Regressional Analysis Of the NBA Salary Cap*

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ABSTRACT

This paper provides a context in showing how different determinants may play a role in influencing salary for the NBA. The Salary Cap has been adopted by the NBA to provide fair and equal advantage for each of the teams in the NBA. However, these statistics may show that players are overpaid or underpaid and with a recent large increase to the Salary Cap, there may be effects on future salary negotiations. To include more numerical determinants to my model, I added NBA franchise records and compared them to Salary to see their correlations. I obtained my salary data from Kaggle data site for the 2017-2018 season and selected historical NBA record data from Basketball Reference website.[1]which shows Win Percentage, of Playoffs Titles, of Division Titles, and of Championship Titles.

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1 INTRODUCTION

The National Basketball Association was founded in 1946. In the early career of the NBA they tried to impose a salary cap, but it ended after only a season. The NBA wouldn't start a salary cap again until the 1984-85 season. The salary cap was to ensure that all teams and players were provided an fair and equal advantage with a balanced playing field. However, as the Salary cap grew this playing field began to skew and caused some teams in the league to dominate and become "super teams" with multiple high caliber star players on a single team.

The reason I choose to specifically look into NBA salary data, is because I am an avid consumer who watches the NBA and loves it. I noticed a trend of some teams in the NBA who stack players onto their roster with big salary contracts. Are certain teams more likely to spend more for bigger contracts than others? Which teams have more top player contract salaries than others?

To figure out this information, I had to obtain a data set for NBA Salary data and use literature pieces that discuss NBA salary and how they contribute to influencing how the salary cap is determined. These articles also showed that certain exception rules and factors may or may not give an advantage to the specific team. The Predictors I choose to use to analyze my model is # of Wins, # of Losses, Win PCT for each NBA team, # of years in NBA, # of Championships, # of Division Titles, and # of Playoff Titles. I compared 2017-2018 Player Salary to these predictors to create a regression model and analyze its statistical significance.

The impact of my results may have a correlation for teams with more cap space having better advantages. For example, for the current upcoming 2018 season of the NBA, the team with the most salary cap space was the Los Angeles Lakers with 61.9 million [2] and as we learned Lebron James signed with the Lakers.

2 LITERATURE REVIEW

In a San Diego Law review by Mitchell L. Engler titled "The Untaxed King of South Beach: Lebron James and the NBA Salary Cap," Engler addresses the problem of the salary cap. He also claims that the lack of state tax adjustment may be a source to undermine the cap's goal. Engler's main argument and point of view came from the look into the season in which Lebron James entered to play with Dwayne Wade and Chris Bosh in Miami Heat. Engler chose this season in particular due to the fact that many of Miami's actions that season were correlated to the benefit that it received by not needing to pay for state or local income tax. Engler draws a conclusion that the salary cap limit allows for no-tax teams to offer max individual contracts and in doing so creates a higher after-tax salary than teams which have to pay for state or local income tax.[2]

In the Sports Law Journal "When Negotiations Fail: An Analysis of Salary Arbitration and Salary Cap Systems ", Melanie Aubut discusses the styles of negotiation from different sport teams. Aubut discusses that the NBA salary cap system is similar to NFL system. Both organization's promote to grow the cap together and has goals of sharing more of the it with teams and players. On the other hand, in MLB and NFL the players are more likely to take more of the owner's piece of the salary.[3]

In the International Business Times "NBA News: Chicago Bulls' Joakim Noah Luring Carmelo Anthony to Join the Chicago Bulls (With Salarby Cap Analysis) ", the corrupt 2014 actions of the Bulls team are depicted. Bulls center Noah lured Carmelo Anthony to join Bulls because of Bulls max salary cap advantage. At the same time, he eliminated Carlos Boozer to free up cap space for a high salary contract player like Carmelo Anthony. During this time, The Chicago Bulls were over the salary cap and Boozer was recieving

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[1]https://www.basketball-reference.com/teams/

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[2]https://www.forbes.com/sites/kurtbadenhausen/2018/06/19/the-lakers-bulls-and-76ers-head-the-teams-with-the-most-2018-salary-cap-space/3faf823253e7

$16.8M in which they could drop and free up space. Carmelo Anthony also has an expiring contract and potential free agent after a $23.4M deal with the New York Knicks.[1]

In Ebony Magazine from the September 2016 edition an article was written about the justification of NBA Salaries. It stated that we see more trends like Mike Conley who never make an All-Star Team once in a 9 year career but still took home a 5 year $151M deal. The article also goes on to describe the recent new expansion of the NBA network, with a nine year television deal with Disney, ESPN, and Turner Sports for $24 Billion.[4]

In the Journal of Sport Economics from 2001, the article looked at the new Collective Bargaining Agreement that was adopted and suggests that it will redistribute the rent from Superstars to the median voters. In an analysis by Richard Hill and Peter Groothuis, a Lorenz curve analysis was used and results showed in favor with those below median wage but most with those closest to the median wage in benefit with the new Collective Bargaining Agreement.[5]

In contrast of the literature normally seen comes the article, An eBook titled "Cap in Hand: How Salary Caps are Killing Pro Sports and Why the Free Market Could Save Them", by Bruce Dowbiggin. In this article, Leagues like the NBA are exposed with salary-restraint schemes which result in select elite players to emerge from the bunch. If the NBA were to adopt a model like European Football, it would result in putting on a great show for the audience for more revenue with better loyal fans.[6]

In a another supporting article, Adam Silver discusses with someone over the NBA Salary Cap being un-American. There is a statement made by the Players association executive director which Silver strongly disagrees with and his reasoning that root of the NBA success is based on collective agreement between owners and players. Not one single group could have done this on its own.[7]

Berry Tramel from the Daily Oklahoman newspaper discusses the 2018 NBA payroll breakdown: in this breakdown, he discusses teams like the Warriors who are over the cap and hard capped,teams like the Los Angeles Lakes with 30+ Million to spend, and other team payroll statistics. This extra cap space for the Los Angeles Lakers allows for an new elite player on the team for the upcoming season.[8]

In another entertainment and sports journal by Christopher Kendall about the 2011 about the how NBA teams free up their salary cap space to allow for more monetary space for an elite superstar player. Kendall relates an example from the summer of 2011 with Lebron James and his free agency for next season with rumors like Nike giving Lebron an $100 million deal if he came to the New York Knicks. However these claims turned out to be false.[10]

In a Sports Journal analyzing the determinants that influence player salary for the NBA. using regression to analyze these various determinants results that points per game, rebounds, and personal fouls all contributed significantly to a player's salaries. an interesting example stated in the journal with the large increase in player salaries over the last few year. The 2013-14 season for the Los Angeles Lakers recent a large earnings gap from the $30.4 Million salary given to Kobe Bryant compared to Ryan Kelly's $490,000 dollar salary.[11]

The research questions that have arisen as inferences from the literature reviewed are: Does the NBA salary cap provide an fair and equal competitive balance for its team and players? Does the NBA salary cap provides bigger advantages to team with a larger salary cap?

Table 1: Descriptive Statistics for NBA 2017-18 Season

	Rank	Salary
count	573	
mean	287	585,8937
std	165.6	716,2367
min	1	17,224
25%	144	1,312,611
50%	287	2,386,864
75%	430	7,936,509
max	573	34,682,552

3 METHODS

It is commonly known on ESPN[13] where to find NBA salary data for a specific season. The difficultly came in obtaining the data as comma separated values. I found a git hub link to an individual's own analysis on NBA player and salary data[12] I used his CSV file and removed the one column, leaving only my column headers as Rank, Player, Team, and Salary. I also obtained another dataset from this GitHub and used NBA historical Record Data. I made a combined CSV with the 2017-2018 salary and the historical data leaving the headers Rank, Salary, Franchise name, League, Starting Year of NBA Team, Current Year, Years in NBA, # of Games, # of Wins, # of Losses, Win PCT, # of Playoffs Titles, # of Division Titles, # of Conference Titles, and # of Championships Titles. The Rank column ranks the highest paid player as 1 and least paid as last. The Player column lists all the player for the 2017-2018 season of the NBA. Team column lists the teams for 17-18 season. The last column is salary which is count in millions and depicts all the salaries for each player. For the wrangling of my data, the first visualization I wanted to create was to compare salary for certain NBA teams. To accomplish this task I had to only look at Rank and Salary columns for the specific NBA team I was looking at. I accomplished this by using a where statement which allowed for me to pick a specific column and search for specific value. To answer my research questions, I need to compare each column to salary and analyze and discuss the results from these findings. Table 1 above features comparison of salary giving its mean, min and max values, and 25% 50% and 75% percentile distributions.

4 RESULTS

4.1 Cleveland Cavaliers: RankvsSalary

First Visualization was to depicting a bar graph comparison of Rank versus Salary for the Cleveland Cavaliers. For Figure 1, I compared Cleveland Cavaliers for their 2017-2018 season was because they spent over the cap for the season.The Cleveland Cavaliers for 2017-2018 season used the most total cap space for the season with $135,980,450. This shows for the 17-18 season, the Cavaliers were placed in a Hard Cap.

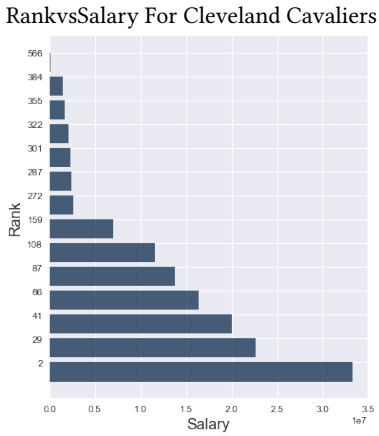

Figure 1: A bar graph depicting Rank of Players versus Salary for the Cleveland Cavaliers.

4.2 Chicago Bulls: RankvsSalary

My Second Visualization also depicts the Rank versus Salary for the Chicago Bulls 2017-2018 season. The Chicago Bulls for the 2017-2018 season had used the least amount cap space with $108,150,139 and data shows they paid less for salaries for their players.

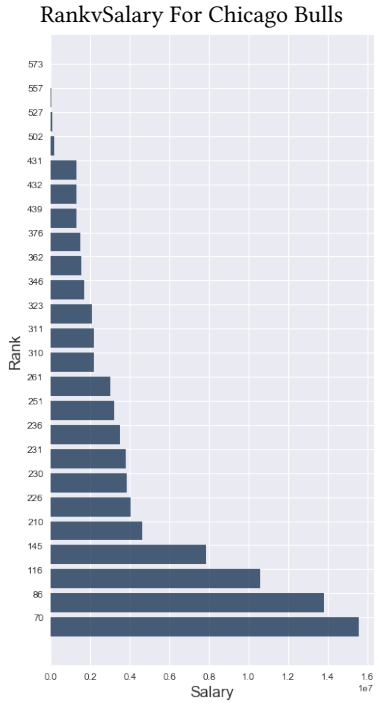

Figure 2: A bar graph depicting Rank of Players versus Salary for the Chicago Bulls for the 2017-2018 season.

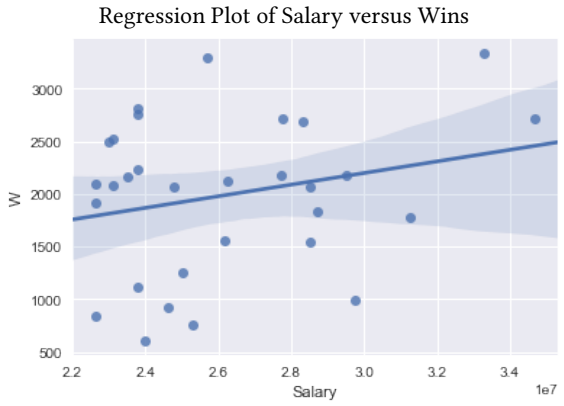

Figure 3: This plots a regression plot comparing Salary to Wins and the light shaded region shows the confidence interval for co linearity.

4.3 Regression for Wins

My Third Visualization was to find and see if there in a linear relationship among the number of wins for an NBA Team and the Salary given to the Players.

4.4 Regression for Losses

My Fourth Visualization was to find and see if there in a linear relationship among the number of losses for an NBA Team and the Salary given to the Players.

Figure 4: This plots a regression plot comparing Salary to number of losses and the light shaded region shows the confidence interval for co linearity.

5 DISCUSSION

Figure 1 depicts the correlation of rank and salary for the Cleveland Cavaliers. Our results suggest that compared to the Figure 2 the distribution of rank for the Cleveland Cavaliers places 5 players below the rank of 100, so has more players below Rank 100 compared to the Chicago Bulls. This signifies that Cleveland Cavaliers compared to Chicago Bulls spent more on salary for players below rank 100 to

get stronger players as for the 2017-2018 season, a known finding is that the Cleveland Cavaliers spent the max salary cap amount of $135,980,450 and therefore were given a hard capped.

Figure 2 shows the correlation of Rank to Salary for the Chicago Bulls for the 2017-2018 season. From the results and the graph creating a Salary compare and rank for the Bulls team showing that only 2 player were below the rank of 100. This creating a overall gradual linear increasing trend for rank versus salary compare to the Cavaliers trend of a higher increasing salary as the rank of player also goes up.

Figure 3 compares the correlation between Number of Wins for an NBA Team and Player Salary for the season using a regression to find if the regression has linearity. We can see a trend for linearity in this figure with a nice range in the confidence interval. With these inferences there seems to be a relationship between the more Number of Wins the higher salary given.

Figure 4 depicts the regression plot comparing my numerical determinants of Number of Losses to Salary. There seems to be enough supporting evidence for linear relationship between number of losses and the salary given. There are outliers showing a trend for higher losses with lower player salaries.

Therefore, from the literature reviewed and the analysis done on player salary. Some of the inferences or conclusions I have drawn is that as the NBA Salary Cap increases, the earning gap between players also increases. The Salary cap also cause select few elite player to come out of the player salaries given. Would the NBA run better as team sport if run as a free market like European Football. But there are those who believe and feel the NBA Cap serves its purpose as a alliance and betterment of the players even tho the new contract has higher average salary but the player now don't get as much piece of the pie more rather an equal distribution of the pie and increasing over time.

6 CONCLUSIONS

All in all, the NBA salary cap is a relevant topic to today's audiences. Although at the surface it may seem to be a fair system, the data reveals a different case. As mentioned, there are various factors to which a team can have advantages, such as not having to pay income tax. These advantages may start small, but they can build up, resulting in an unfair advantage to a team. Higher Salary Caps also means for larger earnings gaps among players in their respective teams. In the world of sports, fairness is key, and in such instances as these, it is important to evaluate the data to find the source of discrepancy. This data analysis is important, because it shows influences on the salary cap, and gives clear statistics and information that can be visualized. Using numerical determinants to tranpose my data and run regressional model to compare the linear relationship of the data is important and useful and from the regression done there is significance in the linear trend between Player Salary and # of Wins and # of Losses in the NBA. It is also important, because it is a neutral platform of displaying the information. A salary cap does provide equality in some ways, but there are other factors at play that reveal there may not be true equality among teams and players. For example, The Golden State Warriors recently for this season acquired another top player Demarcus Cousins for only 5.3 million dollar deal.[9]

REFERENCES

[1] International Business Times. "NBA News: Chicago BullsâĂŹ Joakim Noah Luring Carmelo Anthony to Join the Chicago Bulls (With Salary Cap Analysis)."
[2] Engler, Mitchell. "The Untaxed King of South Beach: LeBron James and the NBA Salary Cap ." Law Journal
[3] Aubut, Melanie. "The NBA Salary Cap: Controlling Labor Costs through Collective Bargaining." HeinOnline
[4] Ebony Magazine "Why NBA Salaries Are SOMEWHAT Justified." Ebony 71.11 (2016): 34. Dec 14. 2018.
[5] Hill, J.Richard, and Peter A. Groothuis. "The New NBA Collective Bargaining Agreement, the Median Voter Model, and a Robin Hood Rent Redistribution." Journal of Sports Economics, vol. 2, no. 2, May 2001, p. 131.
[6] Dowbiggin, Bruce, et al. Cap in HandâĂŕ: "How Salary Caps Are Killing Pro Sports and Why the Free Market Could Save Them."
[7] Silver: Salary cap in NBA is not ún-AmericanŔy BRIAN MAHONEY - AP Basketball Writer, AP English Worldstream - English, November 13, 2014.
[8] NBA payrolls: Warriors have no cap space and don't need it By: Tramel, Berry, Daily Oklahoman, The (OK), Jun 27, 2018.
[9] Paine, Neil. "The Warriors Are Making A Mockery Of The NBA Salary Cap." FiveThirtyEight, FiveThirtyEight, 3 July 2018.
[10] Circumventing the NBA's Salary Cap: The "Summer of LeBron" and Beyond. By: Kendall, Christopher C., Entertainment Sports Lawyer, 07321880, 20100301, Vol. 28, Issue 1.
[11] Determinants of NBA Player Salaries. Sport Journal, 15439518, 2015.
[12] ando, koki. "koki25ando/NBA-Franchise-Record." GitHub,2016.
[13] ESPN. "NBA Salary." ESPN, ESPN Sport Data, 2017.

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