

Team Spending & Regular Season Wins in the NBA

DS 5610 | Exploratory Data Analysis

November 2023



Motivation



Exploring the relationship between historical team payrolls and records and wins.

Do NBA teams with higher payrolls win more regular season games?

→ Are teams justified in going over the salary cap?

Salary Cap: Maximum total amount that NBA teams can pay their players in a given season

Data

Exploring the relationship between historical team payrolls and records and wins.

Datasets

- **Salaries:** salary information for every player in the league between 1997 and 2018.
- **Salary Cap:** Annual NBA salary cap, since its inception in the 1980s.
- **Inflation:** Annual inflation rates in the US from 1980 to 2023, used to convert salaries to 2022 USD for apples-to-apples comparison
- **Team Records:** Win/Loss records for every NBA team for every season, from 1985 through 2020



Data

Exploring the relationship between historical team payrolls and records and wins.

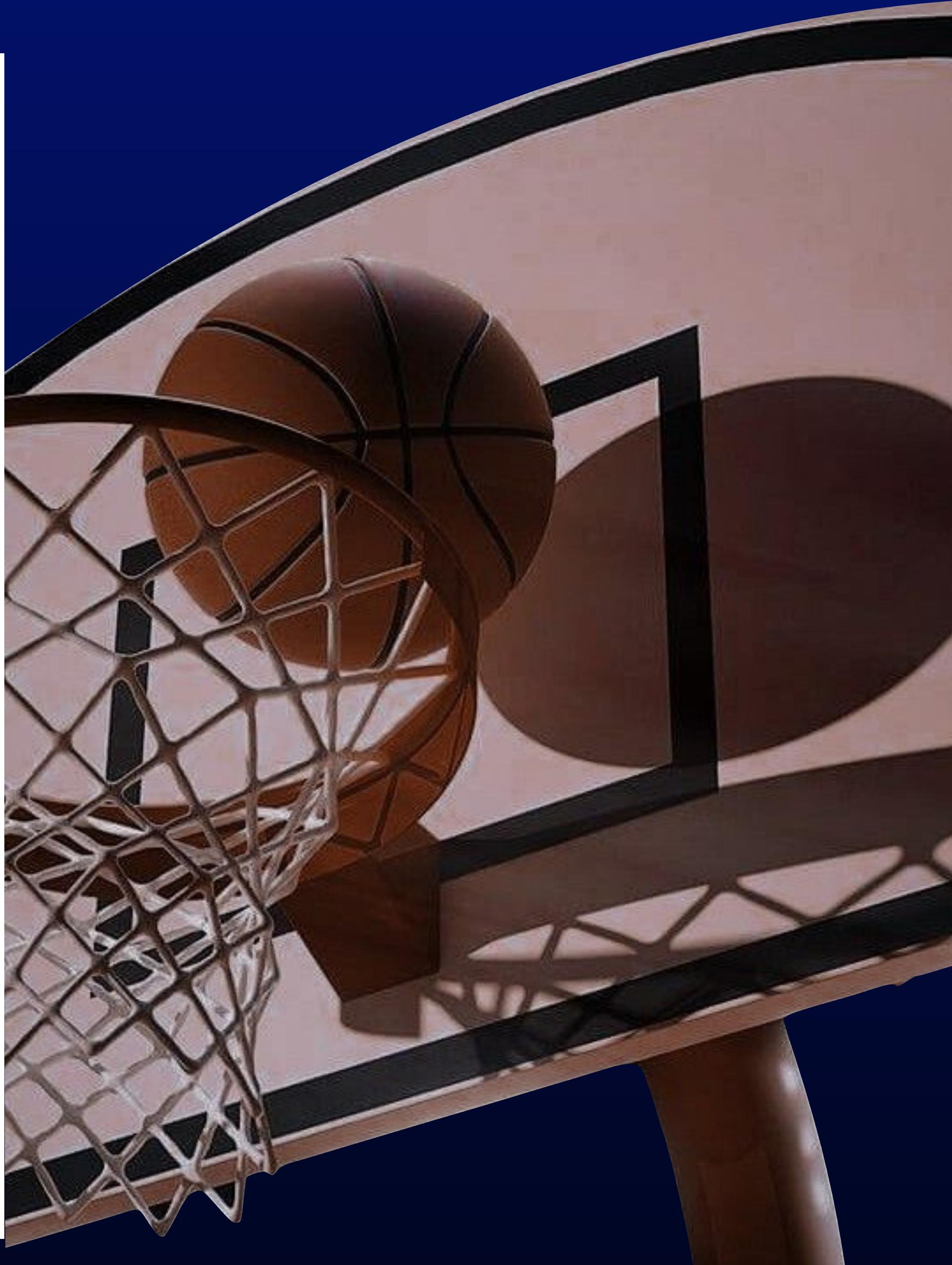
Key Variables

- **Total Payroll** by team and season (in 2022 USD), computed as the sum of all player salaries
- **Regular Season Wins** by team and season
- **Salary Cap** for each season
- **Cap Space** by team and season, computed as the difference between the salary cap and a team's payroll
- **Cap Bucket** by team and season, manually assigned by based on cap space
- **Cap Compliance** (Y/N), manually included as a flag for if a team's payroll is below the cap



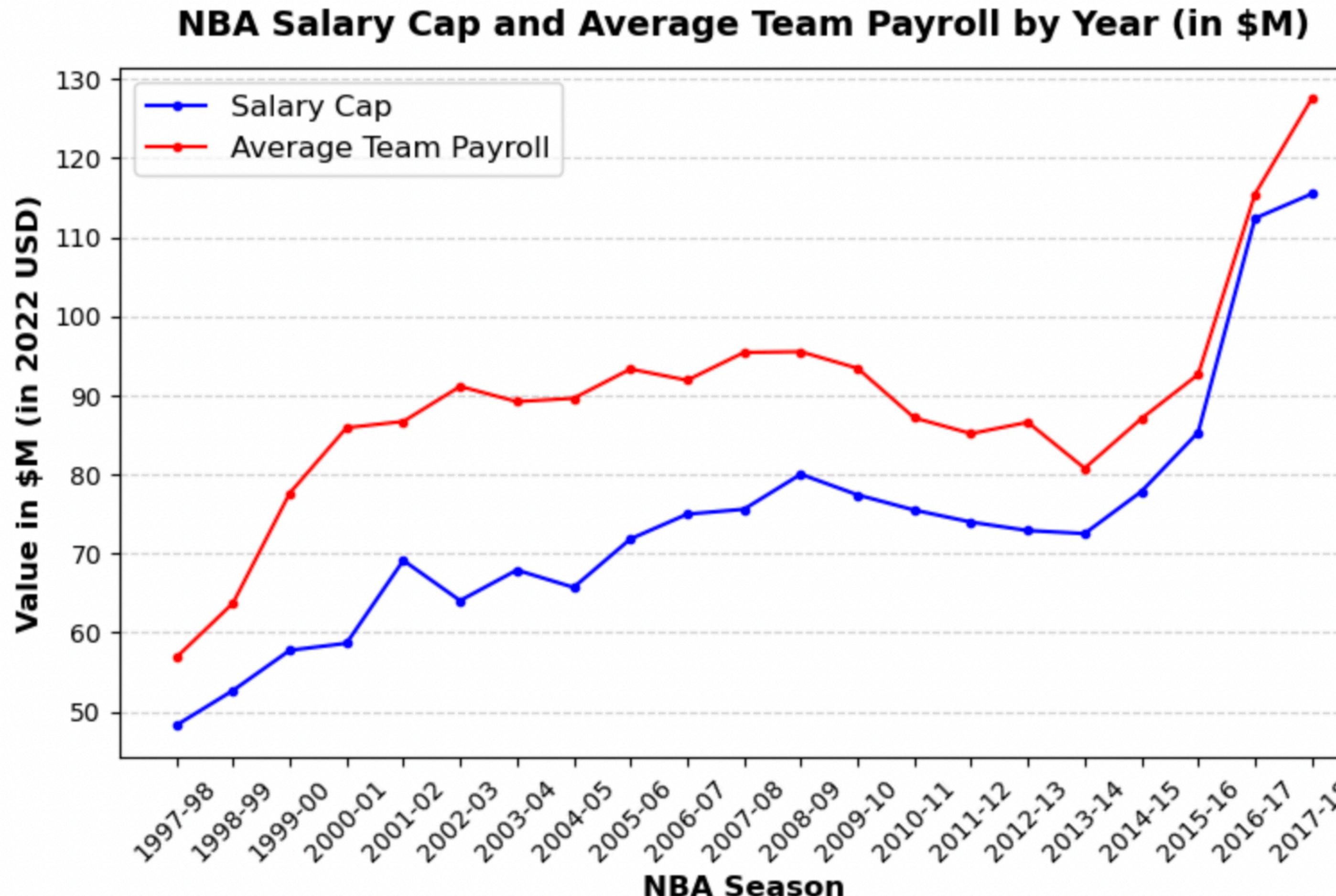
Simplifying Assumptions

- Looking at a 20-year, 21-season period, from the 1997-98 season through 2017-18 season
- A team's payroll is the sum of all of their players' salaries
- All dollar values have been converted to and are represented in 2022 USD, based on inflation rates from Investopedia
- Teams are represented by the names they went by in the given season
- Seasons with lockouts and other special cases are treated as normal seasons
- A team is considered over the cap or not cap compliant if their payroll exceeds the salary cap
 - No consideration is given to teams with exceptions or luxury tax exemptions



Salary Cap & Average Payroll by Season

How has the average team payroll varied with changes in the salary cap?



Changes in average team payroll **follow the same general trend** as changes in the salary cap, however, the **average team payroll is consistently larger than the salary cap** for any given season.

These values start to converge more in the later years, as a result of a large jump in the salary cap, put in place for the 2016-17 season.

Team Payrolls & Number of Wins

What is the relationship between team payroll and number of regular season wins?

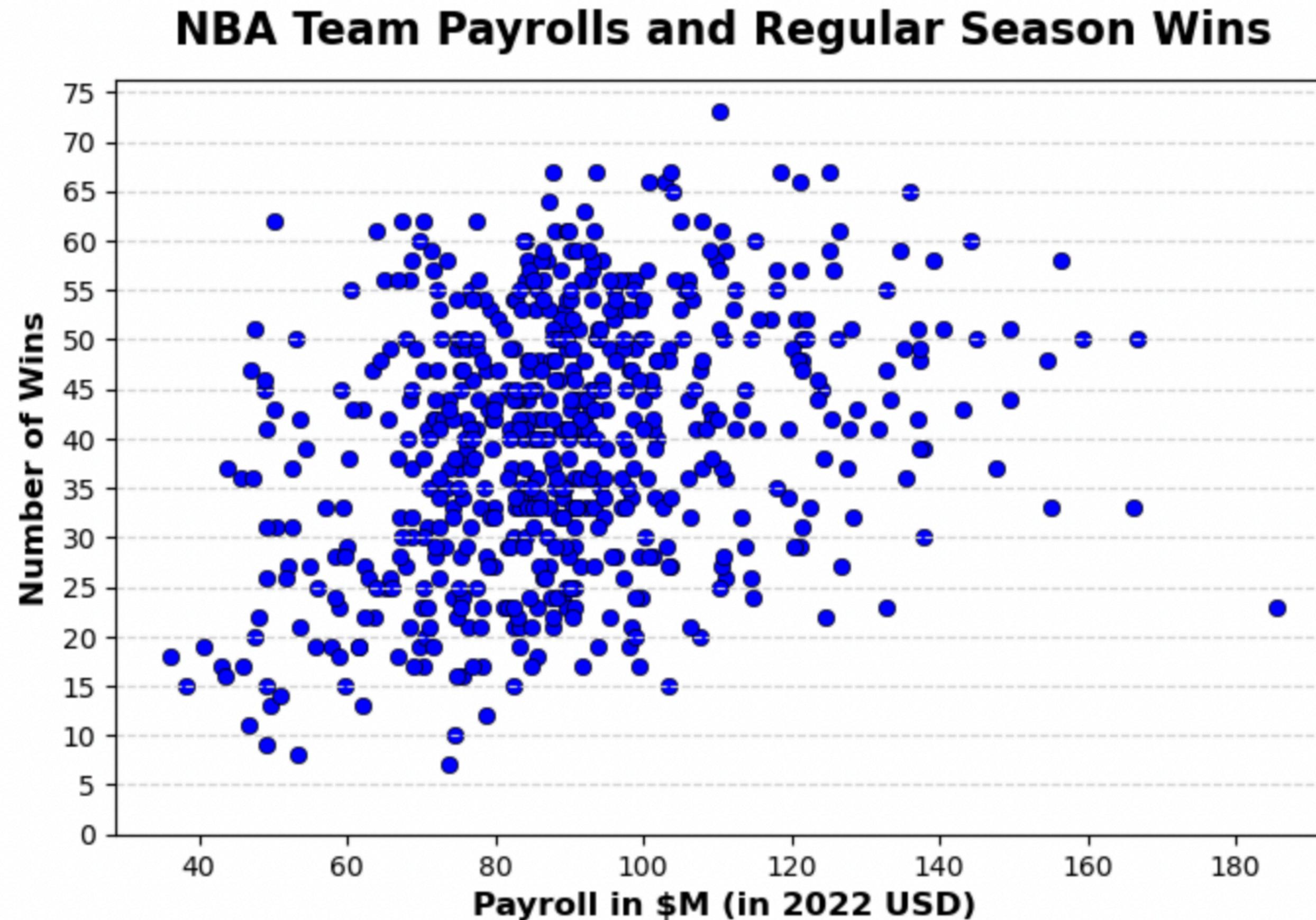
There appears to be some positive relationship between team payroll and number of regular season wins.

In general, as a team's payroll increases, so does their number of wins, though this relationship is relatively weak.

Correlation Coefficient = 0.31

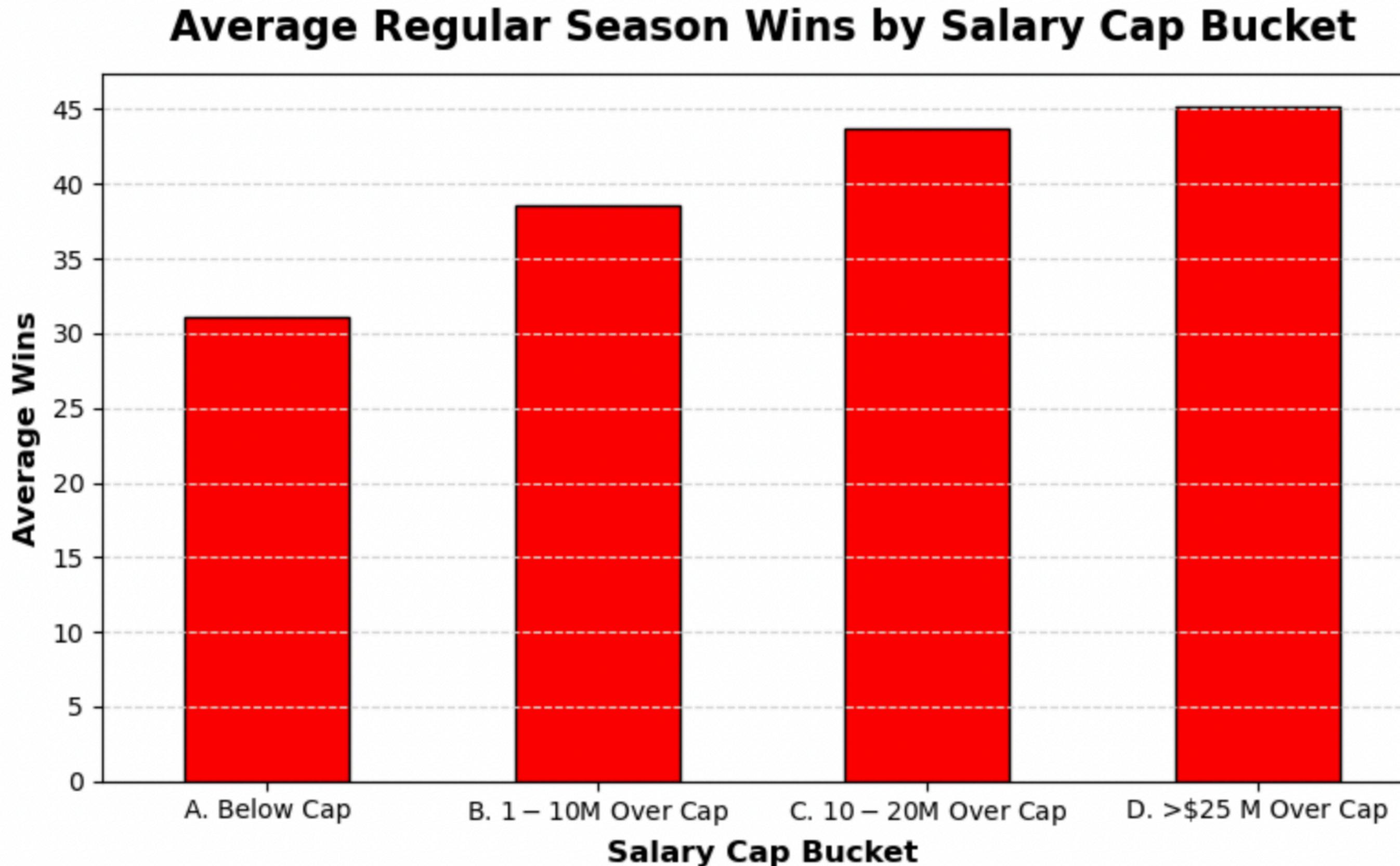
P-Value = 9e-15

Statistically significant at the 0.05 level



Team Payrolls In Relation to the Cap & Number of Wins

What is the relationship between team payroll and number of regular season wins?



When team payrolls are grouped into buckets based on their cap space, there is a clear upward trend, where **teams with higher payrolls** relative to the cap **win more games**.

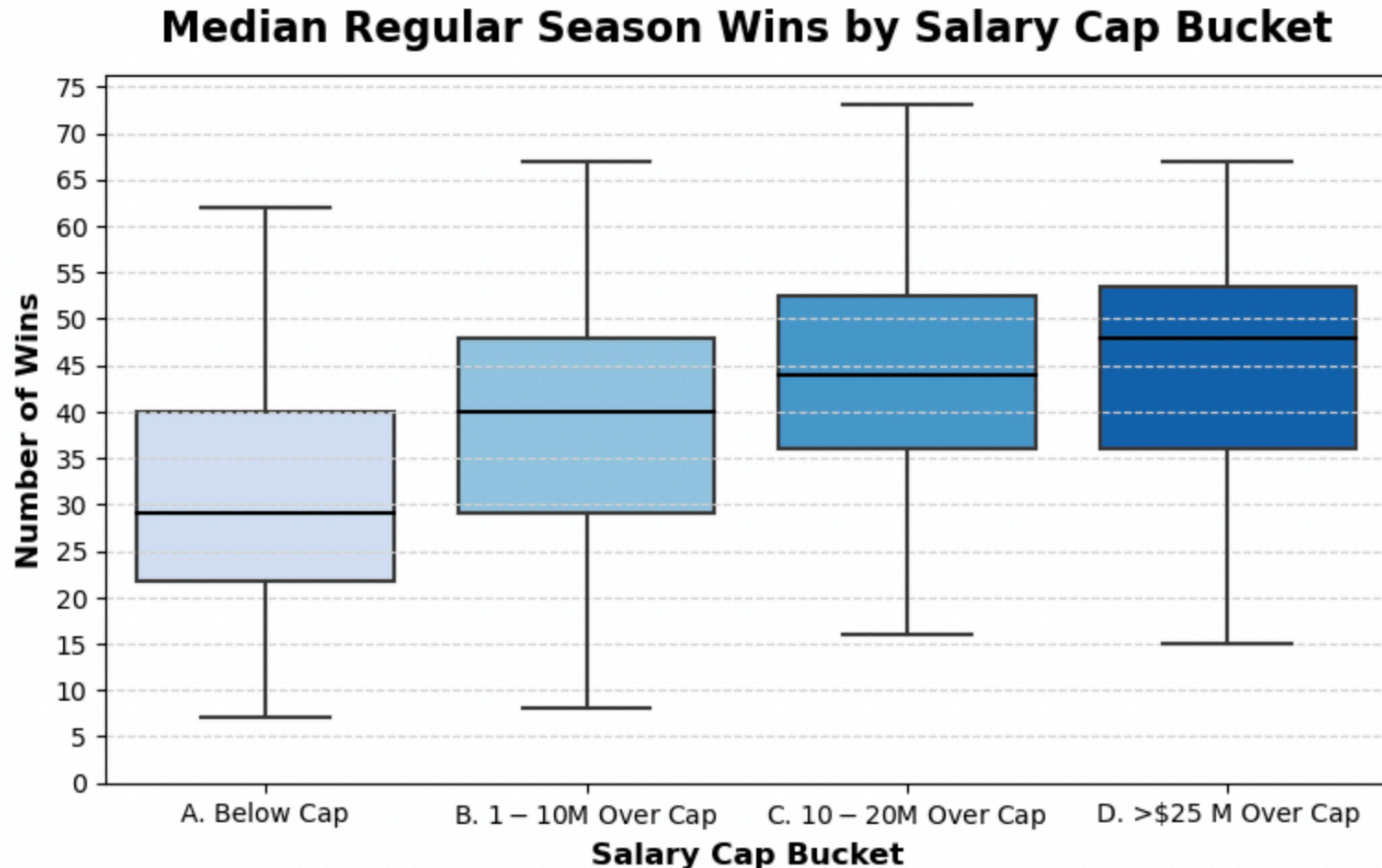
In other words, **as the gap between a team's payroll and the salary cap grows, so does their number of wins**.

Salary Cap Status & Number of Wins

What is the relationship between team payroll and number of regular season wins?

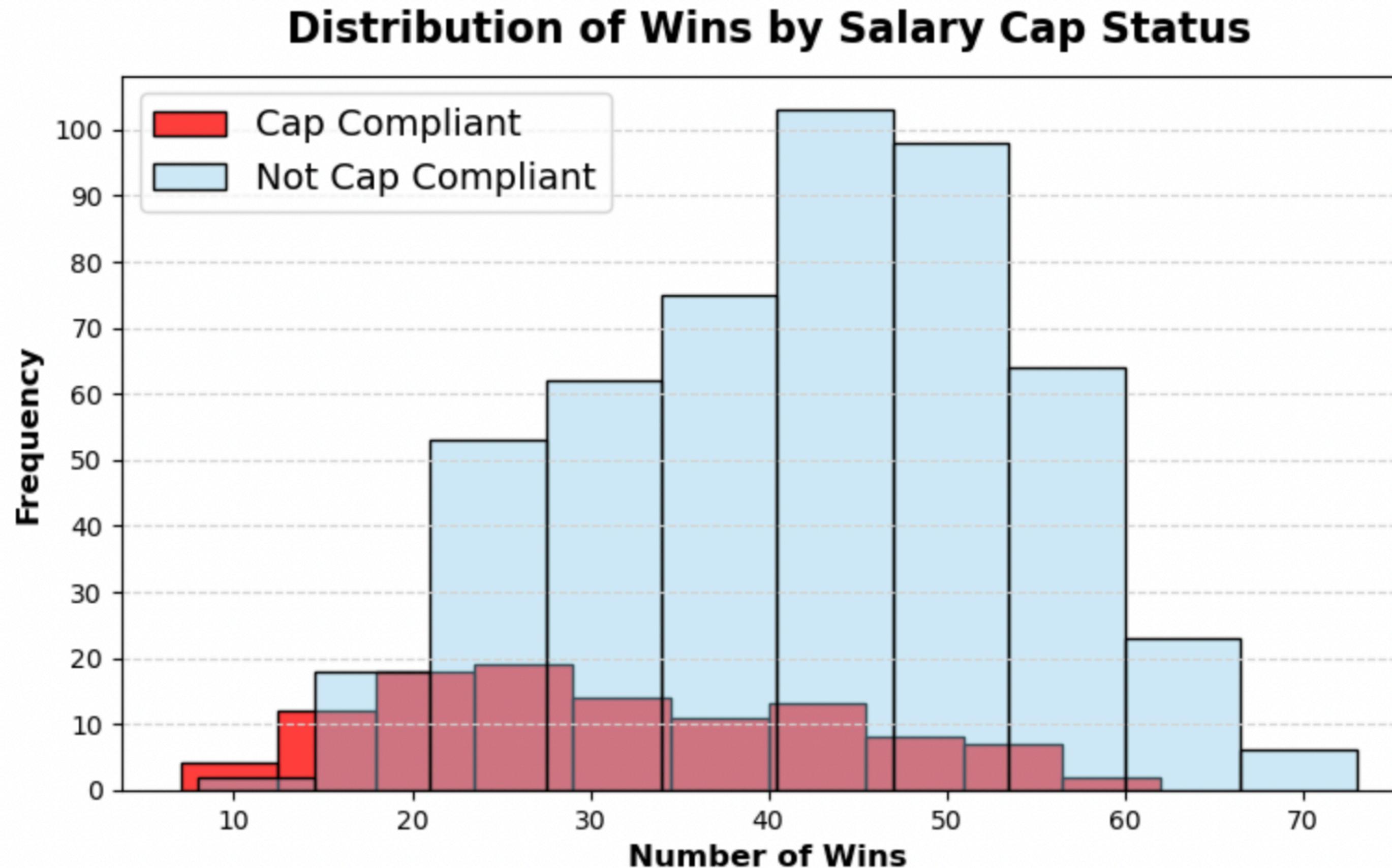
Similarly with average regular season wins, **as teams go further above the salary cap, their median wins increase.**

However, the range of wins for teams in bucket C, \$10-\$20M above the cap, skews the highest.



Salary Cap Status & Number of Wins

What is the relationship between team payroll and number of regular season wins?



Teams who are not cap compliant (above the salary cap), **win larger numbers of games more frequently**.

For cap-compliant teams, the most frequent number of games won is around **25**, whereas for non-compliant teams, it is around **45**.

Moreover, no cap-compliant team has ever reached the 70-win threshold.

Team Payrolls & Number of Wins

What is the relationship between team payroll and number of regular season wins?

Season	Team	Payroll (\$M)	Record	Wins	Win %	Salary Cap Bucket
2015-16	Warriors	110.25	73-9	73	89.0	C. 10–20M Over Cap
1999-00	Lakers	93.73	67-15	67	81.7	D. >\$25 M Over Cap
2006-07	Mavericks	125.27	67-15	67	81.7	D. >\$25 M Over Cap
2015-16	Spurs	103.73	67-15	67	81.7	C. 10–20M Over Cap
2016-17	Warriors	118.48	67-15	67	81.7	B. 1–10M Over Cap
2014-15	Warriors	87.83	67-15	67	81.7	B. 1–10M Over Cap
2007-08	Celtics	102.80	66-16	66	80.5	D. >\$25 M Over Cap
2012-13	Heat	100.76	66-16	66	80.5	D. >\$25 M Over Cap
2008-09	Cavaliers	121.22	66-16	66	80.5	D. >\$25 M Over Cap
2008-09	Lakers	103.89	65-17	65	79.3	C. 10–20M Over Cap

Every one of the top 10 winningest teams in the dataset were above the salary cap.

8 out of the 10 were at least \$10M over the cap.

Additionally, **6 of these teams went on to win the championship** in the given year.

Championship-winning team

Takeaways

Based on the data, it appears that teams with higher payrolls, specifically those above the salary cap, win more games in the regular season, on average.

- If this is indeed the case, teams hoping to make a championship run are justified in their action of spending more money on personnel and going above the salary cap.

More research and further analysis would be needed to confirm this hypothesis, including:

- Additional consideration for cap exceptions
- Other factors in wins (coaching, home court advantage, schedule, etc.)
- Injury history
- 2-way player consideration
- Etc.



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