Analyzing MLB Contracts:

Offensive Production with WAR Throughout Contract Lifecycle

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FURMAN COMPUTER SCIENCE

Background

In December of 2023, Japanese superstar Shohei Ohtani signed a massive 10-year 700 million dollar contract with the Los Angeles Dodgers, the largest in sports history. While Shohei Ohtani's contract is a definitive outlier, the baseball world has become increasingly accustomed to seeing contracts totaling in the hundreds of millions of dollars. In this work, we set out to quantitatively determine how well MLB (Major League Baseball) players perform during their most lucrative contract.

INTRODUCTION

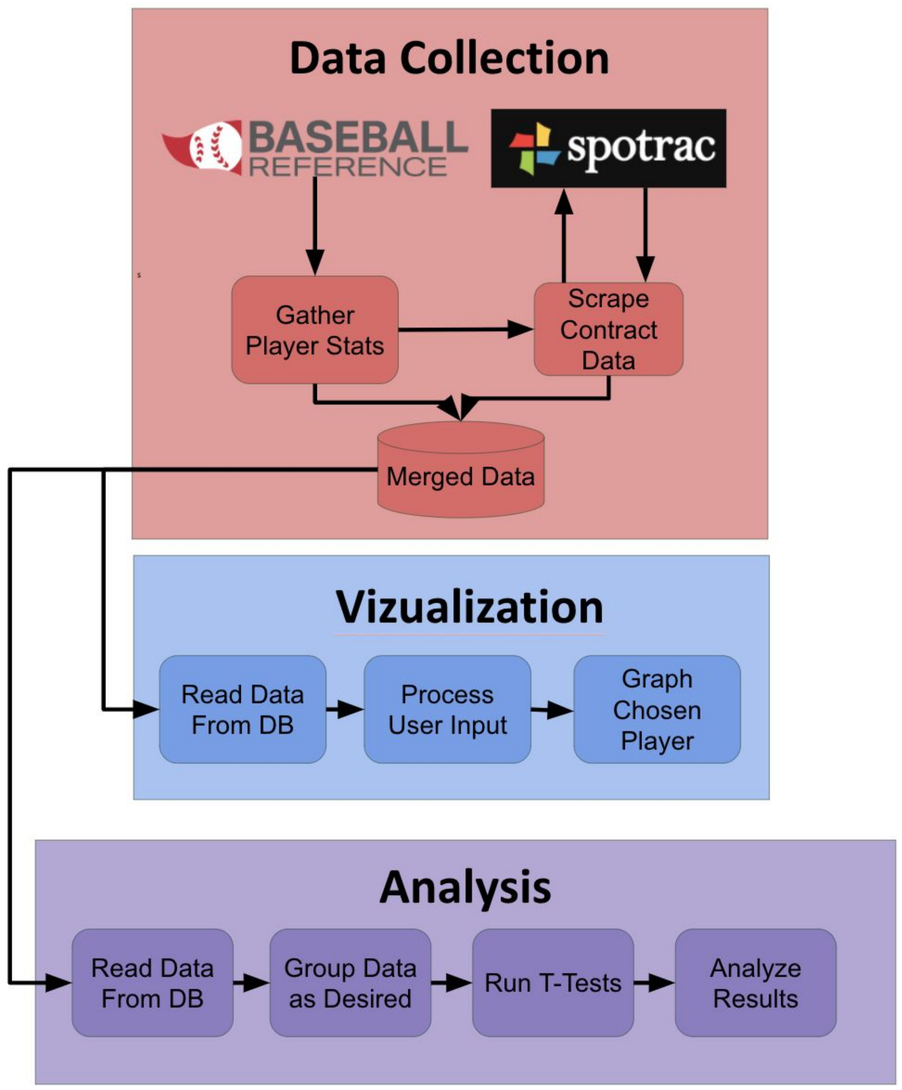
The goal of this research is to determine if MLB players performance fluctuates during their largest contract. Even though baseball is a data driven sport, calculating a player's total value on the field can be quite difficult. Many analysts favor more advanced metrics like OPS+ (standardized On-base + Slugging) or wRC+ (standardized weighted runs created), while a more casual fan may base a players worth on stats like their batting average or total home runs. To combat this, the following visualizations and analysis will be based on a stat called **WAR** (Wins Above Replacement). Although WAR is extremely complex to compute, it is a great comparison metric **(see *What is WAR* header for more information).**

This research uses simple regressions and data visualization to compare MLB players WAR during the span of their largest contract with their WAR before and after their largest contract.

DATA

All of the data collected for this project was gathered from Baseball-Reference.com and Spotrac.com. Individual player stats (WAR) were manually obtained from Baseball-Reference.com's yearly pitcher and hitter *Value Stats* table. To obtain each given players contract information from Spotrac.com, a web scraper was implemented. After data collection was complete, the player statistics data and the contract data were cleaned and merged into one csv.

PIPELINE



What is WAR?

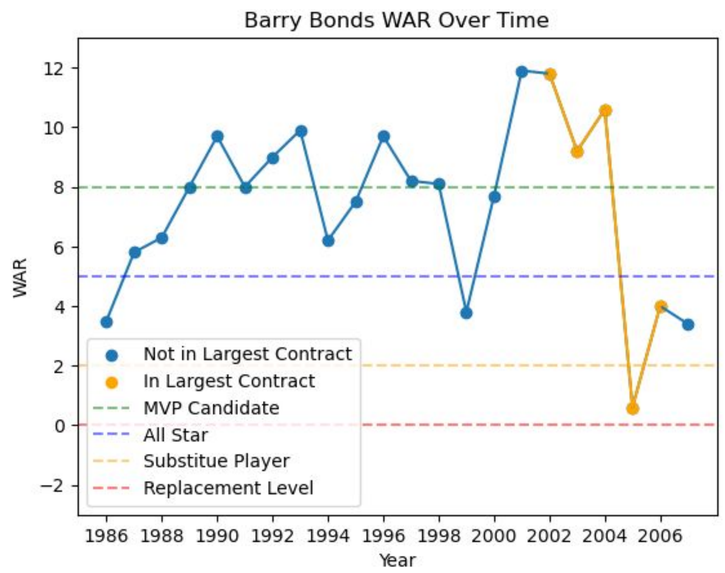
Formula for WAR:

$$WAR = \frac{\left(\text{Batting Runs} + \text{Base Running Runs} + \text{Fielding Runs} + \text{Positional Adjustment} + \text{League Adjustment} + \text{Replacement Runs}\right)}{\text{Runs per Win}}$$

Definition:
"WAR measures a player's value in all facets of the game by deciphering how many more wins he's worth than a replacement-level player at his same position (e.g., a Minor League replacement or a readily available fill-in free agent)." - MLB.com

- **8+ WAR: MVP Candidate**
- **5+ WAR: All Star**
- **2+ WAR: Starter**
- **0-2 WAR: Substitute**
- **< 0 WAR: Replacement Level Player**

RESULTS



Statistical Significance of WAR During Largest Contract

	All Contracts	1 - 3 Years	4 - 6 Years	7+ Years
% Not Significant	88.08%	88.46%	89.73%	82.54%
% Significant	3.84%	3.15%	3.42%	7.94%
% Very Significant	1.82%	0.35%	4.11%	3.17%
% Highly Significant	0.92%	0.35%	1.37%	1.59%
Total Players	468	264	144	60
Note: Total Carear WAR for all players is at least 7.6				

- **Summary Statistics**
  - Total Players: 50,134
  - Scope: Hitters with more than 7.6 career WAR from 1985 - 2023
  - Final Data Set: 468 eligible players

Analysis
- Longer contracts lead to slightly more variance in WAR over time
- 12 - 20% of big leaguers exhibit statistically significant variance in WAR throughout their largest contract
- Average Salary of players with non-significant WAR variance: $14,155,844.81
- Average Salary of player with significant WAR variance: $17,641,097.56

Conclusion

- No more than ~20% of established MLB players will see a significant change (positive or negative) in their WAR during their largest contract
- These findings align with MLB's trend to sign players to lucrative long term contracts as players have an ~80% chance to maintain their current levels of production.

https://github.com/CadenParry/MLB-WAR-Analysis

https://cadenparry.github.io/MLB-WAR-Analysis/website/