Triple Threats: Analyzing 3-pointers made per game, 3-Point Percentage Ranking and their Impact on Regular Season Wins Over the Past 10 Years

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Introduction

Motivation:

I have loved the NBA since I was in middle school, and there has been complete shift in the way the game is played as three-pointers are way more prevalent now than ever. I wanted to see just how much the three-point shot affects the amount of wins these NBA teams have.

Research Questions:

Research Question 1 – Does a team being in the top 15 in the league in three-point percentage affect the number of wins they have in that regular season?

Research Question 2 – Does the amount of three-pointers made per game affect the number of wins they have in that regular season?

Methods

Data Collection:

My sample data consisted of all 30 NBA teams from over the past 10 years. This gives a total population size of 300 teams, and of this population, my sample size was 100 of these teams. This meant any team all the way from the 2012-2013 season all the way to the 2022-2023 season could have been picked and analyzed.

Measures:

I first started with the 2012-2013 season and progress every year after analyzing the team picked from that year. I would use a random number generator (ranging from 1-30), which I would use to determine the team from that season based on power ranking (if I got the number 8, I would analyze the 8^{th} best team in the league). I then used Statmuse.com to see the amount of wins the team had that season. I then moved over to Teamrankings.com to see the amount of three-pointers made per game and if the team was top 15 in the league in three-point percentage for that season. After I got all three of the values I was looking for, I moved onto the next year and repeated the process until I had the data for 100 teams.

Analysis Method:

The first method of analysis I did was create a histogram to see the frequency of the distribution of the number of wins in regular season. The data showed normalcy, so I did not have to use the log function to make it normal. I then made a histogram for the distribution of three-pointers made per game, which also came out to give a normal histogram. I then graphed a scatterplot to see the correlation between three-point shots mad per game and the number of wins in the regular season. The correlation however was scattered and didn't show a positive or negative trend. I then made a barplot to show the frequency of the distribution of teams being top 15 in the league in three-point percentage, giving almost identical values for the frequency. I then created a grouped box plot to show the number of wins regular season based on being top 15 in league in three-point percentage. The boxplot came out to be normal and didn't show any statistically significant difference.

Descriptives

Table 1 – Descriptive Statistics

	Median	***IQR***
Number of Wins in Regular Season	45.5	11.25
	Median	***IQR***
Average 3-Pointers Made Per Game	10.7	3.65
	Yes	***No***
Top 15 in League in 3-Pointers Made	52	48

Results

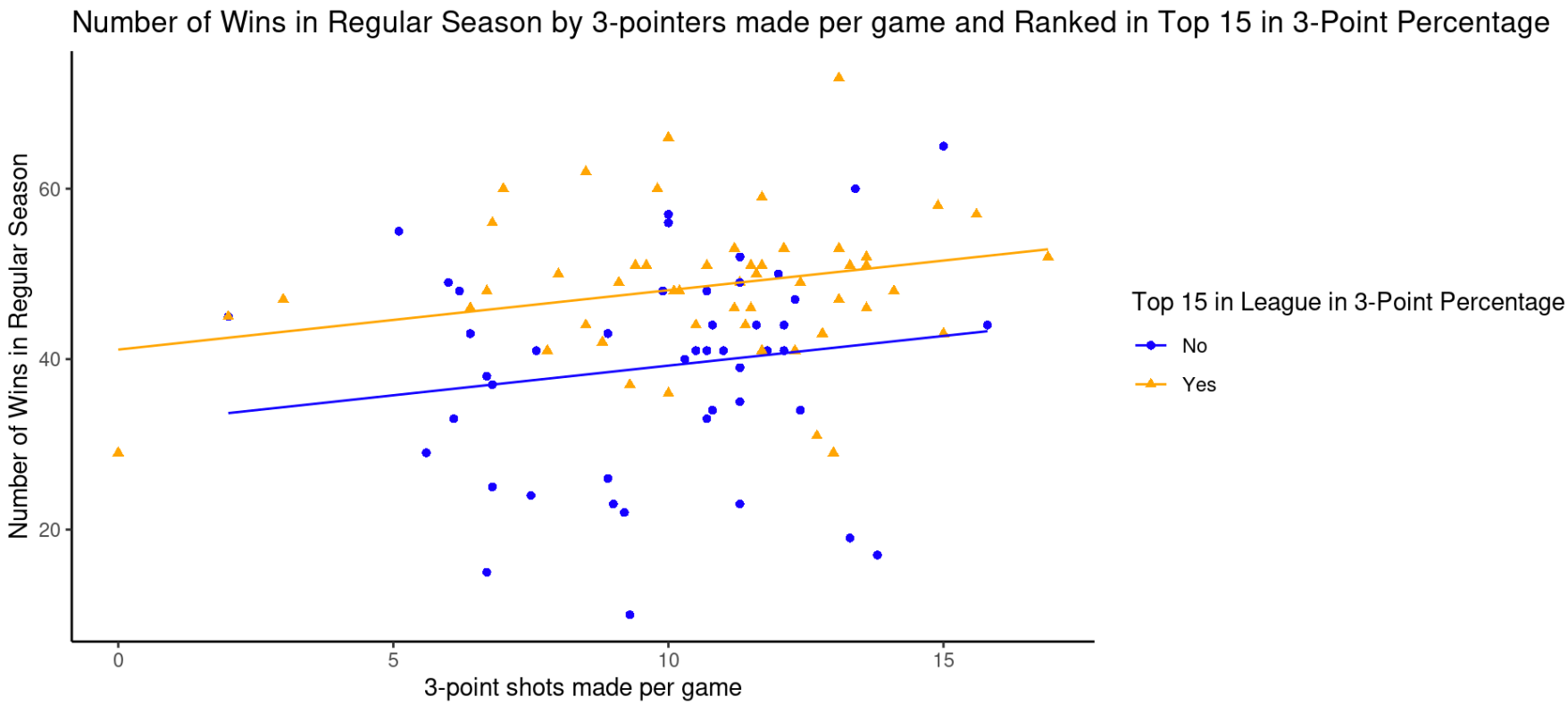
Results table:

Table 2 – Model Results

	Estimate	t-stat	St. Error	p-value
Intercept	32.556	7.312	4.4527	7.56*10^-11
'Top 15 in League in 3-Point Percentage' Yes	8.6385	3.954	2.1847	0.000146
'3-point shots made per game'	0.6656	1.588	0.4192	0.1155

Model df: (2,97)

Adjusted R-squared: 16.39%

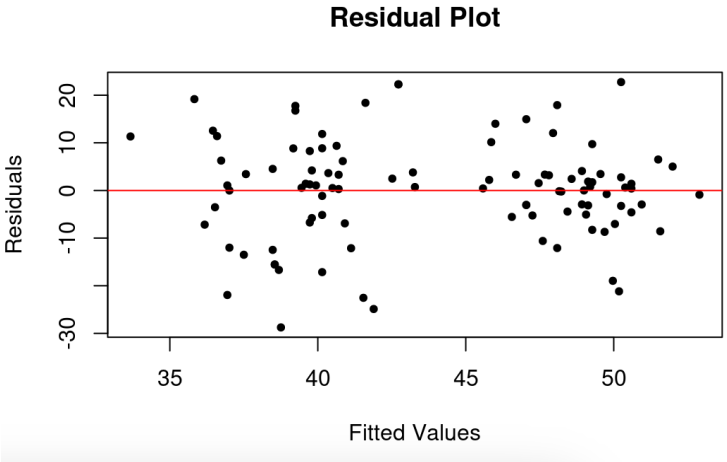

Number of Wins in Regular Season by 3-pointers made per game and Ranked in Top 15 in 3-Point Percentage
Number of Wins in Regular Season
60
40
20
0
5
10
15
3-point shots made per game
Top 15 in League in 3-Point Percentage
No
Yes

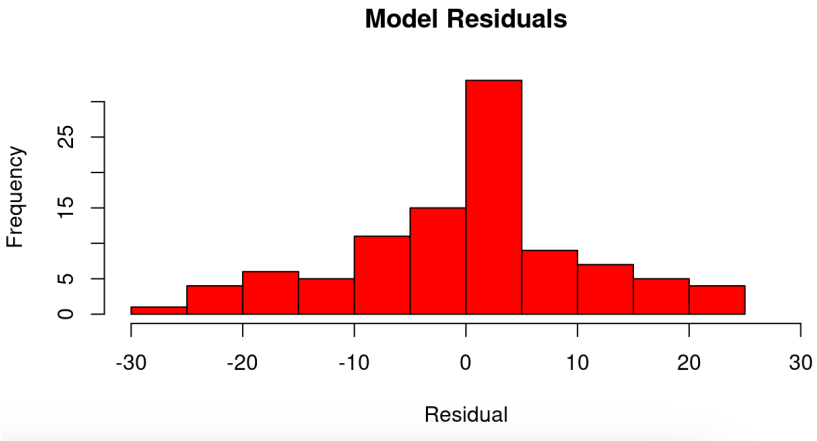
Assumptions

Assumptions:

There were 5 assumptions that had to be met for this project. The first assumption was the data having to be random. The second assumption is the data being independent. The next assumption is that the numeric variable has to have a linear relationship with the response variable. The fourth assumption is that the residuals are normally distributed. The last assumption is that the residuals have equal variance.

- The data was randomly selected through random number generator
- The data is independent
- The numeric variable has a linear relationship with response variable
- Residuals are normally distributed
- Residuals have equal variance





Discussion

Interpretation:

I will reject the null. The overall regression equation predicting the number of wins in the regular season from the team being ranked top 15 in the league in 3-pointers made and the average 3-pointers made per game was significant ($F=10.7$, $df=2,97$, $p < 0.05$). The two predictors explain 16.39% of variance in the number of wins in the regular season. Being top 15 in the league in 3-pointers made was a significant predictor ($t=3.954$, $df=97$, $p < 0.05$), while average 3-pointers made per game was not a significant predictor of number of wins in the regular season ($t=1.588$, $df=97$, $p > 0.05$).

Limitations:

One limitation that has a huge effect on my data is how the game of basketball has changed over the past 7 years. The 2015-2016 Golden State Warriors were. Revolutionary team in basketball, as they shifted the dynamic of basketball from mid-range shots and dunking to 3-pointers becoming the most prevalent shot since. This has a huge effect on my data because, those 3 years before the Warriors definitely throws off the data because the 3-point shot wasn't seen as a must-have for teams as it is now.

Implications:

This study goes to show that although the average 3-pointers made per game doesn't affect the number of wins a team has in the regular season over the past 10 years, a team being top 15 in the league in 3-point percentage does influence the number of wins a team has in the regular season over the past 10 years.

Future Research:

I think an area to look at when looking to expand on this research is to see the effect of average 3-pointers made per game and its effect on wins in the playoffs. If I were to redo this study, I would change my population size to all NBA teams from 7 years ago to now (when teams started constructing more 3-point shooting teams). The 3-point shot is one that has become so prevalent in today's game because of the Golden State Warriors, specifically Stephen Curry (all-time leader in 3-pointer made in NBA history. Many teams started reconstructing their teams to be more geared for three-point shooting since that 2015-2016 Golden State Warriors won their first NBA title. By changing the population size to 7 years ago rather than 10, I believe that the average 3-pointers made per game will be a significant predictor for the number for wins a team has in the regular season.

References:

List of all the NBA & aba teams. Basketball Reference. (n.d.-b). https://www.basketball-reference.com/teams/

NBA standings in 2012-2013. StatMuse. (n.d.). https://www.statmuse.com/nba/ask?q=nba%2Bstandings%2Bin%2B2012-2013

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