

Price Surge Prediction for Football Star Signature Edition Football Boots

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Abstract: Multiple Linear Regression model is a preferred method for dealing with prediction problems. It can be used to analyze how a series of factors affect another factor. It is widely used because of its practicality and scientificity. This study aims to explore the phenomenon of football star's sneakers premium. First, the current popularity of electronic consumption and the effect of brand building on consumer goods are introduced. Then, the factors affecting the signature football shoes of football stars are found, namely, the six dimensions of star achievement, star value, star popularity, fan stickiness, team situation and sneaker market potential, and the impact of each factor on the average spillover price of sneakers is quantitatively analyzed. The data are processed by multivariate linear regression model. The results show that the personal brand value of stars (including achievements, value, popularity and fan stickiness) and the market potential of sneakers are the main factors affecting the premium; the team situation also has a positive impact, but it is relatively small. The study reveals the important role of star personal charm and market operation in the formation of sneaker premium, and points out that future research can further examine the impact of co-branded sneakers and different sizes. The research results are of great significance to the optimization of marketing strategies, the formulation of price strategies, supply chain management and consumer behavior analysis, which will help brands to formulate marketing plans and pricing strategies more accurately, optimize supply chain processes, and deeply understand consumer needs, so as to promote the healthy development and innovation of the sporting goods industry.

Keywords: Football Star; Fitting Model;

Premium; Brand Marketing

1. Introduction

1.1 Research Background

Against the backdrop of global economic integration and rapid technological development, competition in the global consumer goods market is becoming increasingly fierce. In recent years, in particular, the rise of Internet technology and social media platforms has greatly changed consumers' shopping habits, and the trend of personalized and experiential consumption has become increasingly evident. In this environment, brands not only need to maintain product competitiveness, but also must use innovative marketing strategies to attract consumers, especially the younger generation [1]. This change requires companies to constantly adapt to market demand and explore new growth points.

Among many consumer goods industries, the sports equipment sector has attracted much attention due to its high brand loyalty and unique cultural attributes. Among them, the sports shoe market, especially various types of sneakers, is particularly prominent. As young consumers gradually become the mainstream of the market, their choice of sports shoes is no longer limited to functionality and performance, but they pay more attention to their use as a carrier of personal expression and cultural identity [2]. For example, the co-branded trendy toy series launched by Pop Mart in cooperation with many well-known brands, as well as the personalized products launched by brands such as Miniso, are all enthusiastically sought after by young consumers. This shows that in the current market environment, emotional value and cultural connotation have become an important driving force for consumer behavior [3].

In the soccer shoe market, soccer stars are one

of the core influential groups in this field. Their personal achievements, image characteristics and other factors have a significant impact on the market performance of related products. The cooperation model between brands and sports stars has become an important way to shape IP (intellectual property). By launching signature products, it can not only enhance the market competitiveness of the brand, but also deepen consumers' understanding of the brand [4]. For example, after a star achieves outstanding results in a game, his signature soccer shoes are often hotly sought after by the market, and the price rises accordingly. Although this phenomenon has attracted widespread attention, there is still a lack of sufficient quantitative research to reveal the driving mechanism behind it.

Based on the above background, this study aims to explore the phenomenon of football star premium and its influencing factors. Specifically, we will systematically sort out the market performance of football star signature shoes, try to reveal the key variables that affect the star premium, and explore how to use these findings to provide brands with more targeted and practical marketing strategy suggestions. This will not only help deepen theoretical research, but also provide a scientific basis for practical application.

1.2 Research Purpose and Significance

1.2.1 Research Purpose

(1) What is the essence of the star premium phenomenon? Clarify the performance characteristics of star signature football shoes in the market, including price changes, sales volume changes, etc.

(2) What factors affect the star premium? Analyze how factors such as the personal achievements, image characteristics, and social media influence of football stars affect the price and sales of signature football shoes.

(3) What is the specific driving mechanism of the star premium? How can brands use the star effect to improve their market competitiveness? Propose brand marketing strategies based on the star effect, including optimization plans in terms of product design, promotion methods, target consumer positioning, etc.

1.2.2 Research significance

Most existing studies focus on brand

marketing, fan economy and consumer goods, but have not touched upon the brand premium of sports stars. This study can fill the gap in the existing literature on the phenomenon of star premium and explore in depth the influencing factors and driving mechanisms behind it. Through a systematic analysis of the star premium phenomenon, it can provide new perspectives and methods for academic research in related fields.

This topic can provide targeted and practical marketing strategy suggestions for brands, helping them to better utilize the star effect to enhance their market competitiveness. It can also guide companies to make more scientific and reasonable decisions in product development, marketing and promotion, and improve market response speed and effectiveness.

1.2.3 Research Methods

Literature Analysis

By systematically collecting, organizing and analyzing existing research results, we can understand the current status and development trend of the star premium phenomenon and provide a theoretical basis and support for this study. The author mainly uses major academic databases at home and abroad, such as Web of Science, CNKI, Wanfang Data, etc., to search for literature related to the star premium phenomenon, and conduct literature screening, reading and analysis.

Multiple linear regression analysis

Through quantitative analysis methods, the key factors affecting the star premium phenomenon and their interrelationships are explored to verify the hypothesis and draw conclusions. Based on the results of literature analysis, the independent and dependent variables are determined. Then a multiple linear regression model is established, assuming that there is a linear relationship between the dependent and independent variables.

The model is usually in the form of:

$$Y = \beta_1 \cdot x_1 + \beta_2 \cdot x_2 + \beta_3 \cdot x_3 + \dots + \beta_n \cdot x_n + e$$

Y is the dependent variable, x_1, \dots, x_n are the independent variables, β_1, \dots, β_n is the variable coefficient, and e is the random error term.

2. Problem Analysis

The goal of this model is to make a more reliable prediction of the premium ability of

football shoes based on multiple linear regression. The factors affecting the premium ability of football shoes are very complicated. The correlation between each factor and the problem to varying degrees is difficult to be accurately converted, and some factors are difficult to digitize. The mind map established is shown in Figure 1 below.



Figure 1. Modeling Mind Map.

2.1 Independent variables

When studying and predicting the premium of football star shoes, this topic needs to comprehensively consider multiple dimensions such as the star's personal charm, market influence, and the attractiveness of the product itself. The independent variable

Table 1. Golden Globe Award Scoring Method.

Ranking	Points	Ranking	Points
champion	+ 3 0	2nd, 3rd, 4th place	+ 2 0

Table 2. League and Champions League Scoring Method.

Scoring method	League	Champions League
champion	+10	+20
runner up	+7.5	+15
3rd place	+5	+10

2.1.2 Stars' Worth

The value of a star player reflects his or her commercial value. Stars with higher values usually have greater commercial influence and may be able to drive higher sneaker premiums [6]. This study uses the star player ' s transfer fee and annual contract salary as the measurement.

$$Star\ value = Transfer\ fee + Annual\ Salary$$

2.1.3 Popularity of Stars

The popularity of a star can reflect the star's popularity in the domestic market, which directly affects the sales potential of the product. The higher the popularity of a star, the greater his influence in the market, which usually leads to a higher premium for sneakers. The popularity calculation formula counts the number of posts and comments

design is as follows.

2.1.1 Star Achievements

A star's achievements reflect his or her professional level and historical performance. Generally speaking, the higher a star's achievements are, the higher his or her personal brand value is, which may lead to a higher premium for his or her shoes [5]. A star's achievements are difficult to quantify. This topic considers the Ballon d'Or, the number of goals scored in a season, and the number of assists as quantitative indicators. The specific scoring method is as follows in table 1 and table 2.

- ① The top four players in the Golden Globe Award competition will be awarded +20 points. If the star player wins the championship, he will be awarded +10 points;
- ② The top three in terms of goals and assists in a season will be awarded +10, +7.5, and +5 points respectively;
- ③ The top three players in terms of goals and assists in the Champions League in a season will be awarded +20, +15 and +10 points respectively.

related to the star on the online platforms Weibo and Dongqiudi. The Weibo platform has a wide audience, which represents the breadth of communication. Dongqiudi, as a professional football platform, has a high degree of authority and influence among the fan group, representing a certain professional threshold in the football circle. Therefore, when calculating the stickiness of star fans, Weibo and Dongqiudi are selected as data sources.

$$Heat = Number\ of\ topics * Average\ Number\ of\ posts$$

2.1.4 Stickiness of Star Fans

The fan stickiness of a star is defined as the fans ' willingness to continue to follow the star's dynamics and actively participate in the interaction, as well as the extent to which they

are willing to pay for the star's peripheral products [3]. It reflects the fans' support and loyalty to the star. High fan stickiness means that the fans are more loyal and supportive, which helps to increase the premium of the shoes. Statistics on the sales of star jerseys in a season.

2.1.5 Team situation

The team situation reflects the overall strength and supporter base of the star's team, which will also affect the fans' interest in the products they endorse. The more influential the team is, the more exposure the star will have, which may bring a higher premium for the shoes. The specific scoring method is as follows.

- ① The top three in terms of goals and assists in a season will be awarded +10, +7.5, and +5 points respectively;
- ② The top three players in terms of goals and assists in the Champions League in a season will be awarded +20, +15 and +10 points respectively.

Table 3. League and Champions League Scoring Method.

Scoring method	League	Champions League
champion	+10	+20
runner up	+7.5	+15
3rd place	+5	+10

2.1.6 Market Potential

The initial sales volume of sneakers after their release is the most direct indicator of market reaction, comprehensively reflecting the fans' recognition of the design, quality and value of the sneakers [2]. Good sales volume indicates that consumers have a high degree of recognition of the sneakers, which is expected to bring a higher premium. The quantitative method is to count the sales volume within one week after the sneakers are released.

2.2 Dependent Variable

Premium price of football shoes: refers to the difference between the actual selling price of football star endorsed shoes and the standard retail price, that is, the premium part.

Table 4. Variables and their definitions.

variable	definition
Star achievements	The star's professional level and historical performance/points
Star Value	Commercial value of star players/yuan

Star popularity	Number of posts by stars on the Internet platform
Fan stickiness	Sales of star jerseys in a season /yuan
Team situation	The overall strength and support base of the star player's team /points
Sneaker market potential	the number of pairs sold within one week after the release of the sneakers
Sneakers overflow price	The average selling price of sneakers after they are launched that exceeds the official price /yuan

3 Modeling and Analysis

3.1 Data Collection and Preprocessing

3.1.1 Data Collection

In order to reduce the error impact of extreme values in the dependent variable on the model, this project collected some complete data on football stars and football shoes from 2022 to 2024, removed missing values, and finally collected 1,000 valid samples.

3.1.2 Dimension removal

After quantifying all indicators, individual data with missing values or outliers were removed and the dimensions were removed [7], and a total of 1000 valid data were obtained.

$$\tilde{X}_i = \frac{X_i - X_{\min}}{X_{\max} - X_{\min}}$$

Among them, X_i is the i -th variable, \tilde{X}_i and is the i -th variable after dimension removal.

3.2 Multiple Linear Regression Model

After quantifying the model variables, determining the explanatory variables, and selecting the regression model, it was found that the multiple linear regression model was the most appropriate. Combined with the above analysis of specific factors, this paper sets the multiple linear regression model as follows [8].

$$Y = \beta_1 \cdot x_1 + \beta_2 \cdot x_2 + \beta_3 \cdot x_3 + \beta_4 \cdot x_4 + \beta_5 \cdot x_5 + \beta_6 \cdot x_6 + e$$

Among them, Y represents the overflow price of sneakers, x_1 represents the star's achievements, x_2 represents the star's worth, x_3 represents the star's popularity, x_4 represents the fan stickiness, x_5 represents the team situation, x_6 represents the market potential of sneakers, and e is a random error

term.

After establishing the regression equation, the multivariate linear regression model was fitted in Python, and the collected data was divided into a training set and a test set, with the training set accounting for 80% (800 items) and the test set accounting for 20% (200 items). The results are shown in Table 5 below.

Table 5. Errors of Training Set and Test Set.

Dataset	Average Percent Error
Training set	0.057762
Test Set	0.061833

As shown in Table 1, the average percentage error of the multiple regression model on the training set data is 0.05%. The model has a good fitting effect on the training set and there is no underfitting problem; while the model has a good fit on the test set data. The average percentage error is 0.06%. There is not much difference between the training set and the test set, so there is no overfitting problem. After testing, the regression equation and regression coefficient of the regression model are significant and statistically significant, and the fitting effect is good.

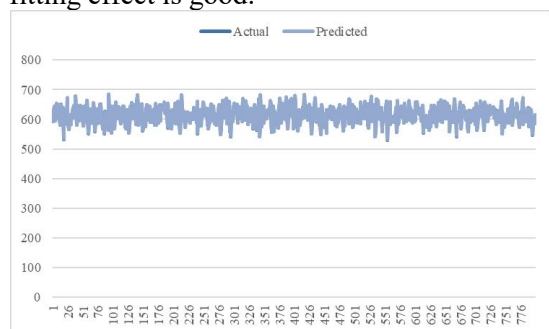


Figure 2. Actual Values and Predicted Values of the Training Set.

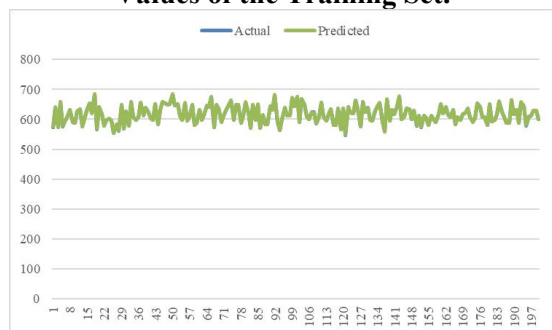


Figure 3. Comparison of Actual Values and Predicted Values in the Test Set.

The regression coefficients of the independent variables are shown in Figure 2. When other conditions remain unchanged, for every unit

increase in the star's achievements, the average spillover price of the shoes is expected to increase by 0.331243 yuan; for every unit increase in the star's market value, the average spillover price of the shoes is expected to increase by 0.567888 yuan; for every unit increase in the star's popularity, the average spillover price of the shoes is expected to increase by 0.472734 yuan; for every unit increase in the stickiness of the star's fans, the average spillover price of the shoes increases by 0.472878 yuan; for every unit increase in the team's situation, the average spillover price of the shoes is expected to increase slightly by 0.095049 yuan; for every unit increase in the market potential of the shoes, the average spillover price of the shoes is expected to increase by 0.330703 yuan.

Table 6. Regression Coefficient.

Feature	Coefficient
Star achievements	0.331243
Net worth	0.567888
heat	0.472734
fan stickiness	0.472878
Team situation	0.095049
market potential	0.330703

Therefore, star achievements, worth, popularity and fan stickiness have a significant positive impact on the average spillover price of sneakers, indicating that the player's personal brand value is an important factor in promoting sneaker premiums; the market potential of sneakers also has an impact on the average spillover price of sneakers. The significant positive contribution shows that other market factors such as the unique design of sneakers and limited editions can effectively increase the value of sneakers; the coefficient of the team's historical situation is relatively small, which means that although the performance of the team it belongs to will also affect the average value of sneakers spillover price, but its effect is not as obvious as other variables.[9]

3.3 Model Summary and Optimization

This study aims to explore the impact of star personal factors and related market factors on the average spillover price of sneakers. The independent variables are: star achievements, star value, star popularity, fan stickiness, team situation, and sneaker market potential. This

study found that the personal brand value of football stars (including achievements, worth, popularity, fan stickiness) is the key factor that drives the premium of sneakers. In addition, the uniqueness and scarcity of the sneaker market can also significantly increase the average spillover price of sneakers.

3.3.1 Model advantages

(1) Compared with single linear regression, the advantage of using multiple linear regression is that it can use more independent variables for prediction. The optimal combination of multiple independent variables can reflect the real situation more comprehensively and capture complex relationships more accurately than the method of a single independent variable.

(2) This model is highly reusable and will not face failure problems in the short term.

(3) The algorithm used in this model is intuitive, fast and easy to understand.[10]

3.3.2 Model Disadvantages

(1) There are many factors that affect the dependent variable, and the premium of football shoes may be affected by some random factors in real situations, which is not fully considered;

(2) The relationship between some independent variables and predictor variables in this topic may not be linear, and it is impossible to transform the problem into a problem that can be handled by linear regression by processing the data;

(3) Some of the selected independent variables may be correlated with each other, resulting in an additive impact on the problem. Methods such as introducing cross terms were not used to make the fitting model more accurate.

3.3.3 Limitations of the study

Although this study reveals the relationship between factors such as star achievements, net worth, popularity, fan stickiness, team conditions, and market potential and the average spillover price of sneakers, it still has certain limitations in methodology and data processing.

(1) The current study mainly focuses on sneakers endorsed by a single star. In the future, we can consider including co-branded sneakers in the research scope. Co-branded sneakers usually have higher market attention and collection value, and their pricing logic may be different from that of ordinary

sneakers.

(2) There may be differences in the demand and supply of sneakers of different sizes in the market, which in turn affects their prices. Future research can explore the specific impact of size on the spillover price of sneakers.[11]

4. Conclusions

This study first determined the independent variables and dependent variables. The independent variables were: star achievements, star value, star popularity, fan stickiness, team situation, and sneaker market potential. The dependent variable was the average spillover price of sneakers. Then, factors such as star achievements, value, popularity, fan stickiness, team situation, and market potential were quantified. Then, the data was dimensionless and the impact on the average spillover price of sneakers was revealed by constructing a multivariate linear regression model. The results showed that the brand value of individual stars (including achievements, value, popularity, and fan stickiness) and the market potential of sneakers were the main factors affecting the average spillover price of sneakers. In addition, although the team situation had a positive impact, its effect was relatively weak.

At the same time, this topic also points out the limitations of the current research. In order to further improve the explanatory power and predictive ability of the model, future research can consider expanding to the impact of co-branded sneakers and different sizes.

The research and application of this topic are extensive, especially in the fields of marketing strategy optimization, pricing strategy formulation, supply chain management optimization and consumer behavior research. In terms of marketing, brands can adjust their marketing strategies based on the research results, launch limited edition sneakers for high-achieving stars, or use social media platforms to increase the exposure of stars and sneakers. By accurately positioning the target consumer groups, products and services that meet market demand can be developed to improve consumer satisfaction and brand loyalty. In terms of pricing strategy formulation, brands can set the initial pricing of sneakers more scientifically based on the findings of this study, and use market

feedback to dynamically adjust pricing strategies to maximize profits. In terms of supply chain management, differentiated supply chain management strategies can be formulated for different types of sneakers to ensure timely supply of products, meet market demand and reduce inventory costs. At the same time, strengthen cooperation with retailers to jointly explore effective inventory management solutions and reduce the risk of unsalable products. In terms of consumer behavior research, further study the psychological factors and social influences in the consumer purchase decision-making process to help brands better understand consumer needs. Conduct consumer satisfaction surveys, collect feedback, and continuously improve product and service quality.

In short, through the application and deepening of existing research results, not only can we bring more refined market operation strategies to the sneaker industry, but we can also promote the innovative development of the entire sporting goods industry and push related industries in a healthier and more sustainable direction.

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