Baseball's 3 Most Valuable Position Players

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Overview

Projecting performance
- Projected future performance averaging Marcel projections and player-specific comparisons
- Factored in risk of injury, chance of regression

Projecting salary
- Projected arbitration salary with last year's WAR using FanGraph's arbitration salary model
- Capped the maximum arbitration salary as a function of Prince Fielder's record arbitration salary

Determining value
- Projected WAR multiplied by the value of a win minus projected salary owed.
- Considered volatility due to injury risk

Methodology

Marcel Projection
- Factored in most recent seasons, factor of 5 for last year, factor of 4 for 2 years ago, etc.
- Projected every player to end of contract

Nearest Hitter Model
- Compared with 5 Closest Position Players
- Rate Stats - K%, BB%, wOBA, wRC+, AVG, OBP, SLG
- Counting Stats - HR, WAR
- Same position, defensive value
- Averaged with Marcel projections

Sample
- Top 10 players, by our projection system, in WAR to end of contract as well as several candidates based on service time considerations
- Ideal players were under 27 with multiple years of team control and a strong track record

Risk
- Took into consideration injury history and injury history of players at the same position

Other players considered

Reasoning for exclusion:

Manny Machado
- Injury risk, free agent in 2019

Carlos Correa
- Injury risk, less productive than finalists

Josh Donaldson
- Older, higher salary, free agent in 2019

Bryce Harper
- Drop-off in performance, injury risk, free agent in 2019

Jose Altuve
- Age, earliest free agent in 2018 (2 team options for 2018/19)

Anthony Rizzo
- Age, owed more money, contract covers post-prime years

Gary Sanchez
- Very small sample size, durability concerns with position

Marcel Projection System

1. Project WAR per PA using Tom Tango's formula

   - 2017 WAR/PA =
     (5 * 2016 WAR/PA * 2016 PA + 4 * 2015 WAR/PA * 2015 PA * 2015 PA + 3 * 2014 WAR/PA * 2014 PA) /
     (5 * 2016 PA + 4 * 2015 PA + 3 * 2014 PA + 400)

2. Project plate appearance by using regression on past 3 years of data
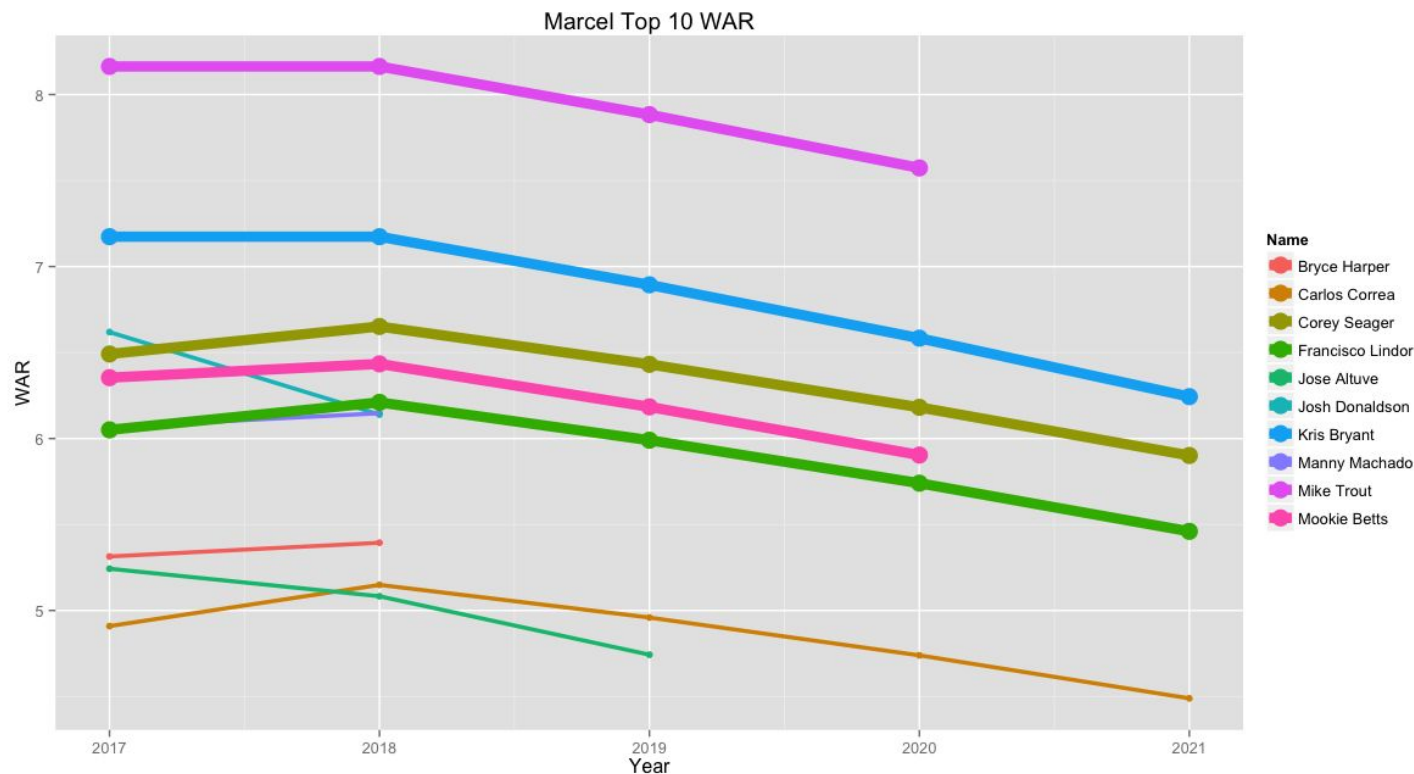
3. Calculate projected WAR per season

   - Projected WAR = Projected WAR per PA * Projected PA

4. Apply standard aging curve using Tom Tango's formula, which is different each year

   - 2017 WAR = 2017 WAR/PA * 2017 PA + (0.1 * (30 - Current Age))
     2018 WAR = 2017 WAR - 0.4 + (0.08 * (29 - Current Age))

Top 10 players by projected WAR to end of contract - Marcel

Marcel Top 10 WAR

Finalists

Mike Trout
- + Best player in baseball, young, contract contains only prime years, durable
- - Money owed, defensive decline, 4 years of control

Mookie Betts
- + Young, one of best players in baseball, durable, diverse skillset
- - Low BB%, pull hitter, 4 years of control

Corey Seager
- + Young, 5 years of control, premier position, durable
- - Relatively small sample, high BABIP

Kris Bryant
- + Young, 5 years of control, 15 WAR in 2 seasons, durable, less diverse skillset
- - K%, pull hitter, Super Two eligible

Francisco Lindor
- + Young, 5 years of control, switch hitter, durable, diverse skillset, premier position
- - Less productive than counterparts, drop in power, relatively poor batted ball profile

Player comparisons

Mike Trout
- Willie Mays, Mickey Mantle, Ken Griffey Jr., Hank Aaron, Frank Robinson

Mookie Betts
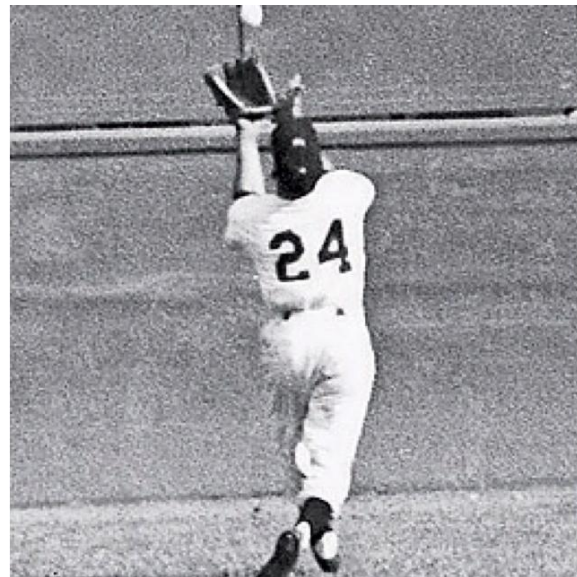- Willie Mays, Duke Snider, Grady Sizemore, Vada Pinson, Ellis Valentine

Corey Seager
- Hanley Ramirez, Derek Jeter, Alex Rodriguez, Troy Tulowitzki, Cal Ripken Jr.
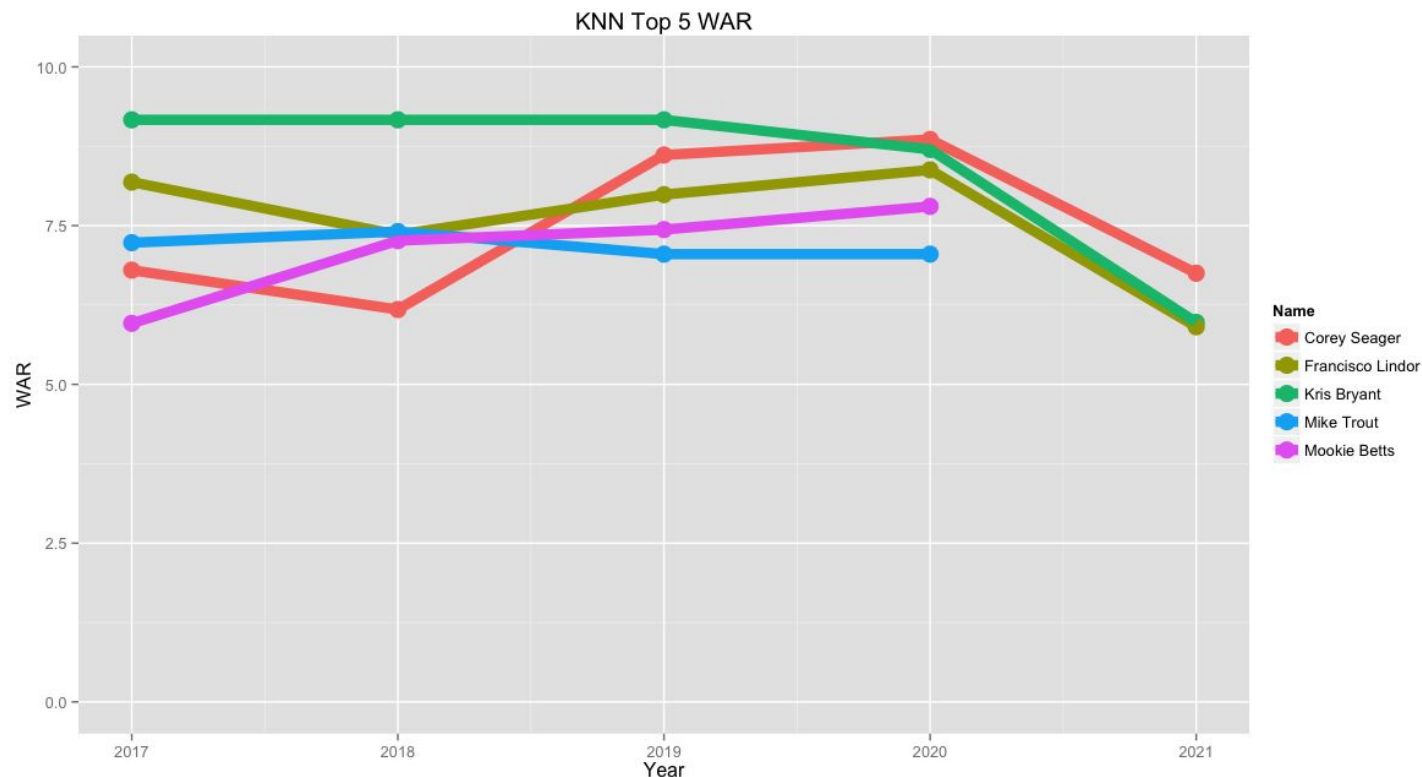
Kris Bryant
- Chipper Jones, Evan Longoria, Mike Schmidt, Jim Thome, Troy Glaus
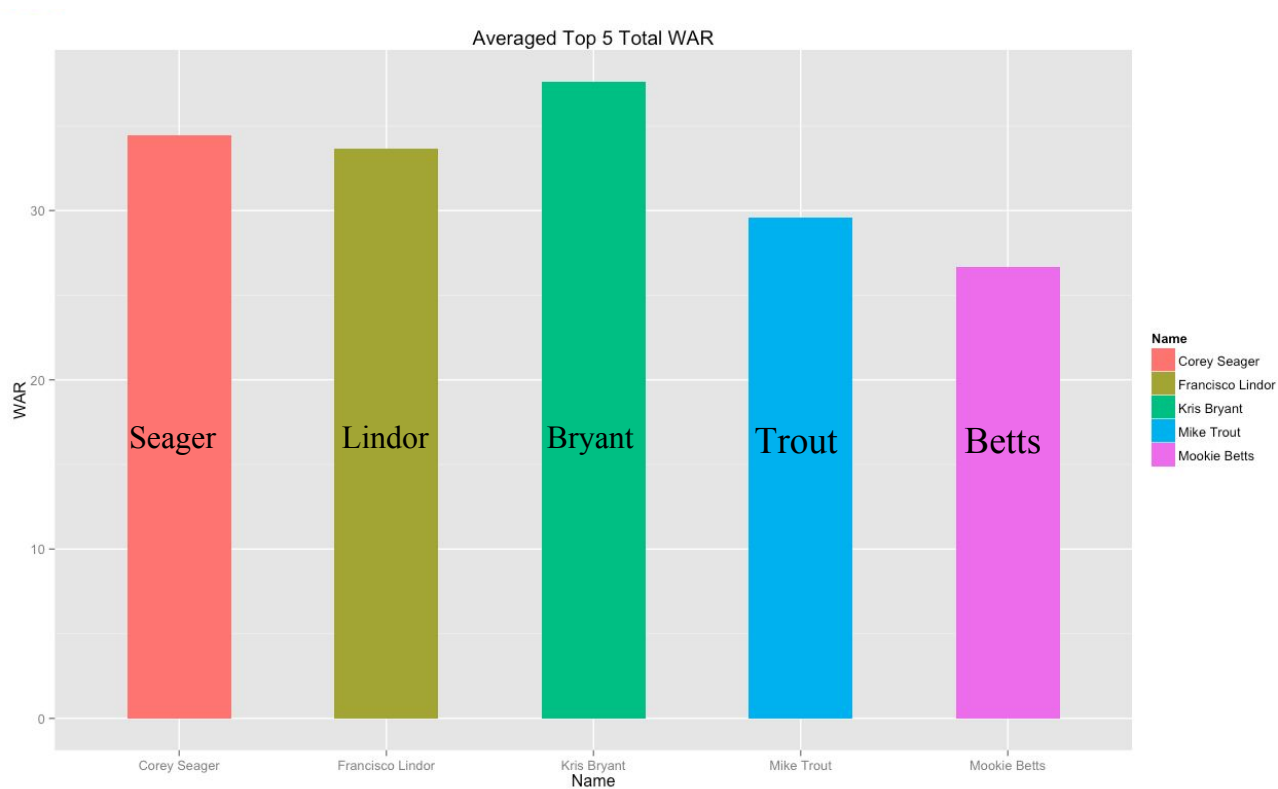
Francisco Lindor
- Jim Fregosi, Troy Tulowitzki, Vern Stephens, Hanley Ramirez, Cal Ripken Jr.

Top 5 players by projected WAR to end of contract - KNN

KNN Top 5 WAR

Top 5 players by projected WAR to 2021- Average

Arbitration projections (in millions)

First Year Arbitration: $f(x)=.479002*e^{\wedge}(.3803*(\text{Prior Season WAR}))$

- Model of arbitration salary based on prior year WAR, per Fangraphs

All other arbitration years: $g(x)=f(x)*1.83$

- Increase salary by 83% thereafter (based on average arb salary increase per Baseball Prospectus)

Salary is capped each season by the function $h(x)=15.5(1.05)^{\wedge}(5+(\text{years since 2016}))$

- Prince Fielder's record salary for arb position players of 15.5 mil adjusted for inflation

Finalists

Player	Projected WAR to end of contract	Projected earning until end of contract	Surplus Value
Mike Trout	29.6	$122,334,000	+100,731,396
Mookie Betts	26.7	$31,276,319	+170,259,289
Kris Bryant	37.6	$84,761,322	**+204,510,052**
Corey Seager	34.4	$51,182,296	**+215,290,045**
Francisco Lindor	33.6	$40,047,876	**+$219,138,348**

Kris Bryant

- Third most valuable asset in baseball
- Projected arbitration
    - 2018: $12.26 million
    - 2019: $21.81 million
    - 2020: $24.04 million
    - 2021: $25.25 million

Performance	2017	2018	2019	2020	2021
Marcel WAR	7.2	7.2	6.9	6.6	6.2
KNN WAR	9.2	9.9	7.5	8.7	6.0
Averaged WAR	8.2	8.5	7.2	7.6	6.1

- Total WAR under contract: 37.6, monetary value added to team: $289,271,374, total money earned: $84,761,321, total surplus: +$204,510,052

Corey Seager

- Second most valuable asset in baseball
- Projected Arbitration
  - 2019: $8.37 million
  - 2020: $15.31 million
  - 2021: $26.50 million

Performance	2017	2018	2019	2020	2021
Marcel WAR	6.5	6.7	6.4	6.2	5.9
KNN WAR	6.8	6.2	8.6	8.9	6.8
Averaged WAR	6.6	6.4	7.5	7.5	6.3

- Total WAR under contract: 34.4, monetary value added to team: $266,472,342, total
  money earned: $51,182,296, total surplus: +$215,290,045

Francisco Lindor

- Most valuable asset in baseball
- Projected arbitration
    - 2019: $6.32 million
    - 2020: $11.56 million
    - 2021: $21.16 million

Performance	2017	2018	2019	2020	2021
Marcel WAR	6.1	6.2	6.0	5.7	5.5
KNN WAR	8.2	7.4	8.0	8.4	5.9
Averaged WAR	7.1	6.8	7.0	7.1	5.7

- Total WAR under contract: 33.6, monetary value added to team: $259,186,223, total money earned: $40,047,876, total surplus: +$219,138,348

Risk Methodology

- Took into consideration player comparisons for finalists based on body types, playing style, and position
    - Found nothing significant

- Examined player's major league and minor league injury history

- For non-injury risk, using player comparisons to project performance took into consideration risk that player would decline year to year

Risk factor for finalists

- No players missed a significant amount of time with injuries in the majors or minors
- Seager and Lindor completely clean in the majors
    - Seager has played 95.8% of games since debut
    - Lindor has played 97.7% of games since debut
- Bryant missed a total of 2 days with an ankle injury, no DL
    - Played 96.8% of games since debut
- Trout had a series of very minor injuries, never been on DL
    - Played 98% of games since the last time he was sent to the minors
- Betts had a series of minor injuries, but never missed significant time
    - Played 88% of games since debut, but most were missed not due to injury
    - 7-day DL following concussion, no recurring symptoms
    - Very minor arthroscopic knee surgery in November 2016

Injury risk by position

Outfield risk factors

- Collisions with walls and other players
- Sliding/diving (wrist injuries)

Infield risk factors

- Hard takeout slides (MI only)
- Awkward landings
- Bad hops

Drawbacks of model

- Small sample size for comparison players

- Strength of comparisons vary

- Lack of comparable players as good as Mike Trout through age 25 (there are none)

- Defense does not pay, as seen with the low valuation for Lindor

- Arbitration model is based off an advanced stat, rather than awards and counting stats usually used in arbitration cases

- Dependent on only one stat

Conclusion

- Francisco Lindor, Corey Seager, and Kris Bryant are the three most valuable assets in baseball, in that order
- 3 very young superstars under team control until 2021

- Relatively cheap contracts, even during arbitration years
- Low injury risk
- Likely to maintain production based on historical comparisons
- We highly recommend that our GM pursue Francisco Lindor