Assessing Fund Allocation for MLB Teams

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Abbreviated abstract: In Major League Baseball, sabermetrics has affected the way players, managers, and front offices conduct their business to put a winning product on the field, especially in the last two decades. This project investigates how sabermetrics have changed front office philosophies and payroll by looking at how that change in thinking has affected teams' decisions to allocate its budget when composing rosters.

Related publications:
1. Jensen, Shane and Mulholland, Jason. *Optimizing the Allocation of Funds of an NFL Team Under the Salary Cap.* (2019)
2. Buamer, Benjamin, Jensen, Shane, and Matthews, Gregory. *OpenWAR: An Open Source System for Evaluating Overall Player Performance in Major League Baseball.* (2015)

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Research Design and Literature Review

Research Question: Has Sabermetrics impacted the fund allocation of MLB teams?

Literature Review:

Optimal Allocation of NFL Funds
- ❑ Highlights which positions present the best investment opportunities to maximize winning potential
- ❑ Tests certain assumptions the general public believes to be true (i.e. investing in elite QBs)

openWAR
- ❑ Dives into the concept of player valuation metrics such as WAR
- ❑ Analyzes Player Value relative to peers who play same position

Research Design:

Sample Size:
- ❑ 150 Teams (30 each in Years 2015-2019)
- ❑ 1,139 players over 5 years (3,227 total data points)

Eventually utilize a model taking into account Wins Above Replacement (WAR), Win Probability Added (WPA), and Salary to compare players teemed with Team Success (Wins) to arrive at the **optimal fund allocation**

Average Allocation by Position 2015-2019	
Pitchers	$ 40,740,410.00
Catchers	$ 7,775,783.00
1st Basmen	$ 12,282,432.00
2nd Basemen	$ 8,330,393.00
3rd Basemen	$ 8,936,826.00
Shortstop	$ 6,211,276.00
Outfilers	$ 25,800,577.00
Designated Hitters (DH)	$ 11,400,270.00

Methods

Data Collection:
- ❑ Using a sample size of the past 5 seasons (2015-2019) is sufficient because it reflects current trends in front office philosophy due to the boom of sabermetrics
- ❑ 2015-2019 Player Data Obtained from FanGraphs
- ❑ 2015-2019 Salary Obtained from USA Today

Approach: Analysis Performed in RStudio
- ❑ Cross Referenced Player and Salary Data and Used Players who had listed salaries
- ❑ Assigned Teams to Low, Medium, and High Salary Tiers based on Total Payroll and grouped by Season
- ❑ Found Total Allocation for each Season, Team, and Position
- ❑ Created a Heat Map which Grouped Teams into Salary Tiers and Represents Spending Tendencies of Teams for Each Season

Hypotheses:
1. Despite a lower number of teams in the High Salary Tier, more often than not, most playoffs teams will possess a High Payroll
2. Successful teams are likely to spend the bulk of payroll on Pitching

Histogram of Team Salaries in 2015-2019
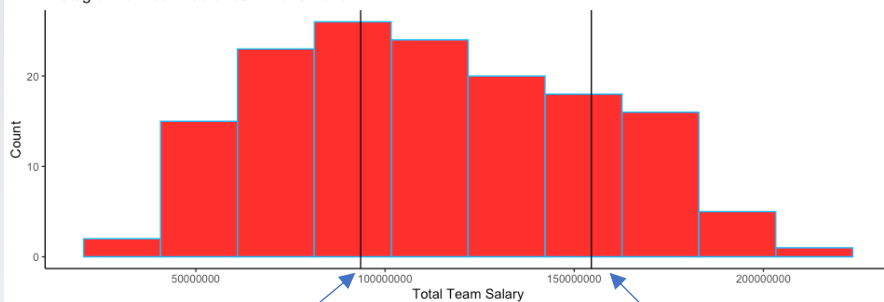
Break Point: Medium Salary: **$93,546,666**
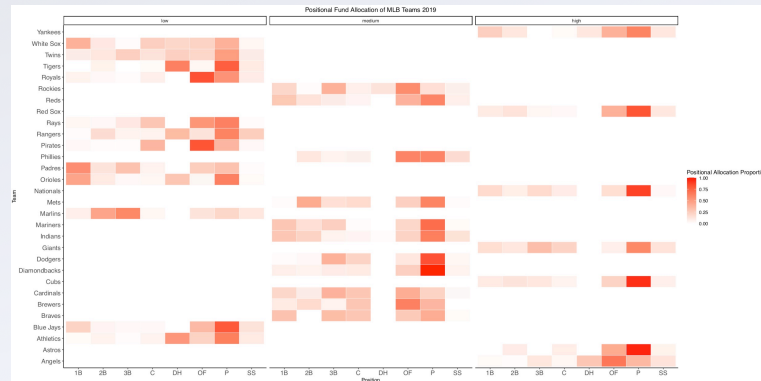
Break Point: High Salary: **$154,521,233**

Results will be in the form of Heat Map comparison between 2015 (when the Sabermetrics boom began thanks to StatCast) and 2019 (when the boom seems to have matured).

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Heat Map Results and Observations

2015 Heat Map

2019 Heat Map

Positional Fund Allocation of MLB Teams 2015

Positional Fund Allocation of MLB Teams 2019

2015: 5 playoff teams (NYY, TOR, NYM, TEX, LAD) in High Bracket, 4 (**KCR**, STL, PIT, CHC) in Medium, 1 (HOU) in Low
2019: 4 playoff teams (**WAS**, NYY, LAD, HOU) in High, 3 (STL, MIL, ATL) in Medium, 3 (TB, MIN, OAK) in Low
Observations on Allocation: 1) Pitching is usually the greatest investment for teams. 2) Throughout the time period, shortstop seems to be the least funded position despite being the most important position on the field.
Comments on League Parity: It seems that sabermetrics have evened the playing field, as 30% of playoff teams came from the low bracket in 2019, showing that analytics departments for teams have bridged the gap between high and low paying teams.

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