6}$$

where t-statistics with $n - 2$ degrees of freedom and the corresponding p-value at 5% level is used. Rejected with p-value less than 5%, indicating that the covariates have a statistically significant impact on the consumption category. The goodness-of-fit of each model is evaluated using the coefficient of determination (R^2) which measures the proportion of variance explained by the regression:

$$R^2 = 1 - \frac{SSE}{SST},\ SST = \sum_{t=1}^{n} \left(y_{jt} - \bar{y}_j\right)^2, SSE = \sum_{t=1}^{n} \left(y_{jt} - \hat{y}_{jt}\right)^2 \tag{7}$$

where SST is the total sum of square, and SSE is the error sum of square.

3. Result

3.1. Descriptive statistics

Table 1 reports the descriptive statistics of retail sales for cosmetics, clothing, and daily necessities from 2018 to 2025. Generally speaking, these three consumption categories are obviously different in terms of scale and volatility. Among them, the fluctuation of cosmetics is relatively small, and the distribution of data around the central value is also more stable. Specifically, the sales of cosmetics are between 592.1 and 1364.7 (100 million CNY), with an average of 926.8 and a median of 903.2. The average is not much different from the median, only 23.6, indicating that the distribution is relatively symmetrical; the standard deviation is 214.5, reflecting moderate fluctuations. In contrast, clothing, shoes, hats and textiles fluctuate much more. The sales volume is between 2332 and 5201.8, with a standard deviation of 789.2, and the deviation from the average is also relatively large, with the lowest being 1054.5 lower than the average and the highest being 1815.3 higher. The fluctuation of daily necessities is in between the two. Its sales range is 1266.5 to 2267.5, with an average value of 1765.3 and a median of 1748.9.

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Table 1. Descriptive statistics of retail sales for three consumption categories (2018–2025) with unit in 100million CNY

Data type	Min	Max	Mean	Median	SD
Cosmetics	592.1	1364.7	926.8	903.2	214.5
Clothing	2332	5201.8	3386.5	3412.7	789.2
Daily necessities	1266.5	2267.5	1765.3	1748.9	276.4
PDI	6248.0	12179.0	8970.94	8832.50	1454.57
DRS	26449.90	135325.00	92506.99	106418.50	35827.75

Figure 1 shows the quarterly retail sales trend of the above three consumption categories between 2018 and 2025. The figure marks the epidemic period (2020 Q1 to 2022 Q4) with shadow areas, and the outbreak and end of the epidemic are represented by two vertical dotted lines respectively. During the epidemic, cosmetics sales continued to grow, from about 7 billion CNY (70 in 100 million CNY) in 2020 Q1 to more than 12 billion CNY (120 in 100 million CNY) by 2025 Q4. Daily necessities showed a relatively stable growth trend, with only small fluctuations during the period. Specifically, the sales of daily necessities increased steadily from about 13 billion CNY (130 in 100 million CNY) in 2018 to more than 22 billion CNY (220 in 100 million CNY) in 2025, with slight ups and downs only during the epidemic. In contrast, clothing, footwear and textiles showed a significant decline at the beginning of the outbreak (2020 Q1), from about 41 billion CNY (410 in 100 million CNY) in 2019 Q4 to about 23 billion CNY (230 in 100 million CNY). Although sales gradually rebounded in the following quarters, the volatility of this category is significantly higher than that of cosmetics and daily necessities.

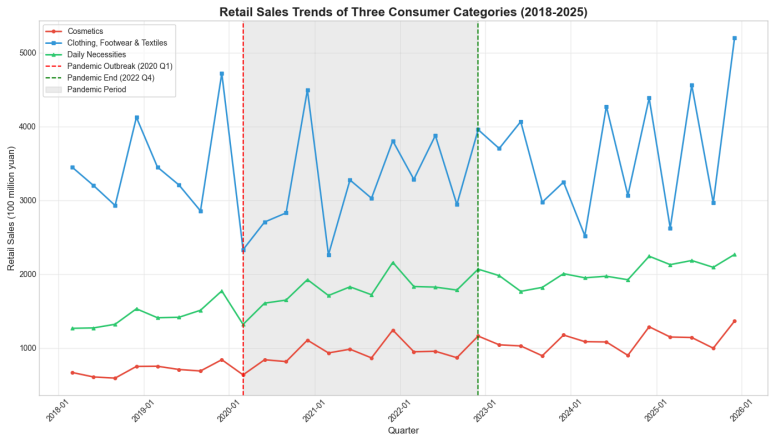


Figure 1. Retail sales trends of three consumer categories (2018–2025). Gray shaded area indicates the pandemic period (2020 Q1–2022 Q4). Red and green dashed lines mark the pandemic outbreak and end, respectively

3.2. Regression analysis

It can be seen from Table 2 that the model fitting effect of cosmetics is relatively good, and the covariates included jointly explain 71.9% of the variance in its sales. Among them, disposable income and total retail sales are both significant positive predictors (the former $p < 0.001$, the latter $p < 0.001$), indicating that the improvement of income level and overall consumption

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capacity will obviously drive cosmetics consumption. Clothing exhibit relatively low explanatory power ($R^2 = 0.278$). Total retail sales showed a significant positive effect ($p = 0.002$), while disposable income was not statistically significant ($p = 0.623$). This suggests that clothing consumption is less sensitive to income changes and may be influenced by other factors such as fashion trends or seasonal demand. Daily necessities demonstrated the strongest explanatory power ($R^2 = 0.863$), with both independent variables being significant positive predictors: disposable income ($p < 0.001$) and total retail sales ($p < 0.001$), confirming the stable demand for essential goods.

Table 2. Results of cosmetics, clothing and daily necessities, with standard errors in parentheses

Variable	Intercept	PDI	p value	TRS	p value	R^2
Cosmetics	-289.20 (144.60)	0.1088 (0.014)	<0.001	0.0028 (0.001)	<0.001	0.719
Clothing	2065.33 (836.89)	0.0404 (0.081)	0.623	0.0110 (0.003)	0.002	0.278
Daily Necessities	-129.55 (144.59)	0.1677 (0.014)	<0.001	0.0045 (0.001)	<0.001	0.863

4. Discussion

This study analyzes the performance of three types of consumer goods during the epidemic through descriptive statistics, time series diagrams and regression models. The results show that the consumption of cosmetics and daily necessities has maintained a steady growth, while clothing, shoes, hats and textiles have shown greater volatility. As a relatively low-priced non-necessity, cosmetics can bring psychological comfort to consumers. During the economic downturn, buying cosmetics can help relieve consumption pressure [1,3]. In addition, the popularity of remote working mode and the convenience of online e-commerce platforms have also further enhanced the resilience of cosmetics consumption [5,6].

In contrast, daily necessities are necessities with less demand elasticity. No matter how the economic environment changes, consumers need to buy such goods to maintain their basic livelihood, so such spending is relatively stable during the epidemic. The popularity of teleworking has reduced the demand for formal and outdoor clothing, which has caused fluctuations in clothing consumption to a certain extent. It is worth noting that there have been many literatures discussing the "lipstick effect" in economic downturn or public health crisis [4].

This study expands the verification scenario of the "lipstick effect" from the traditional economic crisis to public health emergencies. The results confirm that in the uncertainty brought about by COVID-19, the effect is still valid and shows stronger resilience [11]. Unlike the previous research that only focuses on a single category, this article makes a systematic horizontal and vertical comparison of the three categories of goods: cosmetics, daily necessities and clothing. The results show that compared with other non-necessities, cosmetics show stronger consumer resilience, which further verifies the anti-fluctuation ability of cosmetics consumption during the epidemic [7,8].

Regarding the potential limitations of this study, there are mainly the following points. First, this article adopts quarterly data at the macro level, which cannot directly reflect the behavior of individual consumers, and it is difficult to capture short-term fluctuations, seasonal patterns and

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immediate impacts. Second, the linear structure of MLR itself has a linear assumption, which cannot effectively depict the possible nonlinear relationship between variables, which simplifies the presentation of real economic behavior to a certain extent. In addition, the model's explanation of clothing consumption is relatively low, indicating that the currently selected independent variable has limited ability to explain this category.

5. Conclusion

Based on quarterly Chinese data from 2018 to 2025, this study examines whether the lipstick effect held during the COVID-19 pandemic. The results reveal three distinct patterns: cosmetics consumption demonstrated resilience, supporting the lipstick effect; daily necessities consumption remained stable; and clothing, footwear, and textiles consumption exhibited greater volatility and was not sensitive to income changes. The results validate the existence of the lipstick effect in the Chinese market during the pandemic, provides a comprehensive analytical framework by comparing three consumption categories, and offers empirical support for the application of consumer behavior theory in times of crisis.

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