Data Analysis on Basketball Statistics

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Idea behind our Analysis

- In basketball, there are different shots that have different point values:
  - Anything inside the arc is 2 points, everything outside is 3 points
  - Free throws are 1 point that come from shooting fouls
- Our analysis today will look at the shot selection of teams over the last 20 years and analyze the relationship
- **Objective:** Using data that is publicly available, we want to graph the amount of 3 pointers that teams have taken over the last 30 years. We wish to analyze how teams have shifted towards attempting more 3 pointers, and graph other facets of the game that indicate a shift in the way teams play basketball now

Terms to know beforehand

- **Field goal attempts:** shots taken in a game
- **Pace:** number of times a team has the ball in a game
- **Offensive rebounds:** rebounds grabbed when a team is on offense
- **Rebounds:** when the ball is grabbed after a missed shot
- **Offensive rating:** estimate of how many points a team scores per 100 possessions
- **Free throws:** shots taken at the line after a foul
- **Mid-range shots:** shots taken between the paint (restricted area) and 3 point line

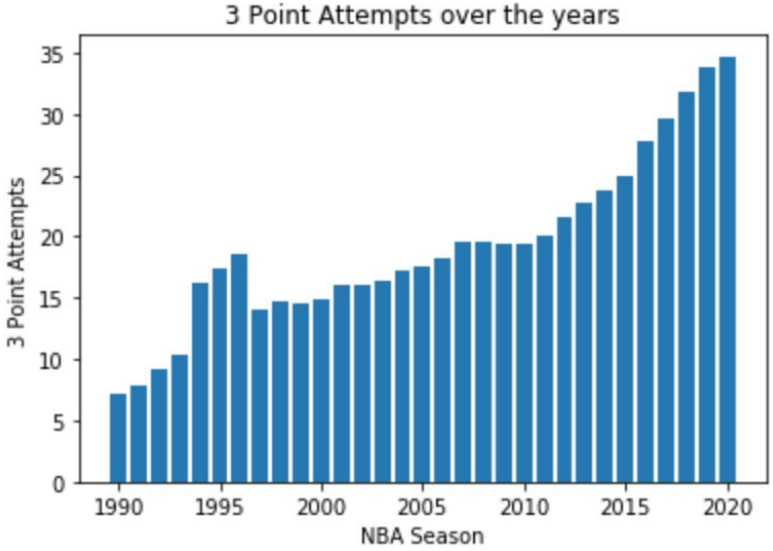
Questions We Are trying to answer

1. Has shot selection of teams changed over the years?
2. If the shot selection has changed, how has the gameplay changed over the time period?
3. Can we expect this change or trend to continue in the way basketball is being played?

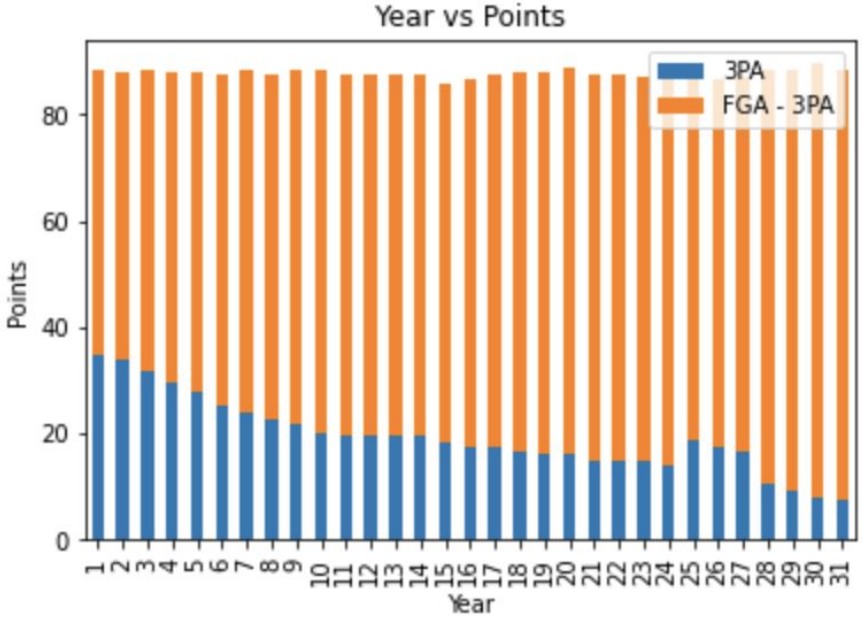
Discussion of data collection part 1

- We can clearly tell that there is a strong positive relationship between the year and number of 3 point attempts
- We can also conclude that teams have been emphasizing the 3 point shot more, as our stacked bar graph reveals that teams are taking a greater proportion of 3’s to total shots
- Graphs posted in next slide

Graphs for question 1



The graph above shows the average 3 point attempts taken per team from 1990 onwards. As teams have taken more 3 pointers per game consistently, we can conclude a change in shot selection.



The stacked bar graph above shows the average ratio of 3 pointers to field goal attempts per team (2020 is on the left). As teams have taken a higher proportion of 3's, this indicates that teams are favoring the 3 point shot.

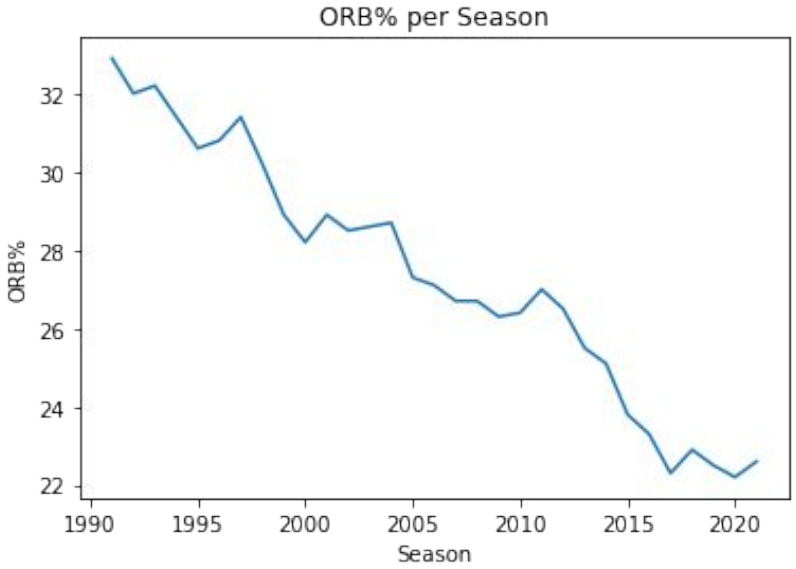
To answer question 1....

Clearly, the shot selection has changed over the years. Teams are taking more 3 pointers than ever, as 3 pointers are more valuable and midrange shots (between the paint and 3 point lines) are less valuable and efficient.

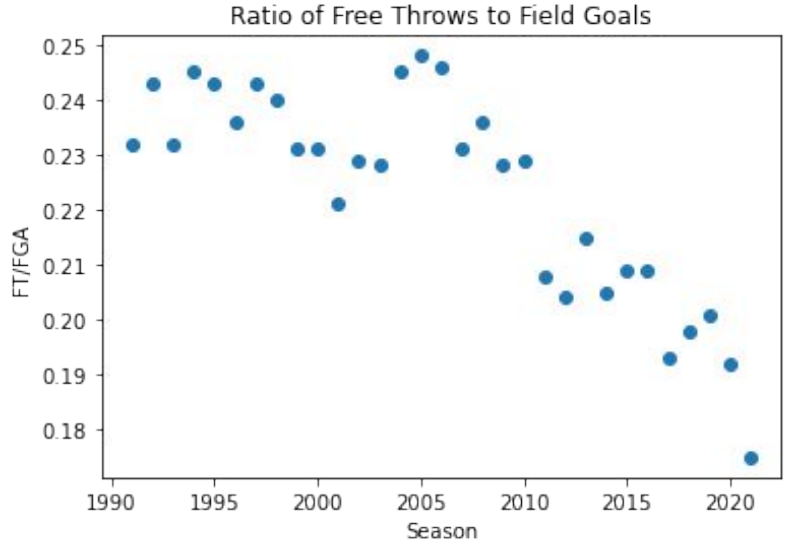
Discussion of data analysis part 2

- We were able to conclude previously that teams have clearly been emphasizing the 3 point shot
- pace has also seen a consistent increase over the years
- Points scored per game and offensive rating have also increased
- The ratio of offensive rebounds to total rebounds and free throws to total shot attempts has also gone down over the years,

Graphs for question 2



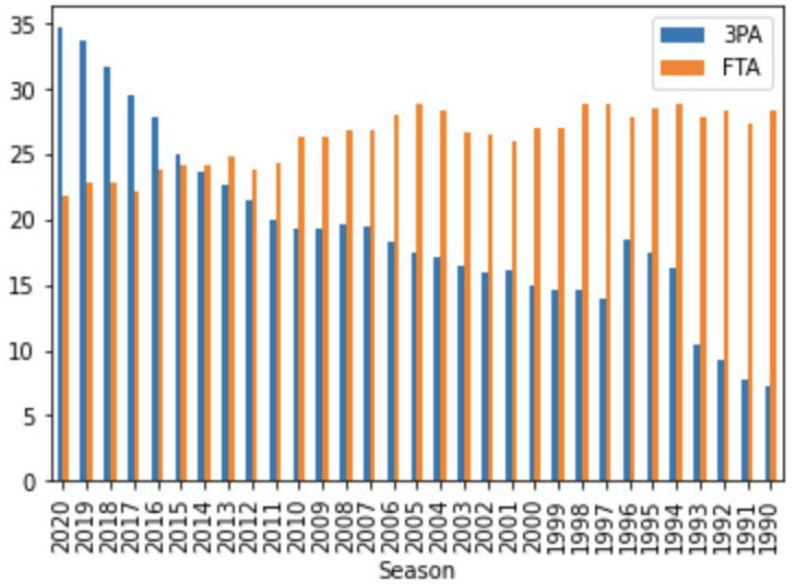
The line graph above shows the average ratio of offensive rebounds to total rebounds per team over the years. Faster gameplay and a spread offense has the team focusing more on getting back on defense, which gives players less chance to grab offensive rebounds.



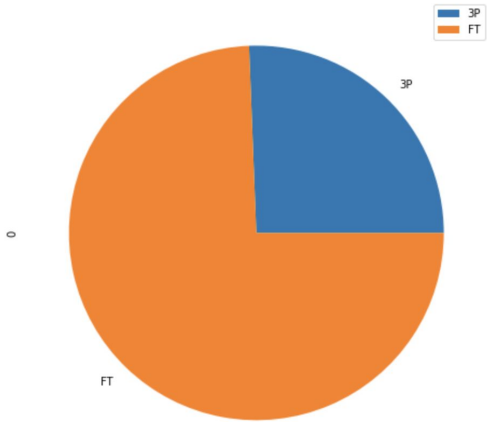
The scatter plot above shows the average ratio of field goals to total shot attempts per team over the years. Even though the field attempts have stayed the same, a lower ratio indicates a faster and less physical gameplay.

Graphs for question 2

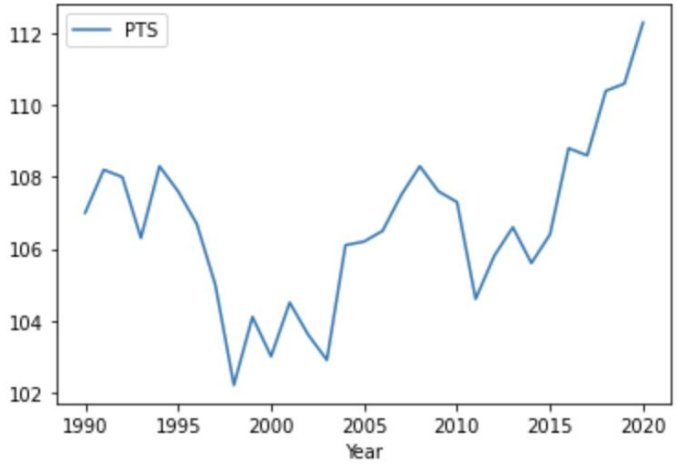
Bar Graph showing 3 Pt. Attempts and Free Throw Attempts over the seasons



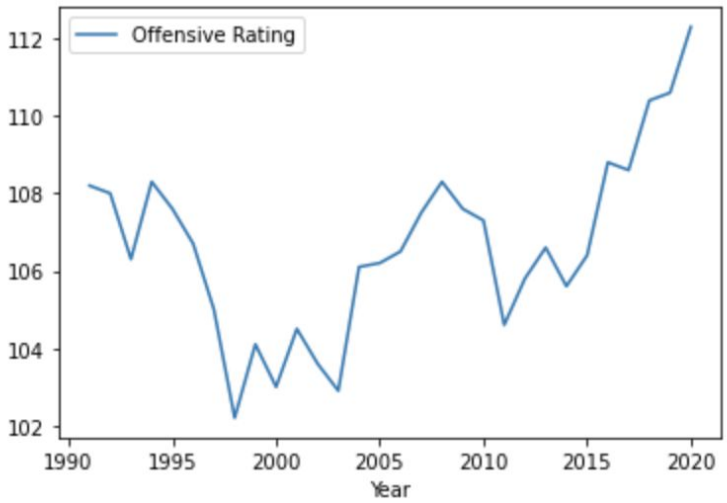
Graphs for question 2



The pie charts emphasize the change in the gameplay as games now are currently shifting to doing 3-point attempts and that’s why the sum is less of 3P because the transition has been recent.



The line graph above shows the average points per game per team over the years. The trend indicates that offenses are playing at a faster pace and scoring more points due to emphasizing the 3 point shot.



The line graph above shows the average offensive rating per team over the years. As there is a slight positive trend, we can say that changing the shot selection has made offenses more efficient.

To answer question 2...

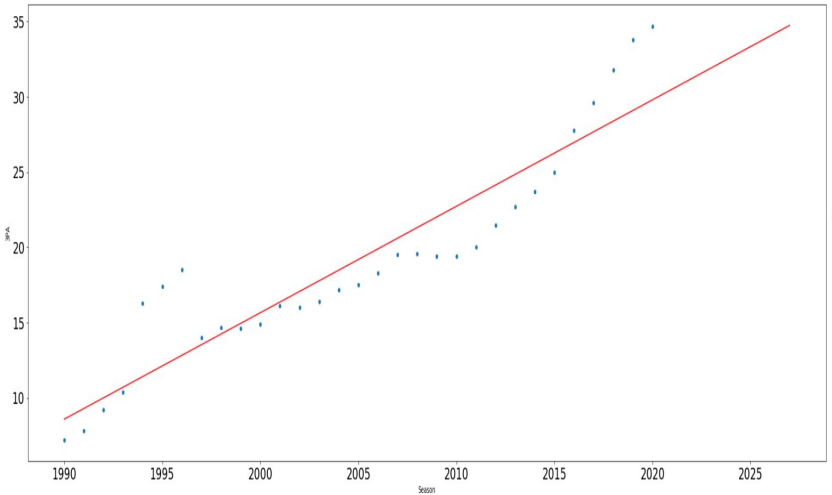
- **Yes, the shot selection has also had a ripple effect in the way the game is played today**
- Difficult and inefficient shots (such as midrange and post ups) have been replaced by 3 pointers and easy layups
- Our graphs shows that the ratio of offensive rebounds to total rebounds and free throws have gone down, indicating a faster and less physical gameplay

Discussion of data analysis part 3

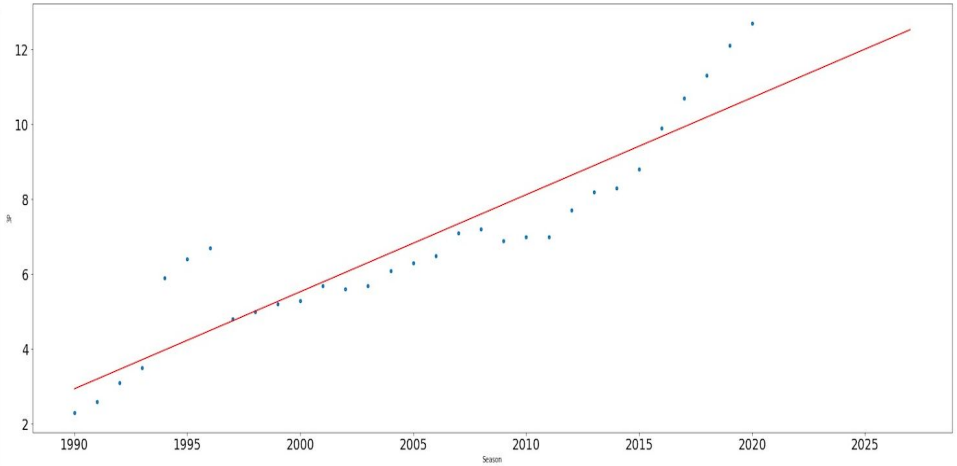
- We have observed that the gameplay has seen a radical change over the years, in terms of shot selection and how the game is played now.
- After running linear regression, we see that our predictions return the trend to continue

Graphs for Question 3

3 Pt Attempts vs. Season (2027)



3 Pt vs. Season (2027)



To answer question 3...

- **Yes, this trend is here to stay. After running linear regression, we can safely conclude that teams have embraced this strategy of 3 Point Attempts and we can only expect it to continue.**

Questions about Presentation To answer

1. Is the trend of three point attempts every season similar to the trend of three points scored, looking at the linear regression models? (True or False)

2. Look at the exploratory data analysis, does taking more 3 pointers necessarily mean scoring more points per game? If so, why is that?

3. How do the pie chart comparing the free throw scored to three points scored results contradict the trends we are analyzing? Why is this so?

THANK YOU FOR WATCHING :)