Analysis of a Betting Strategy in Sports

Vidhi R. Mistry

Northeastern University

Abstract

This project analyzes the betting strategy for a best-of-three baseball series between the Boston Red Sox and New York Yankees. Part 1 assesses the probability of the Red Sox winning based on home game advantage, calculating the expected net win, and conducting a chi-square goodness-of-fit test. In Part 2, the analysis is further extended to consider the Red Sox playing away. Lastly, Part 3 explores the probability in a best-of-five series. The results display favorable betting conditions, providing insights into possible outcomes and providing a strategic approach to maximize expected net win in different series scenarios.

Keywords: Baseball series, Betting Strategy, Probability Analysis, Chi-square test, Random Values, Confidence Interval, Strategic Approach

Applying Probability Theories to Sports Betting Scenarios

This project shades a light on the application of probability theory to sports betting scenarios. It showcases how probability theory improves understanding of event likelihood and uses software for efficient calculations. The project aims to demonstrate the practical integration of probability theory in the context of sports betting.

# PART 1

In this analysis of the best-of-three baseball series of the Boston Red Sox and the New York Yankees, several key metrics were calculated to evaluate the betting strategy. The calculated probability of the Red Sox winning the series was approximately 56.64%. This probability was derived based on the individual probabilities of the Red Sox winning both games in their home stadium and the Yankees losing their home game. The expected net win, representing the average monetary outcome per bet, was computed to be -$362.104. The negative value projects an expected loss per bet, suggesting that, on average, the betting strategy may not be financially favorable. The high standard deviation of $368.9482 focuses the considerable difference in potential outcomes, showing a high level of risk associated with the betting strategy. The 95% confidence interval for the expected net win ranges from -$520 to $500. This wide interval further highlights the uncertainty in the betting strategy's profit. The chi-square goodness-of-fit test, with a calculated statistic of 36949.96 and a p-value of 0, indicates a significant difference between the observed and expected frequency distributions. This questions the validity of the chosen probability distribution for net wins.

In summary, the analysis suggests that the betting strategy, as currently structured, may not be giving financial advantages, as the expected net win is negative and the variability in outcomes is substantial. The results underscore the importance of considering risk and uncertainty in sports betting strategies. This can lead to a re-evaluation of the approach of alternative strategies to improvise potential profit.

## PART 2

In Part 2 of the analysis, the betting scenario was reconsidered, considering the probability of the Boston Red Sox winning away games. The calculated probability of the Red Sox winning the series under given conditions is approximately 9.12%. This reduced probability is influenced by the reverse likelihood of the Red Sox winning away games compared to their success at home. The adjusted betting strategy results in a negative expected net win of -$426.976, showing that, on average, the revised strategy would yield a loss per bet. The standard deviation of $293.6512 suggests a moderate level of variability in outcomes, reflecting a little less risky proposition as compared to the original strategy in Part 1. Comparing the results of Part 1 and Part 2, it is obvious that considering the Red Sox's performance away has a notable impact on the overall profitability of the betting strategy. The reduced probability of winning and the increased expected net loss highlight the significance of home-field advantage in shaping the outcomes of the series.

In conclusion, the analysis of Part 2 suggests that the revised betting strategy, accounting for away game performance, may not be financially favorable, as the expected net win remains negative. The lower probability and increased standard deviation underscore the importance of carefully evaluating all relevant factors when designing sports betting strategies.

### PART 3

In Part 3 of the analysis, the scope is extended to a best-of-five baseball series, introducing additional difficulty to the betting scenario. The calculated probability of the Boston Red Sox winning the series, now requiring three victories, was approximated to 3.99%. This falling probability is a consequence of the heightened challenge with winning three out of five games. The corresponding expected net win for this extended series was determined to be -$479.2628, indicating an average financial loss per bet. The standard deviation of $199.7308 suggests a moderate level of variability in potential outcomes, signaling a comparable level of risk to the best-of-three series considered in Part 2. Comparing the results of the various series lengths (best-of-three in Part 2 and best-of-five in Part 3), it is evident that the probability of the Red Sox winning decreases as the series becomes longer. This reduced probability corresponds to an increased expected net loss, focusing the increased difficulty in achieving success in longer series scenarios.

In summary, the analysis in Part 3 underscores the impact of series length on the overall betting strategy, with a best-of-five series giving in lower probabilities of success and increased expected net losses. This highlights the importance of considering the format and length of sports competitions when creating betting strategies, as different scenarios display varying degrees of difficulty.

**CONCLUSION**

Concluding the analysis of the best-of-three and best-of-five baseball series of the Boston Red Sox and New York Yankees reveals the complex strategies of sports betting. Despite the initial report in Part 1, the unfavorable expected net win and high variability highlight the risks. Part 2 emphasizes the impact of home-field advantage, while Part 3 underscores the challenges of longer series. The project lights up the importance of strategic conversions and comprehensive evaluations in increasing potential profits in sports betting scenarios.

References

1. Ross, S. M. (2014). Introduction to Probability Models (10th ed.). Academic Press.
2. Kaplan, R. S., & Norton, D. P. (1996). Translating Strategy into Action: The Balanced Scorecard. Harvard Business Press.
3. Evans, J. (2012). Statistics, Data Analysis, and Decision Modeling. Pearson.

Footnotes

1. All probability calculations assumed of independence between individual game outcomes, and the actual dependence structure of baseball games may vary.
2. It is assumed that the outcomes of the games are independent of each other.
3. The use of net win values of $500 and -$520 simplifies the analysis and corresponds to the specified betting scenario. Real-world financial considerations may differ.
4. The chi-squared goodness-of-fit test assumes the validity of the chosen probability distribution, and deviations may occur due to factors not considered in the model.
5. The analysis focused on the specific probabilities provided for home and away game outcomes. These probabilities may vary based on team performance, player injuries, and other dynamic factors.
6. The expected net win and standard deviation provide insights into the average outcome and variability but do not guarantee specific future results due to the inherent uncertainty in sports events.
7. The calculated probabilities and expected values are based on historical or hypothetical data and may not accurately reflect future outcomes or changes in team dynamics.
8. It's essential for individuals engaging in sports betting to consider responsible gambling practices and be aware of potential financial risks associated with betting activities.

VISUALIZATION OF BETTING STRATEGIES OF PART 1,2 & 3

A graph of a number of different colored bars

Description automatically generated with medium confidence