Evaluating Market Disparities: A Comparative Study of the NBA and WNBA Ecosystems

Kaiwen Tao[1,*],

Tangjun Wang[2],

KaiShun (Jenkins) Chen[3]

[1]*High School Affiliated To Nanjing Normal University, Nanjing, 210003, China, KevinTao0506@gmail.com*
[2]*Suzhou North America High School, Suzhou, 215104, China, th817918@qq.com*
[3]*Tilton School,30 school street, Tilton, NH 03276, United States of America, jenkinschen64@gmail.com*

Abstract:

There is a significant difference in market value between the National Basketball Association (NBA) and the Women's National Basketball Association (WNBA), which is reflected in financial revenue and fan engagement. First of all, the NBA has higher revenue compared to the WNBA, and second, in the opinion of many, men's professional sports receive more attention and investment than women's professional sports, which gives the NBA a larger fan base. The study aimed to identify the key factors that contribute to these differences. This study used secondary data analysis to obtain data from well-known online databases. The results point out that the market position and market value of WNBA should be improved in many ways, and the gap between NBA and WNBA players should be narrowed. This study hopes to provide a reference for follow-up research and practical intervention.

Keywords: Market Disparities, NBA, WNBA.

1. Introduction

The market value of NBA players is expected to be significantly higher than WNBA players due to various factors. One major factor is the difference in players' salaries and team incomes. The NBA has a much larger revenue compared to the WNBA, which allows it to offer higher salaries and attract top talent. Another important factor is the existing stereotypes that affect basketball fans. In many peoples' eyes, men's pro sports have got much more attention and investment than women's pro sports, leading to a larger fan base for NBA [1,2]. This increased popularity directly turns into higher market value for not only the league but also the players. The NBA benefits from extensive media contracts, lucrative sponsorship deals and a strong global fan base; all of these factors increase the market value of not only the league but also the players. In comparison, while the WNBA is growing in popularity, it is still difficult to get equal media exposure and sponsorship investment. So it seems that through getting more media exposure and sponsorship investments, increasing the fan base of the league, the increasing of the market value of the WNBA can be accomplished. Using specific strategies to improve the market value of the WNBA can help achieve financial fairness and gender equality in pro basketball leagues.

The study focuses on evaluating the differences in market value of the National Basketball Association (NBA) and the Women's National Basketball Asso-

ciation (WNBA). Although both of the two leagues are showing the top talent and bringing us high-quality entertainment at the same time. The NBA is clearly better than the WNBA from the perspectives of financial success and fan engagement. By analyzing the players' performance and their salary and the number of fans online. The study aims to find the critical effects that contribute to the differences. Previous research points out the existence of differences between the two leagues in salary, sponsorships and media coverage. The inner factors that affect the gaps between them still need to be analyzed.

2. Methods

2.1 . Data Collection

To comprehensively evaluate the market disparities between the NBA and WNBA, this study employs secondary data analyses, sourcing data from reputable online databases, including Kaggle.com, Basketballreference.com, Stats.NBA.com, and Stats.WNBA.com. These sources provide extensive datasets on various performance and economic metrics for both leagues.

2.1.1 . Primary Data Collection or Secondary Data Analyses

This study utilizes secondary data analyses due to the availability of extensive historical data on both the NBA and WNBA.

2.1.2 . Data Sources

Kaggle.com: A platform hosting datasets contributed by users, including sports statistics and economic data.
Basketballreference.com: A comprehensive database offering detailed statistics on basketball leagues, teams, and players, including financial and performance metrics.
Stats.NBA.com and Stats.WNBA.com: Official statistical databases for the NBA and WNBA, providing in-depth data on player and team performance, game logs, play-by-play data, shot charts, and advanced analytics.

2.1.3 . Key Performance Indicators (KPIs)

Performance Metrics: Player and team statistics, including points, assists, rebounds, shooting percentages, and advanced metrics.
Fans Metrics: Attendance figures, social media engagement (followers, likes, shares), and television ratings.
Salary Metrics: Player salaries, average team salary.

2.2 . Statistical Analyses

To analyze the collected data and test the study's hypotheses, the following statistical techniques are employed:

2.2.1 . Regression Analyses

Separate regression analyses are conducted for the NBA and WNBA to examine the relationships between:
Performance to Fans: Assessing how player and team performance metrics influence fan engagement and attendance.
Fans to Salary: Evaluating the impact of fan engagement on player salaries.
Performance to Salary: Analyzing how performance metrics affect player salaries.

2.2.2 . T-Test Analysis

Independent t-tests were performed to compare the means of market values between high and low market value groups within each league (NBA and WNBA).
The null hypothesis (H0) for each test stated that there is no significant difference in market values between high and low-market-value groups.
The alternative hypothesis (H1) stated that there is a significant difference in market values between high and low market value groups.

2.2.3 . Market Value Calculation

The market value for each league is calculated by creating a composite score that integrates performance, salary, and fan engagement metrics. The formula for the market value is as follows:
Market Value = (w1 * Performance) + (w2 * Salary) + (w3 * Fans)
where w1, w2, and w3 are the weights assigned to each metric based on their relative importance. The weights are determined through preliminary analysis and literature review.

2.2.4 . Correlations

Pearson correlation coefficients are computed to assess the strength and direction of relationships between different KPIs, such as the relationship between media coverage and revenue.

2.3 . Inferential Statistics

ANOVA (Analysis of Variance): Used to compare the mean differences between multiple groups (e.g., different teams or seasons within the NBA and WNBA) to determine if any statistically significant differences exist.
This methodological approach ensures a rigorous analysis of market disparities, leveraging robust statistical techniques to derive meaningful insights. By employing secondary data from established sources and utilizing comprehensive statistical analyses, this study aims to provide a detailed and accurate comparison of the NBA and WNBA ecosystems.

3. Results

3.1 . Correlation Analysis

The correlation analysis was conducted to explore the relationships between performance, fans, and salary within both the NBA and WNBA. Pearson correlation coefficients were calculated to measure the strength and direction of the linear relationships between the variables. The results are presented in the following correlation matrices (Table 1).

Table 1. Pearson correlation coefficient calculation results

WNBA			
	FANS	SALARY	PERFORMANCE
FANS	1		
SALARY	0.41252281	1	
PERFORMANCE	0.49441084	0.96398827	1
NBA			
	FANS	SALARY	PERFORMANCE
FANS	1		
SALARY	0.13760469	1	
PERFORMANCE	0.16575816	0.95841122	1

3.2 . Interpretation of Results

3.2.1 . WNBA Analysis

· Performance and Fans: There is a moderate positive correlation (r = 0.4944), indicating that better performance is associated with a larger fan base.
· Performance and Salary: The correlation between performance and salary is very strong (r = 0.9640), suggesting that players' salaries in the WNBA are highly dependent on their performance.
· Fans and Salary: There is a moderate positive correlation (r = 0.4125), indicating that players with a larger fan base tend to earn higher salaries.

3.2.2 . NBA Analysis

· Performance and Fans: The correlation is weak (r = 0.1658), suggesting that performance does not have a strong direct influence on the number of fans.
· Performance and Salary: There is a very strong positive correlation (r = 0.9584), indicating that players' salaries in the NBA are highly dependent on their performance.

· Fans and Salary: The correlation is very weak (r = 0.1376), suggesting that the size of a player's fan base has little to no direct impact on their salary.

3.2.3 . Defining Market Value:

Market value for each player was calculated as a weighted average of their performance, salary, and fan base metrics.

3.2.4 . Categorization:

The 75th percentile threshold was determined separately for the NBA and WNBA.
Players were categorized into two groups:
High Market Value: Players whose market value is above the 75th percentile.
Low Market Value: Players whose market value is below the 75th percentile.

3.3 . Market Value T-Test Results

3.3.1 . High Market Value Group

3.3.1 .1. NBA vs WNBA

Table 2. T-test results for high-market value groups

	nba	*wnba*
Mean	26753306.6	237083.863
Variance	2.57706E+14	18646304096
Observations	9	9
Hypothesized Mean Difference	0	

df	8	
t Stat	4.955128222	
P(T<=t) one-tail	0.000556844	
t Critical one-tail	1.859548038	
P(T<=t) two-tail	0.001113687	
t Critical two-tail	2.306004135	

3.3.1 .2. Interpretation for High Market Value Group

As Table 2 shows, since the p-values (both one-tail and two-tail) are less than 0.05, we reject the null hypothesis. This indicates a significant difference in market values between the NBA and WNBA high market value groups.

The high market value players in the NBA have a significantly higher market value compared to their WNBA counterparts.

3.3.2 . Low Market Value Group

3.3.2 .1. NBA vs WNBA

Table 3. T-test results for low high market value groups

	nba	wnba
Mean	13319719.9	118431.2808
Variance	3.54931E+12	8542142864
Observations	26	26
Hypothesized Mean Difference	0	
df	25	
t Stat	35.68691912	
P(T<=t) one-tail	2.86745E-23	
t Critical one-tail	1.708140761	
P(T<=t) two-tail	5.73489E-23	
t Critical two-tail	2.059538553	

3.3.2 .2. Interpretation for Low Market Value Group

As Table 3 shows, the extremely low p-values (both one-tail and two-tail) indicate a highly significant difference between the NBA and WNBA low market value groups. The NBA players in the low market value category have a significantly higher market value compared to their WNBA counterparts.

3.4 . Summary

The t-test results show significant differences in market values between high and low market value groups in both the NBA and WNBA. Specifically:
· High Market Value: NBA players have a significantly higher market value than WNBA players.
· Low Market Value: NBA players also have a significantly higher market value compared to WNBA players.

3.4.1 . WNBA Regression Analysis
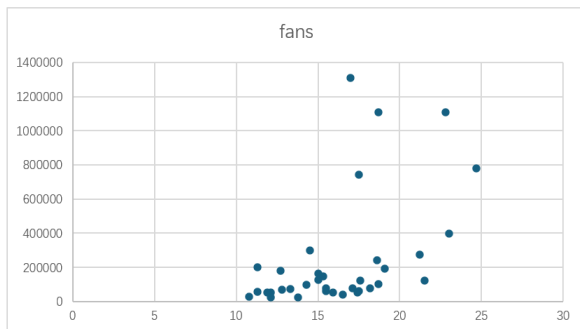
3.4.1 .1. Performance to Fans

· Multiple R: 0.4944

· R Square: 0.2444
· Adjusted R Square: 0.2215
· Standard Error: 298,333.53
· Observations: 35
· ANOVA:
o df: 1 (regression) + 33 (residual) = 34 (total)
o F: 10.68
o Significance F: 0.0025
· P-value
o Intercept: 0.037517787
o X Variable 1 (Fans): 0.002536525
· Coefficients:
o Intercept: -518,271.92
o X Variable 1 (Performance): 46,879.90
Interpretation: The moderate positive relationship indicates that better team performance moderately increases fan engagement, explaining about 24.44% of the variance in fan engagement [3]. Figure 1 is the graphical representation of WNBA's performance to fans.

Figure 1. Graphical Representation of WNBA's Performance to Fans

3.4.1 .2. Performance to Salary

· Multiple R: 0.9575
· R Square: 0.9169
· Adjusted R Square: 0.9144
· Standard Error: 6,253.29
· Observations: 35
· ANOVA:
o F: 364.34
o Significance F: 2.12e-19
· P-value
o Intercept: 0.037517787
o X Variable 1 (Fans): 0.002536525
· Coefficients:
o Intercept: 109,968.94
o X Variable 1 (Performance): 5,740.28

Interpretation: There is a very strong positive relationship between performance and salary, with performance explaining about 91.69% of the variance in salaries [3]. Figure 2 is the graphical representation of WNBA's performance to Salary.
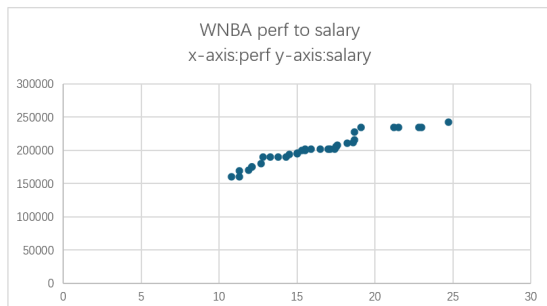

Figure 2. Graphical Representation of WNBA's Performance to Salary

3.1.4 .3. Fans to Salary

· Multiple R: 0.4377
· R Square: 0.1916
· Adjusted R Square: 0.1671
· Standard Error: 19,509.95
· Observations: 35

· ANOVA:
o F: 7.82
o Significance F: 0.0086
· P-value
o Intercept: 2.965233e-21
o X Variable 1 (Fans): 2.12075e-19
· Coefficients:
o Intercept: 196,694.21
o X Variable 1 (Fans): 0.0277

Interpretation: The moderate positive relationship suggests that increased fan engagement leads to higher player salaries, but this relationship is weaker than the performance-to-salary relationship [3]. Figure 3 is the graphical representation of WNBA's fans to salary
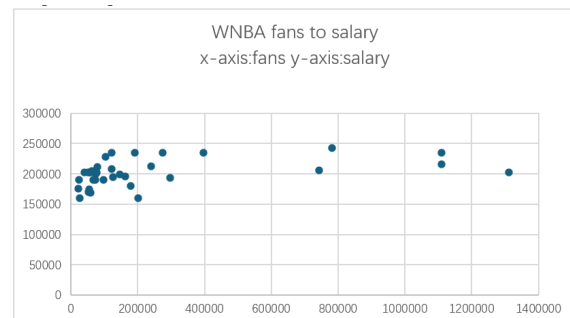

Figure 3. Graphical Representation of WNBA's Fans to Salary

3.1.5 . NBA Regression Analysis

3.1.5 .1. Performance to Salary

· Multiple R: 0.9585
· R Square: 0.9187
· Adjusted R Square: 0.9162
· Standard Error: 1.54
· Observations: 35
· ANOVA:
o F: 372.76
o Significance F: 1.50e-19
· P-value
o Intercept: 0.988667076
o X Variable 1 (Fans): 1.49884e-19
· Coefficients:
o Intercept: 0.03
o X Variable 1 (Performance): 1.6418

Interpretation: The very strong positive relationship indicates that performance is highly predictive of player salaries, with performance explaining about 91.87% of the variance in salaries [4]. Figure 4 is the graphical representation of NBA's performance to salary
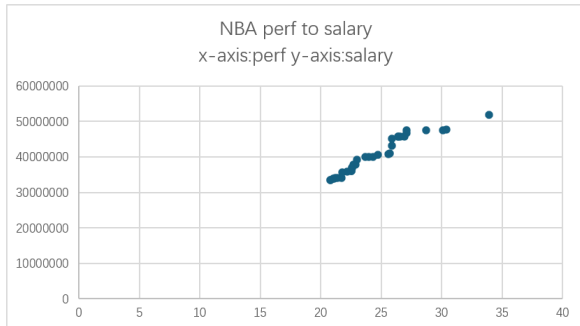
Figure 4. Graphical representation of NBA's performance to salary

Figure 5. Graphical representation of NBA's fans to salary

3.1.5 .2. Fans to Salary

· Multiple R: 0.1376
· R Square: 0.0189
· Adjusted R Square: -0.0108
· Standard Error: 5.37
· Observations: 35
· ANOVA:
o F: 0.64
o Significance F: 0.43
· P-value
o Intercept: 6.66467e-30
o X Variable 1 (Fans):0.430470859
· Coefficients:
o Intercept: 39.94
o X Variable 1 (Fans): 0.00000002786

Interpretation: The very weak positive relationship suggests that fan engagement has a negligible impact on player salaries in the NBA, with only 1.89% of the variance in salaries explained by fan engagement [4]. Figure 5 is the graphical representation of NBA's fans to salary.
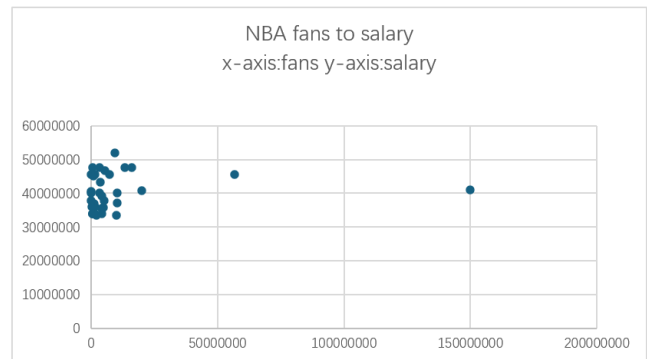
3.1.5 .3. Performance to Fans

· Multiple R: 0.1658
· R Square: 0.0275
· Adjusted R Square: -0.00199
· Standard Error: 26,382,499.79
· Observations: 35
· ANOVA:
o F: 0.93
o Significance F: 0.341
· P-value
o Intercept: 0.50374547
o X Variable 1 (Fans): 0.341284921
· Coefficients:
o Intercept: -24,220,024.80
o X Variable 1 (Performance): 1,402,337.89

Interpretation: The weak positive relationship implies that team performance has a minor effect on fan engagement in the NBA, explaining only 2.75% of the variance in fan engagement [4]. Figure 6 is the graphical representation of NBA's performance to fans
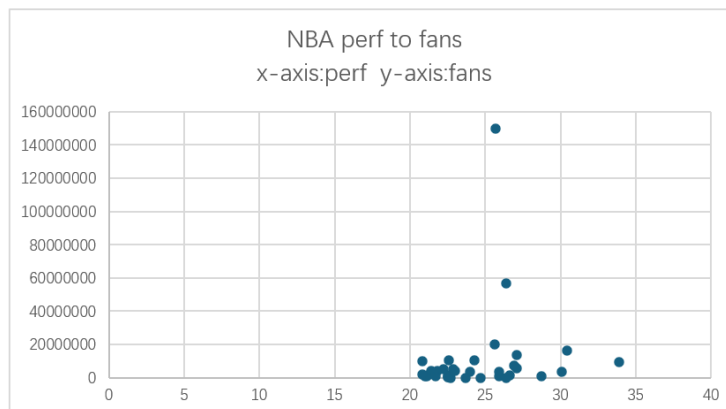

Figure 6. Graphical representation of NBA's performance to fans

4. Discussion

The similarity of our study to existing literature lies in the discussion of elements that contribute to the salary gap between WNBA and NBA athletes. For instance, some dissertations introduced the salary gaps related to the stats of WNBA and NBA athletes, as well as the ecosystem structures of the two leagues. The salary gap is a significant aspect of this study since salaries can directly distinguish NBA and WNBA athletes' market positions in American society, and performance was a variable that affects the variation of players' salaries in the WNBA and NBA [5,6]. Instead of a simple salary relationship between the WNBA and NBA, this study assigned different weights to the components of market value. For example, fans on Instagram account for 30%, player performance in the WNBA and NBA account for 35%, and player salaries in these two leagues correspond to the percentage of performance. Moreover, six regressions were conducted to explore the connections between these categories to determine what influences market power between the WNBA and NBA in the industry as a whole. Additionally, four quartile groups were established based on the score ranking of the two leagues so that the market values of players in the NBA and WNBA could be classified into different quartile groups.

The implication of this research is to identify key factors such as revenue, fans on Instagram, and performances to understand why these differences exist and how the WNBA can improve its market position. Fair competition circumstances are beneficial for both female and male basketball players. If the gap in market value between the NBA and WNBA is expected to narrow in the future, more females may likely pursue professional basketball careers. Consequently, the market shares of both the NBA and WNBA will likely increase.

Regarding the limitations of this study, it did not comprehensively illustrate the market. The data in this study did not include the financial contributions from various sports brands, the sales of players' jerseys, and ticket sales in the NBA and WNBA. Furthermore, this study overlooked the varying intensity of different leagues. It is unfair to compare the statistics of male athletes in the NBA with those of female athletes in the WNBA since they use different types of basketballs, and athletes of different genders possess distinct physical talents. During the study process, player performance was only considered in terms of their scoring ability, neglecting the classification of athletes' characteristics. For example, some players focus on scoring, while others specialize in defending, blocking, and rebounding. Team managers need to allocate budgets wisely, considering not only scoring ability but also defen-

sive skills, which are crucial for team success. Additionally, there is a strong correlation between performance and salary, whereas the correlation between fans and salary is weak, showing no apparent difference in this study [7].

The basketball market is one of the most influential industries globally, with boosting the market values of the WNBA being the primary objective. The developmental pattern of the WNBA can potentially be replicated in other women's sports leagues, thereby enhancing the global market for female sports.

5. Conclusion

This study conducted several different analyzes of the market differences between the National Basketball Association (NBA) and the Women's National Basketball Association (WNBA) and found significant differences in financial revenue and fan engagement. By analyzing player performance, player fan base and player salary, we identified the key factors that contribute to the difference in market value between the two leagues.

First, our correlation analysis points out that in the WNBA, player performance has a moderate positive correlation with both fans and wages. This suggests that the market value of WNBA players is largely determined by how they perform on court and their ability to attract fans. However, in the NBA, since there is a strong positive correlation between player performance and wages, fan base size has only a small impact on wages. This means that the market value of NBA players is affected by factors other than performance, such as media exposure, sponsorship contracts or some other business they hold.

The second is that, as we show through our regression analysis of WNBA outcomes and fan engagement at a market level (an admittedly small sample), audience interest in the league improves slightly on account of an uptick in team performance; demand response to winning or losing has not disappeared entirely. More fan engagement in the WNBA also corresponds to higher player salaries. In the NBA, fan engagement for example has very little to do with where players land in regards to their salaries.

The t-test results further confirmed that there is a significant difference in the market value of the high and low market value groups of the NBA and WNBA. Whether it is high market value or low market value, the market value of NBA players is significantly higher than that of WNBA players.

The findings of this study underline the importance of a multifaceted approach to enhancing the WNBA's market position. This should involve augmenting media exposure, securing additional sponsorship agreements, and expanding the fan base. Implementing such strategies has the po-

tential to foster greater financial and gender parity within professional basketball.

This study is useful for setting the collaborates to follow-up research as well as practical interventions, Especially in gender equity inside sport i.e., equal pay of equivalent work. These differences are very important to recognize in order for the WNBA to be viable and successful long term. We hope this study motivates more discussion and action to close the gender gap between NBA and WNBA players in order for an equal number of men's and women's professional basketball teams play at market parity.

References

[1] WNBA season leaders' stats. n.d. https://stats.wnba.com/players/

[2] NBA season leader' stats. n.d. https://www.nba.com/stats/players

[3] WNBA players' salaries. n.d. https://www.spotrac.com/wnba/rankings/_/year/2024

[4] KOKI ANDO. (2018, MAY 6). " NBA Salary Prediction using Multiple Regression" Retrieved JULY 30, 2024, from https://www.kaggle.com/code/koki25ando/nba-salary-prediction-using-multiple-regression

[5] Morgan, Mark(2024).Inequality of Salaries between the WNBA and NBA

[6] Elle Baker. (2020). "*A Comparison of NBA and WNBA Player Salaries*" [Undergraduate Research Fellow]. KENNESAW STATE UNIVERSITY.

[7] NBA players' salaries. n.d. https://www.basketball-reference.com/contracts/players.html