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**Does Money Buy Championships**

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**Abstract**

This paper examines the relationship between Major League Baseball (MLB) salary and team performance. Baseball is the only major sport in the United States to not have a salary cap, meaning that teams could spend more money on players than other teams can afford. After this 2023 MLB season, the first half-billion-dollar contract may be written, setting a record in baseball history forever. With baseball players costing more than ever, does pay for higher quality, more expensive players result in a higher win percentage? Or in other words, does money buy championships?

Incorporating data collected from the 2022 season, along with the last 20 seasons prior, this study demonstrates that there is a relationship between team salary and win percentage. Team ownership and franchise dynasties do come and go and every team can draft and develop young, inexpensive prospects, but teams that spend more money on their players tend to outperform those who do not. Due to the human nature of the sport, along with playoffs and MLB rules such as salary tax, paying for the best team does not guarantee a team a championship.

**Does Money Buy Championships**

Baseball is a sport that has recently revolved around money and data analytics. The purpose of this capstone project is to combine the use of data analytics to analyze the sport of baseball, specifically in terms of analyzing if money buys championships. Since its creation in 1846, baseball has seen various rule changes, historical cultural changes, and from a business standpoint, financial changes. Dating back to 1871, the first one-season baseball contract was constructed for Sam Jackson of the Boston Red Stockings. The year deal totaled $750, which was slightly greater than the average United States salary. Today, professional baseball players accrue million-dollar salaries for the elite, continuously setting record deals. The most recent superstar salary for the game of baseball was signed this year at a towering 360 million dollars, across nine years Aaron Judge of the New York Yankees.

Along with the financial adaptations baseball has seen, there has also been a revolution in the need for data analytics in the sport. In just the last five seasons, Major League Baseball teams have hired a staff of analysts to best help its program succeed. These analysts are involved in much more than front-office duties as seen in *Moneyball,* a movie about the Oakland Athletics battling salary issues and using statistics and analysis to face off against the salary giants of the game. But have grown to make an on-field difference to help win championships. Using data analysis, the age-old question of, does money buy championships will be answered.

Unlike other sports, baseball does not have a salary cap. A salary cap is similar to a wage cap, which is a written rule or a legal statement that limits how much an employee, or in this case, a player can earn. Most professional sports organizations have salary caps in hopes of creating competition and discouraging all the best players from going to one single team. Over the last couple of years, a few Major League Baseball (MLB) organizations have opened their pocketbooks to bring in all-star-level talent in hopes of bringing home the championship at the end of the season.

**Problem**

Baseball is a sport that has been statistically driven since its creation. Newspapers highlight the game from the night before, along with some sort of statistics about the team and its top players. With statistics exists data. Statistics produce data of value, they help predict future events based on the past. The purpose of this data project is to provide financial insight to baseball organizations. Since money has been a topic in the world of baseball for the last couple of decades, the question comes, does baseball buy championships? Does simply purchasing better players, and investing in the program's prospects give teams a better chance at winning the World Series at the end of the year? Is money the true king of the sport?

**Objectives and Goals**

With the help of baseball data along with other outside resources, the objective of this project is to provide the Major League Baseball teams and other non-salary capped organizations confidence to answer the question, does money buy championships? To achieve this goal, there are many supporting facts and figures that will need to be presented to the reader to build that confidence. First off, understanding the history of baseball salaries will be critical. With the history of salaries comes the understanding of the sports salary caps, luxury tax, free agency, arbitration, team payroll, and other Major League Baseball (MLB) specific terms and rules. This will allow the reader to understand why and how so much money is spent on the game of baseball.

Further points can be made through visualization, baseball salaries can be compared to the median United States income, the NASDAQ, or other industries to fully comprehend the full change baseball has taken over the last fifty years. Another valuable visualization would be seeing the number of wins versus the team's salary. This can be compared to different eras of baseball or other comparable sports that do not have salary caps. Other analyses will include the effect of long-term money, meaning teams that have more long-term contracts versus teams that use short-term deals to keep players. Along with understanding the power of money in the MLB. In the end, the goal is to prove or disprove, if many can buy championships.

**Overview of Study**

Baseball teams have been separated into two categories, small-market, and large-market teams. A large-market team is centralized on location, meaning that bigger cities have larger markets such as New York and Los Angeles versus small-market cities like Cincinnati and Milwaukee. However, the market size does not necessarily represent the amount of money a team can spend on its players, San Diego is ranked 27th in market size but has the 3rd highest payroll in all of baseball. An organization should use this study as proof that teams are not limited by their market size. Teams should, no matter the market size, be willing to spend money on their organization and players. If the analysis is proven to be false, and spending more money does not correlate the more wins and more championships, then it could be used as a way for the small market teams to defend themselves and their current strategies.

**Research Questions and Hypotheses**

The purpose of research questions is to center the research on one specific question. Research questions should be clear, focused, concise, complex, and arguable. The purpose of this capstone, does money buy championships, is a start, but not a finalized research question. To become more clear, focused, concise, and arguable these are the two research questions on which the project will focus:

1. Did MLB salaries have a relationship with team performance during the 2022 regular season?
2. Throughout the last 20 seasons of MLB baseball, is there a relationship between team salaries and team performance defined by winning percentage?

**Hypotheses**

Now the two research questions have been developed, hypotheses should be created. The purpose of a hypothesis is to test the statement and determine if there is statistical significance. If statistical significance is found, then the hypothesis is proven to be true. While creating hypotheses, each research question is given an alternate and null hypothesis. An alternate hypothesis answers “Yes, there is significance” whereas the null hypothesis answer “No, there is no significance”. In the statistical world, the significance is based on a population. While performing hypothesis tests the goal is to make inferences about the population based on a sample, rather than the actual complete population. In terms of this research project, the sample is limited to the number of years contract data is available, along with the 30 teams that participate in the Major League Baseball organization. The following are the alternate and null hypotheses for this capstone project:

1. Research Question: Do MLB salaries have a relationship with team performance during the regular season?

Ha: MLB salaries do have a relationship with a team's win/loss percentage during the regular season.

H0: MLB salaries do not have a relationship with a team's win/loss percentage during the regular season.

1. Throughout the last 20 seasons of MLB baseball, is there a relationship between team salaries and team performance?

Ha: With the data collected from the last 20 seasons, there is a relationship between team salaries and performance.

H0: With the data collected from the last 20 seasons, there is no relationship between team salaries and performance.

**Literature Review**

The purpose of the literature review is to have a discussion that surrounds the capstone problem and research and how other research can lend to the research needed for this capstone project. The capstone project is, Does Money Buy Championships? Throughout the previous modules, it has been specified that the project is focused on MLB team salaries relating to World Series Championships, along with regular season wins. To support the problem and research, four scholarly articles were selected. These articles are related to salary caps in sports, MLB contract durations related to investment quality, how much to play players, and salary dispersion related to team performance.

Three out of the four major sports in the United States (football, basketball, and hockey) use a salary cap to ensure teams are fairly paying their players. Salary caps force teams to budget resources but more importantly allow for smaller market teams to compete with larger markets while creating a better, more competitive viewing experience for the fans. Walter (2020) examines the emphasis that salary caps exhibit on the competition. Major League Baseball (MLB) does not use a salary cap and at times causes small-market teams to fall off in terms of competition, whereas large-market teams have a better chance of winning. The article captures the point of view of the fan, emphasizing the point that sports should have the intention of competition between players, and not front offices. Another purpose of this article is to introduce to “luxury tax” concept to readers, which is MLB’s version of controlling teams from overspending.

MLB attendance is a large factor in how teams make money. If no one shows up to the games, there’s no point in playing the games. With this discussion of salaries, it is important to discuss methods, or ideas, of how to distribute payroll. This article’s purpose is to find a correlation between team payroll and MLB attendance (Rivers, 2002). In a way, this theory correlates directly to team payroll and team performance. Further discussion can be had on how MLB teams distribute payroll, along with what fans look for during a ballpark experience.

From the original business case paper, it was discussed that investing in young talent can better help teams in the long run. This fact goes against the higher payroll correlating with more wins but is still a point that should be made (Barden, 2021). The amateur draft is the future of the organization. This study examines team characteristics such as small-market versus large-market and how their likelihood of selecting risker players in the draft. This article offers significant insight in terms of payroll advantages and disadvantages of how it affects the long-term behavior of the club.

The research article “Compensation and Performance in Major League Baseball: Evidence from salary dispersion and team performance” concentrates on salary dispersion and team performance (Tao, 2016). The research done in this article is very similar to the research in this capstone project but ends in 2013. Having nearly ten years of data adds support to the research and overall hypothesis. This article also introduces tournament theory and team-cohesiveness hypnosis. Both of these theories can help support the difference between small-market teams and large-market teams, in how they prefer to structure contracts and theories to win championships. These two theories also offer a deeper understanding of team salary versus the black-and-white simple regression.

**Research Design**

For the first research question, do MLB salaries predict team performance? There are a few different statistical tests that will be run to determine significance. These tests include simple linear regression, simple linear regression models over time, and regression models. For the salary giving a team an advantage, the statistical tests will include simple regression models, and a correlation (Pearson’s) test. As research continues forward, these tests may change or adapt over time.

With the research questions narrowed down, the hypotheses created, and the dataset selected, the research method that will be used for this capstone project is quantitative. Quantitative research revolves around experiments and database reports. This research type is often presented in the forms of figures, graphs, and numbers and leads to numerical analysis such as determining how long it takes to get to work every day. Furthermore, quantitative research is common when researchers are wanted to confirm or test a hypothesis, similar to this project.

**Limitations**

There are no true limitations to the data, dataset, or gathering of data for this project. Baseball has a rich history of data, along with multiple databases that support one another. Not The only limitation there is on the research project would be time itself. Payroll and team performance are only a scratch on the surface in terms of exploring what contributes to teams winning games. Team payroll was the major variable used in this research but it could be taken to a player level, along with what determines and influences a player’s contract. Usually, a current year’s performance determines the future contract, but there’s also influence from sheer potential where players are obtaining longer and larger contracts than ever. Furthermore, factors such as play bonuses could be considered such as reaching a personal milestone or winning a league title.

**Ethical Considerations**

Ethical considerations are related to how data is collected, stored, and exchanged. Due to the publicity of MLB along with being mostly related to finance along with performance evaluations, there are no ethical concerns with the datasets needed for this research project. Since the data is related to people, being player salary, there is still ethical importance to the project along with the data. It is important to consider that the players consented to have their contracts publicly published in terms of years and dollars. Ethical considerations are important and should be followed during the data collection, exchange, and sharing process. During research and analysis, people’s data must be protected, the subjects of the research project have the right to transparency, and finally, they also have the right to privacy. Throughout the research so far, it seems all the data is public information, in addition, it seems that the only information being shared about the player's contract is the money and length of the deal. No other personal or identifiable information is shared.

Before diving into the analysis, a quick reference of key terms is listed here for help. Win percentage is the number of wins a team has divided by the total number of games played. A salary cap is a limit to how much a team can spend on its player. A luxury tax or Competitive Balance Tax is a tax imposed on teams who exceed the payroll limits for that year. The tax rules are used to create better competition between small and large market teams. In 2022 baseball clubs that exceeded the luxury tax threshold of $230 million face penalties depending on how high over the threshold they go, along with if they have done it in consecutive years.

**Findings**

Does money buy championships? To determine so, along with proving or disproving the hypotheses, statistical tests were performed. The first step examines the 2022 season, using a scatterplot to visualize the winning percentage of every team versus the team’s total payroll for the season.

**Figure 1**

2022 Win Percentage versus Payroll

**Timeline

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**Chart 1**

Win Percentage and Payroll Pearson Correlation

Table

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Figure 1 shows the results showing a somewhat positive correlation meaning that payroll slightly correlates with win percentage. Teams that are listed in the bottom left quadrant are considered “Cheap Team” as they had a low payroll that results in fewer wins; Pirates and Athletics. The top left quadrant is thoughts as “Overpriced” meaning that the team had a high payroll and still results in a lesser performance, such as the Angels and Red Sox. The bottom right quadrant is “Bargain” teams, where a lesser payroll results in more wins; Guardians. Last is the top right quadrant known as “Contenders” more money, and higher winning percentages; Yankees and Dodgers. Although there is a positive correlation, this does not mean causation. Increasing the team’s payroll based on the results of the 2022 data will not guarantee a team a higher percentage.

**Chart 2**

2022 Payroll Summary Statistics



The second test was to examine the last 15 seasons and determine if the teams with the highest salaries would be the same teams winning the World Series each year. Between 2018 and 2020 there was a stretch where teams that were in the top five for payroll were winning the world series, however, looking at the last fifteen years, there would be one other time where that occurred. Figure 2 shows the distribution of the MLB team’s payroll in blue, with the orange marker being the World Series winner of that year. Although there were only a few occurrences where the top few teams found themselves winning the World Series, there are fewer occurrences where a team at the bottom fourth of the payroll comparison won. Having the highest payroll does not guarantee a World Series win, but this does prove that being the bottom-fourth of the payroll will not do a team any favors. Beyond the scope of the chart, dating back to 1990, there was only 1 team dating back to 2003 where the World Series was won by a team with a below-average payroll.

The last test is a combination of the previous two, examining a team's performance based on winning percentage compared to payroll. Recreated using R, inspired by “On If and How MLB Salaries Predict Team Performance” (Kanevsky, 2018) shows the distribution of regular season winning percentages compared to the team's payroll. Similar to the data seen in just the one-year view of 2022, Figure 3 shows that slight, positive correlation. Keep in mind, the data will be slightly skewed due to salaries heightening over the last decade. MLB payroll has increased dramatically with teams now paying more than ever, which will continue as the value of the dollar and players increase as the sport continues to grow.

**Figure 2**

World Series Winner Compared to MLB Payroll

Chart, scatter chart

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**Figure 3**

MLB Team Payroll versus Performance

**Chart, scatter chart

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Circling back to the hypotheses of the portfolio project, the first hypothesis was, do MLB salaries have a relationship with team performance during the regular season? The null hypothesis is rejected, stating there is significance between team payroll and win percentage. For the second hypothesis, throughout the last 20 seasons of MLB baseball, is there a relationship between team salaries and team performance, the null hypothesis is also rejected. The three tests performed during this project prove that money does have a positive effect on winning percentage. As stated earlier in this discussion, having the highest payroll does not and will not guarantee a team to win the world series, but having a high payroll tends to positively correlate with a higher win percentage and give teams a better chance of making the post-season and in turn, the World Series.

**Conclusion**

The objective of this capstone is to provide owners of MLB teams with confidence in spending more money on their teams to win more games. After defining research questions and hypotheses, data was collected, and the focus pivoted to either proving or disproving the hypotheses. Thanks to baseball’s rich history, team, and financial data was collected from various sources. With the use of data analytics, statistical tests were performed to determine if money buys championships. With the data collected from the last 20 seasons, along with the analysis performed in this capstone, there is proof that a relationship between team salary and team performance is positive. This means teams have the analytical proof that spending more money on its team will give them more opportunities to win more games, and in hopes, win the World Series.

**Recommendations**

Since it has been proven yearly that payroll does positively affect a team's win percentage, future research is necessary to find out how to best optimize this. Although teams do not need to be the biggest spenders, they should find a way to best optimize their markets. The San Diego Padres are listed as one of the smallest markets in 2023 but yet hold one of the highest payrolls this season. Would this be a poor assessment of market value, or are the Padres finding ways to better themselves by using the cards they are dealt? Beyond the team data, it would be interesting to analyze player data and determine what players are worth. Is there a way to correlate a player’s salary to the number of wins? Further research could also be done on players’ bonus structures. Teams always have a bonus in place for winning a certain number of games, their division, and of course the world series. Lastly, it would be interesting to take this research into other sports, as well as other baseball organizations around the world. It’s quite possible that a model similar to this one can be shown for sports with salary caps. This project is an early sign for teams to not be afraid to spend more money and invest in the ballplayers and fans that make the sport of baseball so great.

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