

# Analysis of E-commerce Platform Expansion and Brand Effect

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## Abstract

Against the backdrop of accelerated penetration of the digital economy, e-commerce platforms have achieved scale expansion through technological iterations such as live streaming sales and algorithm recommendations, profoundly reconstructing the transmission path of brand value. The ecological expansion of leading platforms such as JD.com is significantly correlated with the formation mechanism of brand premium, but existing research lacks quantitative verification of the dynamic interaction between platform economies of scale and brand effects. This issue holds significant practical value for understanding the evolutionary laws of the e-commerce ecosystem and adjusting brand strategies. This paper takes the sportswear category on the JD.com platform as an observation window, selects Nike, Anta, and Li-Ning as comparative samples, and constructs a ridge regression model based on monthly sales panel data from 2020 to 2025 to analyze platform scale indicators and quantify the differentiated contributions of different brands to platform scale expansion. This study reveals the transformation path of e-commerce platforms from “channel tools” to “value co-creators,” providing data support for platforms to optimize brand-tiered operation strategies, and establishing a decision-making framework for brands to formulate differentiated platform entry strategies.

## Keywords

E-commerce platform, scale expansion, brand effect, brand premium, Nike

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## 1. Introduction

Amidst the wave of the digital economy, the profound transformation of online consumption scenarios has propelled e-commerce platforms into a period of rapid development. From early shelf-based e-commerce to today's live streaming and social e-commerce, e-commerce platforms have not only achieved exponential growth in transaction scale but also reshaped consumers' shopping habits through technological iteration and model innovation. For instance, live streaming sales with real-time interaction have lowered the threshold for consumer decision-making, personalized recommendation algorithms have enhanced shopping efficiency, and upgrades in logistics services such as “next-day delivery” have redefined consumers' expectations for service experience. In this process, leading platforms like JD.com and Taobao have continuously expanded their scale by broadening merchant coverage, improving supply chain systems, and optimizing user rights, forming a complex and dynamic e-commerce ecosystem.

For brands that have settled on e-commerce platforms, the platform serves as both a sales channel and an important carrier for brand value transmission. Brand premium, as a key indicator of brand competitiveness, depends not only on the brand's own historical accumulation and product strength, but also closely relates to

the e-commerce ecosystem in which it resides. Current research mainly focuses on three dimensions: platform dimension, brand dimension, and consumer dimension. In the platform dimension, Pavlou's (2023) classic research points out that e-commerce platforms, as transaction intermediaries, directly affect brand premium through the “trust transfer effect” due to their scale expansion—when the platform's user base expands and the service system is improved, consumers will transfer some of the institutional trust accumulated by the platform to the settled brands. Li (2009) confirmed that the degree of platform functionality (such as payment security, return, and exchange efficiency) constitutes the infrastructure of consumer trust. Huang and Yu (2009) added the synergistic effect of “brand alliance”, that is, joint marketing between platforms and top brands can strengthen trust capital in both directions. In the brand dimension, Erdem and Swait's (1998) signaling theory reveals that brand premium is essentially the premium consumers pay for “consistency commitment”. Aaker (1991) further refined this commitment into five dimensions of brand equity (loyalty, perceived quality, etc.), emphasizing that reputation capital formed by historical accumulation is the core source of premium. It is worth noting that Chen (2021) found that the platform environment moderates the effectiveness of signals: when product homogeneity on e-commerce platforms is severe, the signal transmission efficiency of top brands is significantly higher than that of long-tail brands. Finally, in the consumer dimension, Hai et al. (2025) pointed out that user stickiness strategies (such as member points) make consumers more dependent on platform information rather than independent judgment, amplifying the Matthew effect of top brands. In other comprehensive aspects, Li (2025) believes that corporate social responsibility of e-commerce platforms is closely related to customer loyalty. Zheng (2024) believes that brand value plays an important role in corporate performance. Wang and Jiang (2025) explored the mediating role of brand value in brand trust and brand premium.

Based on this, this paper primarily focuses on JD.com and Nike as the research subjects. As a comprehensive platform that combines self-operated and third-party merchants, JD.com's scale expansion is reflected in the increase in sales revenue and volume, the strengthening of supply chain capabilities, the improvement of service systems, and the penetration into lower-tier markets. Nike, as a globally renowned sports brand, relies on its brand power as well as the consumption scenarios and user reach provided by the platform to achieve premium pricing on e-commerce platforms. By analyzing the interactive relationship between the two, this paper aims to answer the question: “What is the 'formation basis of the impact of e-commerce platform scale expansion on brand premium?” Through exploring this issue, this paper hopes to provide ideas for brand owners to maintain and enhance their premium pricing capabilities in the e-commerce environment, while also providing references for e-commerce platforms to optimize their ecological layout and achieve collaborative development with brands.

## 2. Exploring the Relationship between Brands and the JD.com Platform Based on Ridge Regression

### 2.1 Data Overview and Variable Settings

This article selects the monthly sales revenue and sales volume of JD.com's apparel from 2020 to 2025, as well as the sales revenue and sales volume of three brands: Nike, Anta, and Li-Ning. The sales revenue and sales volume of JD.com's apparel (Y) are set as dependent variables, while three factors of each brand's sales revenue and sales volume are set as independent variables, as shown in Table 1.

Table 1: Dependent and Independent Variables

| Variable | Name                     | Variable | Name                    |
|----------|--------------------------|----------|-------------------------|
| Y        | JD Apparel Sales Revenue | Y        | JD Apparel Sales Volume |
| X1       | Nike Sales Revenue       | X1       | Nike Sales Volume       |
| X2       | Anta Sales Revenue       | X2       | Anta Sales Volume       |
| X3       | Li-Ning Sales Revenue    | X3       | Li-Ning Sales Volume    |

### 2.2 Research Methods

This article employs the ridge regression model, an improved method of linear regression specifically designed to address multicollinearity issues. When there is a high degree of correlation between independent variables (i.e.,  $|X'X| \approx 0$ ), traditional least squares estimation becomes ineffective. Ridge regression, by

introducing a regularization term  $\lambda$  ( $\lambda > 0$ ), makes the regression coefficients estimable and more stable. Based on preliminary data collation and hypotheses, this study found that the independent variables exhibit multicollinearity, hence the adoption of ridge regression. This article aims to explore the marginal effects of different brands on sales performance on the JD.com platform through ridge regression.

### 3. Empirical Analysis

#### 3.1 Analysis of Correlation

Table 2 presents the relationship between JD.com's sales revenue and sales volume with other variables through Pearson correlation. It can be seen from the Table 3 that there may be a linear correlation between JD.com's sales revenue and sales volume and the independent variables X1, X2, and X3. As these independent variables increase, JD.com's sales revenue and sales volume also increase accordingly.

Table 2: Correlation coefficients between JD.com's sales and independent variables

|                           |                     | JD Sales Revenue (¥) | Nike Sales Revenue (¥) | Anta Sales Revenue (¥) | Li-Ning Sales Revenue (¥) |
|---------------------------|---------------------|----------------------|------------------------|------------------------|---------------------------|
| JD Sales Revenue (¥)      | Pearson Correlation | 1                    | 0.670**                | 0.622**                | 0.663**                   |
|                           | Sig. (2-tailed)     |                      | 0                      | 0                      | 0                         |
| Nike Sales Revenue (¥)    | Pearson Correlation | 0.670**              | 1                      | 0.638**                | 0.662**                   |
|                           | Sig. (2-tailed)     | 0                    |                        | 0                      | 0                         |
| Anta Sales Revenue (¥)    | Pearson Correlation | 0.622**              | 0.638**                | 1                      | 0.801**                   |
|                           | Sig. (2-tailed)     | 0                    | 0                      |                        | 0                         |
| Li-Ning Sales Revenue (¥) | Pearson Correlation | 0.663**              | 0.662**                | 0.801**                | 1                         |
|                           | Sig. (2-tailed)     | 0                    | 0                      | 0                      |                           |

Table 3: Correlation coefficient table between JD sales volume and independent variables

|                              |                     | JD Sales Volume (units) | Nike Sales Volume (units) | Anta Sales Volume (units) | Li-Ning Sales Volume (units) |
|------------------------------|---------------------|-------------------------|---------------------------|---------------------------|------------------------------|
| JD Sales Volume (units)      | Pearson Correlation | 1                       | 0.522**                   | 0.448**                   | 0.406**                      |
|                              | Sig. (2-tailed)     |                         | 0                         | 0                         | 0.001                        |
| Nike Sales Volume (units)    | Pearson Correlation | 0.522**                 | 1                         | 0.706**                   | 0.513**                      |
|                              | Sig. (2-tailed)     | 0                       |                           | 0                         | 0                            |
| Anta Sales Volume (units)    | Pearson Correlation | 0.448**                 | 0.706**                   | 1                         | 0.560**                      |
|                              | Sig. (2-tailed)     | 0                       | 0                         |                           | 0                            |
| Li-Ning Sales Volume (units) | Pearson Correlation | 0.406**                 | 0.513**                   | 0.560**                   | 1                            |
|                              | Sig. (2-tailed)     | 0                       | 0                         | 0                         |                              |

Through the correlation coefficient matrix between the dependent variable and the independent variables, it can be found that there is indeed a significant strong linear correlation between the dependent variable and the independent variables X1, X2, and X3.

#### 3.2 Multicollinearity Test

To examine the potential multicollinearity among independent variables, this study conducted an exploration of multicollinearity. The empirical judgment method of variance inflation factor (VIF) indicates that when  $0 < \text{VIF} < 10$ , there is no multicollinearity; when  $10 \leq \text{VIF} < 100$ , there is strong multicollinearity; and when  $\text{VIF} \geq 100$ , there is severe multicollinearity.

Table 4: Multicollinearity

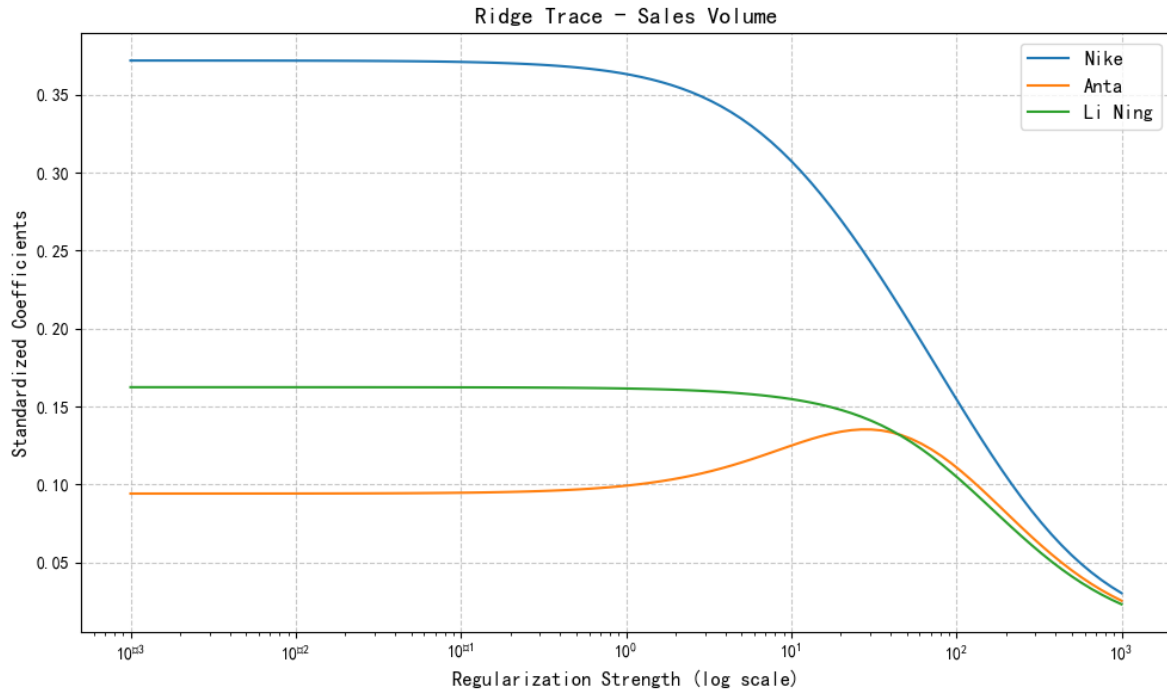
|     | Sales Revenue Model |           |           | Sales Volume Model |           |           |
|-----|---------------------|-----------|-----------|--------------------|-----------|-----------|
|     | X1                  | X2        | X3        | X4                 | X5        | X6        |
| VIF | 9.701530            | 20.119880 | 22.494079 | 15.598767          | 17.844866 | 11.797061 |

|            |      |      |      |      |      |      |
|------------|------|------|------|------|------|------|
| Conclusion | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE |
|------------|------|------|------|------|------|------|

From the results in Table 4, it can be seen that there is severe multicollinearity among the independent variables in the data studied in this paper. In the following, this paper will use ridge regression to establish a model to study the problem.

### 3.3 Ridge Regression

Figure 1: Ridge trace- sales volume



This study employs ridge regression to explore the relationship between independent variables and dependent variables.

In the study, as can be seen from the ridge plots Figures 1 and Figure 2, the ridge traces quickly stabilize as they increases. Especially when  $\lambda \geq 0.001$ , all three ridge traces have become relatively stable, so it can use  $\lambda = 0.001$  to establish the ridge regression equation.

Therefore, the results with  $\lambda = 0.001$  are presented in Table 5. From the results, it can be observed that in both regression models, the  $R^2$  score for sales regression is 0.541119, indicating a good explanatory power of the model, while the  $R^2$  score for volume regression is 0.30225, indicating a weaker explanatory power of the model. Both models consistently show that Nike has the greatest influence on sales performance on the JD.com platform, followed by Li-Ning, with Anta having the least influence. This ranking is consistent with general market perception (Nike, as an international first-tier brand, usually has stronger premium pricing power).

Figure 2: Ridge trace- sales amount

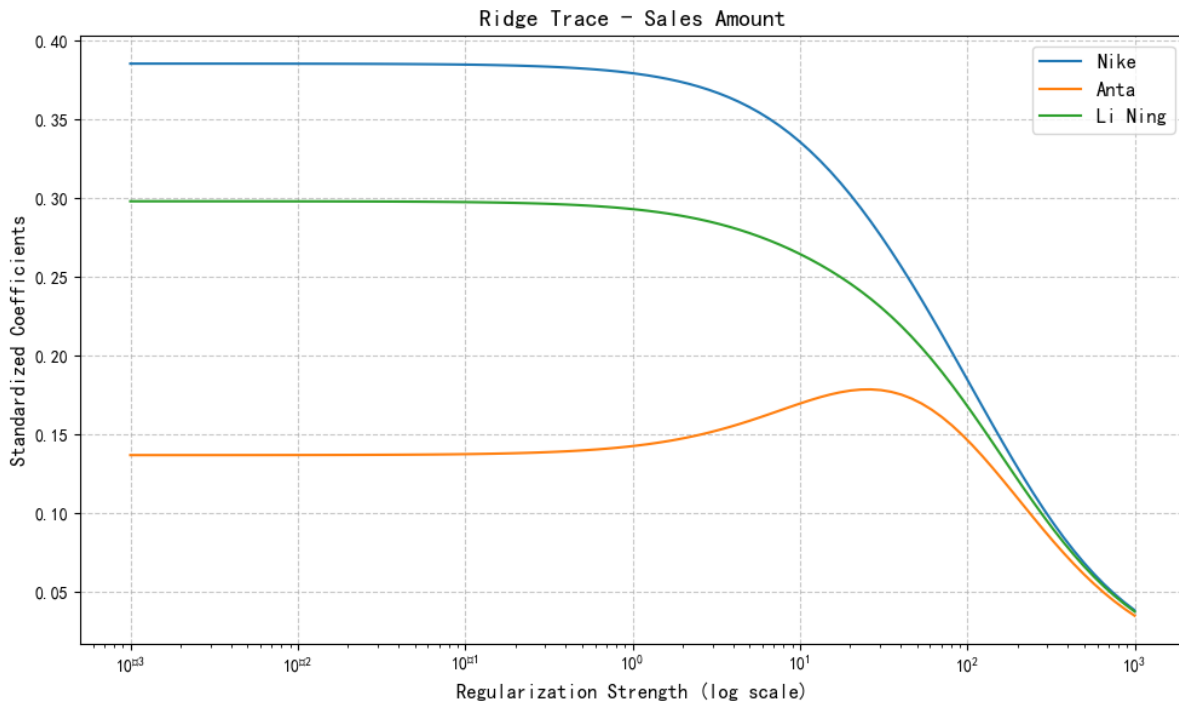


Table 5: Summary of Ridge Regression Results

| Analysis Type       | Nike Coefficient | Anta Coefficient | Li-Ning Coefficient | R <sup>2</sup> Score |
|---------------------|------------------|------------------|---------------------|----------------------|
| Sales Revenue Model | 0.385441         | 0.137008         | 0.298094            | 0.541119             |
| Sales Volume Model  | 0.371907         | 0.094254         | 0.162468            | 0.30225              |

In terms of market share, according to Statista data from 2023, Nike holds approximately 18% of the global sports footwear and apparel market, significantly surpassing Anta (around 3%) and Li-Ning (around 2%)

From the perspective of consumer psychology, according to the “China Sports Consumption Trend Report” (2023), 60% of Chinese consumers consider Nike as their preferred “high-end sports brand”, while Anta and Li-Ning are seen as “cost-effective” choices.

Based on the above analysis and regression analysis, it can be concluded that Nike, as a leading brand in sportswear, has a strong correlation with the JD.com platform, and the scale expansion of the JD.com platform is closely related to Nike's brand premium.

#### 4. Conclusion

In e-commerce platforms, platform scale has an amplifying effect on brand influence, and there is a high correlation between platform scale and brand premium. For e-commerce platform operators, how to reasonably amplify brand advantages in platform scale, promote brand premium, and increase platform sales and sales volume requires advanced risk assessment of the brand. Brands should control their social discourse and, on the scale of e-commerce platforms, amplify their brand advantages, which is conducive to their brand premium.

The brand premium of high-end or top brands is more closely related to the expansion of platform scale. This provides insights for platform operators on how to increase the sales of top brands during platform scale expansion and also offers relevant ideas for the development of ordinary brands. For example, when facing high-end and ordinary brands, a certain proportion of traffic delivery or promotion can be increased for ordinary brands to boost their sales volume and sales revenue on the platform, thereby increasing the platform's sales volume and sales revenue, promoting further progress in the platform's economies of scale, and forming a mutually reinforcing cycle between the platform and brands. This article only selects data on brand sales revenue and sales volume on the platform, with relatively simple variables. For future research, it is recommended to supplement consumer research to verify the psychological mechanism of premium pricing.

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## Conflicts of Interest

The authors declare no conflict of interest.

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