Wins Above Replacement:

The Key Performance Model to Offensive Production and Player Contracts

AP Research

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**Abstract**

This paper investigates the best possible contract structure in terms of length valuation that makes a player more productive, thus looking for the most productive contract structure. Using the WAR sabermetric, the best player in the last four years was determined. Mike Trout had the highest WAR and a contract structure was created for him. Using the averages of all the eligible players of the 2016 season that have been in the league at least four years, Trout’s stat line and contract length and valuation were compared to this data. It was determined that in terms of length, Trout already has the best possible contract as his stats were higher than all averages compared to. As of valuation, using the idea of great productivity at a low cost, trout’s annual salary saw a decrease of about 2 million USD. It is recommended that Trout is used as a model to follow and this type of analysis could offer a possible solution to the guaranteed contract system in the MLB. It is recommended that clubhouses try this method out with unproductive players, as it could bring better numbers to the team. As this research is purely statistical, the analysis could not work out for all the players in the same way as they are all different. It is also recommended that this area is further looked upon to see how effective this analysis method turns out to be.

**Introduction**

Baseball, a sport where statistics are king and determine the success and impact of a player in the league. Based on said statistics fans have for many years argued about the best batter player in said sport.  By comparing offensive productivity (stats produced by a batter) sport broadcasters have made different lists of the all-time greats. Stats not only give an argument for the best offensive statistics, they reward a player with new contract extensions. If a player has a good offensive producing season (high H, RBI and HR totals), he will attract the attention of the other teams in the league. This means that the player will have a high amount of times hits the ball and reaches base safely without aid of an error or fielder’s choice (H), or reach home plate safely and score (HR) and will produce or bat in runs safely when hitting the ball (RBI). In order to fend them off, the team for which the batter currently plays for offer them a contract extension worth large amounts of money. The thing in baseball is that all the money is guaranteed, meaning that when the players sign the deal the team is obliged to pay the settled amount completely. To be able to pay these large amounts of money teams offer multiyear deals and break down the salary of the player over the term of the deal paying each year a settled amount of money. The most recent of these deals is the $325 million 13-year deal that the Miami Marlins agreed on with outfielder Giancarlo Stanton; the biggest deal in sports history.

In recent years, these types of contracts are on the rise. In some cases, the most famous being that of Alex Rodriguez, a large contract sees a decline in player performance. Sturman and Thibodeau (2001) linked contract length with performance. As a contract got longer, there was a hint at a lower return in performance. Krautmann and Oppenheimer (2002) linked contract length and valuation; contract length has a direct impact on player wages. Using these two previous studies Cahill (2014) concluded that once a player has signed a long-term deal worth a large amount of money his offensive performance, in terms of stats like H, RBI and HR, decreases through the duration of the deal. As more long term deals are on the rise, more teams are prone to lose the performance levels of their star players. Some studies (Meltzer, 2005 & Stankiewicz, 2009) link it to age while others (Cahill, 2014 & Surman and Thibodeau, 2001) link it to incentives in contract valuation. The focus of this research is to create a contract structure that fits both the needs of the team and the player and that attempts to prevent the downfall of offensive production that is an increasing problem among clubhouses around Major League Baseball (MLB) as more players are signing greater deals. The aim of the created contract structure is to offer a possible solution to MLB franchises and their players.

**Literature Review**

**Introduction**

Baseball has been studied closely since the signing of the Basic Agreement in 1976. This allowed players to become free agents and negotiate their new contracts with many teams. Better offensive performances, that brought in better stats attracted teams who offered large deals in terms of money, and length in order to keep the player and what he gives off to the team for a good amount of time.  Contracts, player performance and their intricate relationship, have been looked at by other researchers.

**Terminology**

Throughout the history of the sport, many models or statistics have been created to show the offensive performance of players.  The three most common statistics used to measure offensive production are Batting Average (BA) or simply the rate at which a player produces hits, Runs Batted In (RBI) and Home Runs (HR) (MLB, 2016). These are the most used and most common but, these are not quite the best to measure player performance. Bennett and Flueck (1983) studied all the offensive estimators that have been created to measure hitter’s performance. The most complete sabermetric statistic –a mathematical or statistical study of baseball– (SABR, 2017) acknowledged by ESPN and Bleacher Report, is Wins Above Replacement (WAR) which measures the overall wins added by a player to his team over a replacement player. A replacement player could be from the bench or the Minor Leagues (SABR, 2017). In the study, WAR was highly criticized as at that time as there was no standard version of it as three versions were in existence. In 2015, *Fangraphs* and *Baseball-Reference.com* came together and created a standardized WAR out of the three existing versions making WAR the most complete statistic in existence. Ultimately, stats rule baseball and will in the end, decide the contracts that players receive.

**Contract Length and Player Performance**

Previous research using various methodologies, indicated a significant relationship between contract length and player performance. Meltzer (2005), investigated how variations in player performance and other factors such as injuries and off-field incidents have an impact on the contract value and most importantly, contract length of a player. By analyzing data from the 2002 season, Meltzer concluded that young players get long term, low money deals in order to encourage them to improve their performance. Injury prone players and veterans, are given short contracts with a salary that teams think is adequate for the risks of their lagging performance.

Adding on to Meltzer’s idea, Stankiewicz (2009) explored in more detail the actual relationship between contract length and player performance. Stankiewicz studied contract by contract based on player opinion and found out that MLB players prefer a long term contract as there is a guaranteed income over a long period of time. Stankiewicz then backs this up with the finding that a multi-year deal is better than a one-year deal as it increases player performance. Seemingly, players back up that argument for long term deals by outputting a greater offensive production in the long run for the team. Stankiewicz suggests further research as her findings were done on only some players in a very general scope.

Other studies also focusing on length and performance contradict Stankiewicz’ conclusion that multi-year deals in the end give out a higher offensive production for the team. Cahill (2014) and Sturman and Thibodeau (2001), both concluded that players tended to decline in performance once they signed a long-term deal. It is important to note that Stankiewicz used economic theories while Cahill and Sturman and Thibodeau used concrete data to get their findings.  This conclusion is worrying for the MLB as longer and larger contracts are on the rise (Perry, 2014). A meta-analysis with data of the last 120 years by Judge et. al on pay and job satisfaction in all workplaces, (2010) concluded that less than 2% of people are actually motivated by their salaries, and they also did not relate their performance and/or job satisfaction to the increase of their salaries. This shows that higher salaries in any field will have no positive effect on performance, this trend is also apparently true in baseball in accordance to Cahill's (2014) and Sturman and Thibodeau’s (2001) research.

**Contract Length and Valuation**

Research has also established a relationship between the length and valuation of a contract. Krautmann and Oppenheimer (2002) were the first to link contract length with valuation. Their research concluded that there is a positive correlation between length and value. It was also concluded that with any contract, the player will take time to produce the stats that the team desires. Stankiewicz (2009) bases off her conclusion of a multi- year deal being better than a one-year deal on Krautmann and Oppenheimer’s conclusion by arguing that a one-year deal will bring low stats as opposed to a multi-year deal which in the end, will bring better stats. Meltzer (2005) explains that many times these one year contracts bring in high producing seasons as players are seeking new, longer contracts. Meltzer also studied Krautmann and Oppenheimer’s results and concluded that there are two areas of divergence or “exemption of the rule” in terms of contract length and valuation. These are with rookies and injury prone players. Rookies will receive long contracts with a low salary and injury prone players will receive short-term deals with a medium or moderate salary.

Averbukh (2015) looked at Meltzer’s results and attempted to create a contract structure that would assure a good balance between length, valuation, and performance for pitchers including rookies and injury prone players. In his conclusion it is stated that no contract could be created as he failed to consider factors team payrolls. Payrolls matter as these actually determine if a team can actually give a contract to a player. The only conclusion reached is that a team must look for the greatest performance at the lowest cost possible. In previous research, it had been concluded that one had to consider team payrolls as in recent years there has been a polarization or imbalance between team payrolls of over $200 million in the MLB as small market teams cannot afford to pay such high prices to their players. Team payrolls are determined by the team’s financial status and the yearly salary of the team’s 25-man roster. Team payrolls greatly affect contract value and determine the biggest earners in the big leagues.

**Biggest Earners**

As the sport has grown over the years, television and advertising markets of the league have increased, causing the largest salaries in baseball to drastically increase over the years. Using lifetime statistics, Pantuosco and Stone (2010), found that players that have been inducted into the Hall of Fame (HOF) would earn an average of $20 million dollars (2009 dollars) per year compared to $10 million of the 2009 All-Star roster. They also explain that today’s players get contracts based on their performance of their last four seasons, not their lifetime statistics. Many players who have not had HOF worthy careers are earning more per year than some of the best players in the history of the sport. In order to look deeper into current salaries one must go into team payrolls.

According to Brandenhausen (2016) The biggest payroll in the MLB belongs to the Los Angeles Dodgers. In 2016, the Dodgers will give out a total of $267,302,820. The team that will give out the least amount of money are the Tampa Bay Rays with a total of just over $67 million. There is a difference of almost $200 million, which confirms Staudohar’s idea of payroll polarization. Payroll polarization has a big effect on a team’s regular season performance. Schwartz and Zarrow (2009) explored the relationship between payroll of MLB teams and their success in regular season and postseason. It was concluded that the bigger the payroll the more wins a team will typically have in a season. Meaning that the higher a team payroll is, they will have a better record. For example, it is expected that the Dodgers have a better record than Tampa Bay as they have a much higher payroll. They recommend teams to follow what Averbukh concluded: find great productivity at a low cost.

**Contract Structure**

In baseball, two types of contracts exist: signing free agents and the extending contracts of players on team rosters. The average length of the contract signed by a free agent is 1.79 years or 2 seasons. The average contract extension is 4 years (Meltzer, 2005) Contract structures have changed throughout the years. These numbers, average contract lengths, which are the most recent, changes in the 1990s when contract regulations were changed by The Major League Baseball Players Association (MLBPA). After a player strike of 1994-1995 which cut the season in half, Major League Baseball teams started re-signing free agents and new deal structures were created under the basis of demands set by the MLBPA (Staudohar, 1997). With this structure in place a new minimum salary was established at $300,000. Staudohar (1997) also found that since the 1970s the minimum salaries of MLB players has seen a sharp increase of over 10-17% per year. This rise is due to the emergence of free agency which enabled players to negotiate their new contracts. This would mean that the minimum salary of 2016 would be much different to that of 2003 if this trend is still occurring. The minimum salary and contract regulations are designated by the MLBPA and the MLB in their 4-year Collective Bargaining Agreement (CBA). Not only do MLBPA regulations apply, also federal laws like taxes apply. Alm and Kaempfer (2012) found that teams with lower income taxes in their cities will be able to easily sign a free agent as their salary will be much lower. The lower the salary, there will be no risk of luxury tax, a 17.6% charge on total payroll if it exceeds $189 million (Fangraphs, 2017), and teams will save money while getting more players and thus more productivity.

**Conclusion**

With longer and larger contracts on the rise, more players, possibly superstars, could see a drop in performance according to Cahill’s and Sturman and Thibodeau’s conclusions. This could end up being a big problem for the MLB with less action for the fans to see, for teams that pay too much and non-star players who earn a low salary. In her conclusions, Stankiewicz suggested to do further research for only one player and Averbukh could not create a contract structure because it was too generalized for too many players and important aspects as taxes and team payrolls were not considered. In the field of research, no case study on one single player and generating his contract for better production has been made. Based on previous recommendations and gaps of other researchers an attempt will be made to determine a contract structure for one player, that fits both its team and the player, that improves his performance over the years. This could possibly bring in a new horizon for MLB contracts as it could enable small market teams to find or enhance productive players at a low cost.

**Methodology**

**Selection Criteria**

The research was limited to hitters. Some criteria were established to determine players that fit into the sample being researched so statistics best represented the 2016 MLB player averages and contract structures. It was first determined that the players had to have played at least four years in the league as the research question looks to find the most productive player in the last four seasons. It was determined that it would be of the past four seasons as the average contract extension is of four years (Meltzer, 2005). Players who passed this criterion then had to be eligible in the past (2016) season. This was so there existed no outliers with high averages or really low H, RBI or HR totals that could affect the outcome of the final contract structure. The MLB (2016) defines an eligible player as one who has 502 plate appearances. So for a player to be eligible for this research he had to have played at least 4 years in the league and have  at least 502 plate appearances in the 2016 season. 123 players met these criteria.

**Data**

The average of total H, HR, and RBI totals of those 123 players were collected. In order to accurately represent their current contracts, the averages of mentioned statistics was taken out of the elapsed seasons of their current deals instead of the previous four seasons as many players had had either many contracts in the last four seasons and the stats would represent two deals instead of only one, or the player's’ contract was longer than the last four seasons. Basically the averages of the stats generated by a player under his current contract were taken. A formula like this can be used to determine the averages (see Appendix A for results):

*Figure 1*: equation to determine player averages.

(sum of statistic totals of number of elapsed seasons)(number of elapsed seasons)

The next step in the research was to determine the most productive player in the past four seasons. As it is regarded by ESPN and Bleacher Report as the most complete statistic to measure productivity and it was used in Averbukh’s (2015) attempt to create a contract for pitchers, the Wins Above Replacement (WAR) stat was chosen to determine the most productive player. The Average WAR of the past 4 seasons of all 2016 eligible players was taken from Fangraphs (2017).

After determining the most productive hitter, his average stat line was compared to the league average of his position and player status (see *Figure 2*.) This would make sure that his stats and contract structure were being fairly compared to other players as according to Meltzer (2005) there are divergences in contracts and statistics depending on the field position and experience of a player.

In this case Mike Trout went out as the most productive player. So the averages for statistics and contract valuations of all Rookies, Center Fielders and Rookie Center Fielders were taken to produce stat lines depending on CL for each group.  In total 3 stat lines were generated per group with the exception of Rookie Center fielders as only one CL division applied. Contract lengths were divided into 3 categories: 1 year 2-4 years and 5-7 years. Trout’s stat line was compared against each CL and its generated stat line for Rookies Center Fielders and Rookie Center Fielders.

To determine what contract in terms of length best fitted Trout in order to improve or maintain his performance, areas of improvement in terms of stats were looked for. Meaning that if a contract length had better stats that Trout’s stat line that contract should be used. If trout had better stat lines than all, then the most similar stat line will be used. After comparing Trout to the three different groups, a consensus would be reached on which contract best represents his stat line or desired stat line.

The same comparison was made for contract valuation, depending on the length and stats generated a new contract valuation would be determined that made sense with the league average and the team payroll, in this case the Los Angeles Angels. If the stats currently generated by Trout are lower than the average then a lower valuation would be given, if these are higher than a higher valuation will be given. The limitation within this is that there is no point of reference on what the difference between stats actually cost so the valuation will be determined with league averages and the current valuation given by the team payroll as well as being in accordance with the MLB’s minimum salary.

*Figure 2*: Variable Definitions provided by *MLB.com*

|  |  |
| --- | --- |
| Variable | Definition |
| Status | Player status either a rookie (R) which means he has been only the minimum four years in the league or a Veteran (V) four years plus. |
| CL | Contract Length, how much a contract lasts, it is measured in years |
| CV | Contract Value, how much the contract is worth measured in millions of USD |
| H | Hits, the number of times a player hits the ball and reaches base safely without aid of an error or fielder’s choice. |
| HR | Home Run: the number of times a player hits the ball and reaches home plate safely without the aid of an error |
| RBI | Runs Batted In: Number of runs that score safely due to a player hitting the ball or drawing a walk. |

**Results**

To determine who has been the most productive hitter in the MLB in the past four seasons the WAR sabermetric was used.

WAR Results:

Mike Trout had the Highest Average WAR in the past four seasons (9.26), he led the league in WAR in three of those four, meaning that the discussion will focus on how a contract will apply to Mike Trout considering his position as a Center Fielder and experience as a Rookie for this study as well as the available payroll of his team the Los Angeles Angels.

Team Payrolls:

For the 2016 season the Los Angeles Angels had a total payroll of $180,743,007 in 2016. In 2017 it is expected for them to have a total payroll of $150,318,333, as many players have had their contract restructured or have been released, (Spotrac, 2017),which out of that $19,250,000 are spent on Trout’s Salary. The contract created will aim to follow the idea of getting the most productivity at a lower cost, so the contract in the end will try to reduce their total payroll from $150,318,333 to something lower by reducing Trout’s salary which represents 12.8% of the Angels’ payroll. If this is achieved, the Angels will have more space to possibly sign other players that add to the team’s productivity.

An analysis of the different contracts in the MLB was done in order to establish the best possible contract in terms of highest productivity and lowest cost. As Trout is a Center Fielder and a Rookie for this study, he will be compared to other Center Fielders and Rookies in the league. Contract Structures will also be broken down to see which length brings in the most productivity for all Center Fielders and Rookies in the league.

*Figure 3:* Productivity and Contract Value of Center Fielders regarding contract length.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CL | CV | H | HR | RBI |
| 1 | 3.7 | 147.3 | 18.8 | 65.5 |
| 2-4 | 31 (10.3 per year) | 152 | 11 | 53 |
| 5-7 | 108.6 (about 18.1 per year) | 163.6 | 24.9 | 83.3 |

 The 5-7 year contract is the best all across the board stat-wise and thus gives the best productivity for Center Fielders.

*Figure 4:* Productivity and Contract Value of Rookies regarding contract length.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CL | CV | H | HR | RBI |
| 1 | 2.1 | 151.5 | 21.1 | 74 |
| 2-4 | 27.7 (about 9.2 per year) | 155.3 | 25.5 | 81.2 |
| 5-7 | 65.5 (about 10.9 per year) | 159 | 20.3 | 77 |

Both 2-4 and 5-7 year contracts produce similar, and are the most productive contracts for rookies.

*Figure 5*: Average productivity and contract value for players who are Rookies and Center Fielders (excluding Trout; The 5 players that fall into the criteria have a one-year contract.) regarding contract length

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CL | CV | H | HR | RBI |
| 1 | 1.9 | 151.6 | 25 | 69 |

*Figure 6:* Mike Trout’s stat line during the past four seasons was:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CL | CV | H | HR | RBI |
| 6 | 144.5 (24.1 per year, 19.25 in 2016) | 172.7 | 35.3 | 100.3 |

This is how Trout compares to other Center Fielders and Rookies and Rookie Center Fielders:

Mike Trout’s 2016 stat line compares favorably to the average stat lines of center fielders, rookies, rookie center fielders and the average league player.  As for center fielders Trout gets 9.1 more hits, 10.4 more home runs, and produces 17 more RBIs than those under a five to seven-year contract, the most productive deal for an average center fielder. Considering that Trout also has a six-year deal and is producing greater stats than the average center fielder (see *Figure 3*), the current contract length should be maintained so that the previous seasons stats are equaled or even get better.

As of rookies, Trout gets 13.7 hits, hits 15 more home runs and produces 23.3 more RBIs than the average rookie on a 6-year contract. Again, taking into account that Trout’s stat line is significantly greater than the most productive contract for a rookie (5-7 years) in terms of length (see *Figure 4*), Trout’s current contract length should be maintained as during his last years of as a “rookie” his productivity will be greater than the average player and should continue to improve.

When comparing Trout to rookie center fielders, it is difficult to reach a consensus on stat productivity as he is the only player that falls into this category that does not have a one-year contract (see *Figure 5*) making him sort of an outlier. The data would recommend that Trout should be given a 1-year contract as that is what all MLB clubhouses recommend and use for players of his status and field position. Yet, this study aims to recommend new deals to MLB clubhouses to increase productivity, and as *figures 3 and 4* show, the most productive deal for both center fielders and rookies respectively is that of a length between 5-7 years, and this is the one that will be taken for Mike Trout.

It was expected that Trout’s statistics were better than those of the average center fielder as he is the WAR leader. Wins Above Replacement measures the wins that a player adds to his team opposed to a replacement level player, in this case an average player. With this being said, Trout becomes the model to follow in the league, and teams should aim to give average or under average rookies and center fielders a 5-7-year deal to try and maximize their stats in the future. This is a recommendation based purely on statistics, meaning that not all players will respond the same way to the deal, and production will be sprayed all over as all players are different and many on and off-field incidents that could alter a player’s productivity on the field are not taken into consideration. Teams are encouraged to change the most possible deals to that length range to get the best possible productivity, yet it must be taken into consideration that each team must work within its parameters and economic ability as each team has a different payroll.

Trout earns an average of $24.1 million dollars per year and $19.25 million in 2016 (see *Figure 6*). Over his six years on average he would earn $24.1 million a year but because of how his contract is structured he earns different amounts each year. For this comparison the figure of 24.1 million will be used. Trout earns 6 million more than the average Center Fielder and 13.2 million more than double what a rookie earns (see *Figure 4*), both under a 5-7-year deal respectively. Considering Averbukh’s idea of getting the best possible productivity at the lowest possible cost, Trout’s Deal could be restructured to be of a better fit to both the rookie and center fielder categories. Starting with rookies, considering that he is still falls into this category, even though he is producing significantly greater stats, it is ridiculous that he is earning more than double than that of an average rookie (see *Figures 4 and 6*). This number should be brought down to a more reasonable scope.

To set that scope the best possible comparison can be made with the valuation of a 5-7-year deal of a center fielder as these are that stats that are the most similar, and best compare with those of Trout. Trout generates greater stats than the average center fielder, yet the differences are not astronomical, meaning that these are not worth 6 million more per year. As there is no real mark of reference or formula to calculate the best net worth for a contract in comparison to stats, the best possible reference for valuation will be used to determine a new one.

The best reference possible is the contract breakdown given by the Los Angeles Angels. They are currently paying Trout 19.25 million in 2016 as it is how it best suits their payroll, this same valuation is given for the upcoming 2017 season. It is recommended that the team keeps this same valuation for the remainder of the contract which ends in 2021 (Spotrac, 2017). If this adjustment is made, then Trout would earn 19.25 million per year, 1.15 more than the average center fielder and 8.35 more than the average rookie both again, under a 5-7 year contract. It is a significant reduction for the team’s payroll as instead of paying 144.5 million over six seasons, the Angels would pay 115.5 million over six seasons. They will have 29 million available to either sign or extend other players that would give them a greater possibility to win, that without that extra 29 million in space they would probably have to make tough decisions in player handling. Over the next four years, the Angels could look to use those 29 million following the idea of getting the most productivity at a lower cost, to sign other players looking to add stats, and thus wins to their future campaigns. It is also recommended that the Angels keep a single valuation over the six year deal as that way they will be able to determine at the end of the deal if that valuation has gone up or down and then make a new offer to keep Trout.

If the valuation changes over the years, and increases towards the end of the deal, just as in Trout’s case, earning goes from 19.25 million in 2017 to a final valuation of 33.25 in 2021. Taking a non-changing valuation would act as a safety valve for the Angels. In the scenario that Trout’s stats increase up until 2021, his valuation would stand at 33.25 million and the Angels would be forced to start the negotiation from there ending in a ridiculous valuation in accordance to Staudohar’s (1997) idea of polarization which states that one player crams up most of the team’s  payroll making them unproductive. At a valuation of $19.25 million Trout would take up 12.8% of the payroll with a valuation of 33.25, 22.1%.  Instead, with a 19.25 valuation that new valuation after 2021 would be smaller than 33.25 million and the Angels would give up a lot less on cap space, that, again, they could use to sign more players to improve their 25-man roster. This constant valuation is also positive in the event that Trout’s stats went down reaching 2021, the Angels could lower their new valuation from 19.25 instead of 33.25. This would be a more realistic valuation as it is increased or decreased after the deal ends when all the stats are laid out, and not while the contract is currently in place as anything, in or off the field could hinder or enhance Trout’s stats. The recommended contract for the Los Angeles Angels, that would most probably enhance Mike Trout’s statistics, would be a six-year deal with a net worth of 115.5 million and 19.25 million per year.

**Conclusion/Calls for Future Research**

Trout’s stats were greater than the average center fielder, rookie, and rookie center fielder. Due to this it is recommended that Trout is taken as a model player, if a team is looking to enhance its players’ productivity. The most productive deal for both an average rookie and center fielder was that of a 5-7 year length, as Trout has a current contract length of six years it was recommended that the length be kept. As of valuation, it was determined by this research that it was too high for his status, position and even productivity. A 19.25 million valuation per year over the 6 years of contract was recommended, as it still represented a significant amount of money over an average center fielder and rookie, and as a sign of being the most productive player in the league. This new valuation brought a significant decrease to the Los Angeles Angels’ payroll. A constant valuation was recommended as a safety net for the Angels in order to allow flexibility in their payroll at the end of the deal. This analysis could also be done for other players, and it is recommended that it is both tried out, and possibly researched if this new valuation would actually increase Trout’s stats. If it is done for another player, or when checking if this actually works, it must be taken into consideration that this research was purely statistical and that no on or off-field incidents like injuries or steroid use that might hinder or enhance player productivity, respectively, were taken into consideration. As a finishing thought, when attempting to create a contract, one must remember that all players are different, and no consensus can actually be made about a common deal for all players in the MLB.

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Appendix

Appendix A:

2016 MLB Eligible Player Averages and Statistics

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Player | Team | Position | Status (R/V) | CL (Years) | CV ($) | Avg. | H | HR | RBI |
| Murphy, Daniel | WSH | 2B | V | 3 | 37.5 | 0.347 | 184 | 25 | 104 |
| Altuve, José | HOU | 2B | V | 4 | 12.5 | 0.319 | 204.5 | 12.8 | 68.3 |
| Segura, Jean | ARI | SS | R | 1 | 6.2 | 0.319 | 203 | 20 | 64 |
| Cabrera, Miguel | DET | 1B | V | 8 | 248 | 0.32 | 174.7 | 27 | 97.6 |
| Trout, Mike | LAA | CF | R | 6 | 144.5 | 0.3 | 172.7 | 35.3 | 100.3 |
| Ortiz, David | BOS | DH | V | 1 | 16 | 0.315 | 169 | 38 | 127 |
| Marte, Starling | PIT | LF | R | 6 | 31 | 0.296 | 154 | 13.7 | 61 |
| Prado, Martín | MIA | 3B | V | 3 | 40 | 0.297 | 163.5 | 8.5 | 69 |
| Escobar, Yunel | LAA | 3B | V | 1 | 7 | 0.304 | 157 | 5 | 39 |
| Andrus, Elvis | TEX | SS | V | 8 | 118 | 0.279 | 153.5 | 7.5 | 65.5 |
| Beltre, Adrian | TEX | 3B | V | 6 | 96 | 0.308 | 175.5 | 27.8 | 93.8 |
| Canó, Robinson | SEA | 2B | V | 10 | 240 | 0.299 | 187 | 24.7 | 88 |
| Rizzo, Anthony | CHC | 1B | R | 7 | 41 | 0.271 | 156 | 29.5 | 92 |
| Kinsler, Ian | DET | 2B | V | 5 | 75 | 0.286 | 183.7 | 18.7 | 82.7 |
| Posey, Buster | SF | C | V | 8 | 167 | 0.303 | 163.8 | 17.5 | 84 |
| González, Adrián | LAD | 1B | V | 7 | 154 | 0.286 | 168.2 | 22.6 | 100.8 |
| Desmond, Ian | COL | 1B | V | 1 | 8 | 0.285 | 178 | 22 | 86 |
| Donaldson, Josh | TOR | 3B | R | 2 | 28.65 | 0.291 | 174 | 39 | 111 |
| Cabrera, Asdrubal | NYM | SS | V | 2 | 18.5 | 0.28 | 146 | 23 | 62 |
| Céspedes, Yoenis | NYM | LF | R | 3 | 75 | 0.28 | 134 | 31 | 86 |
| Seager, Kyle | SEA | 3B | R | 7 | 100 | 0.272 | 166 | 28 | 86.5 |
| Kipnis, Jason | CLE | 2B | V | 6 | 52.5 | 0.274 | 153 | 12.7 | 58.3 |
| Crawford, Brandon | SF | SS | R | 6 | 75 | 0.275 | 152 | 12 | 84 |
| Longoria, Evan | TB | 3B | V | 10 | 100 | 0.266 | 164.8 | 27.8 | 87.5 |
| Zobrist, Ben | CHC | 2B | V | 4 | 56 | 0.272 | 142 | 18 | 76 |
| Carpenter, Matt | STL | 3B | R | 6 | 52 | 0.272 | 148.7 | 19 | 70.3 |
| Castro, Starlin | NYY | 2B | V | 7 | 60 | 0.27 | 156 | 21 | 70 |
| Markakis, Nick | ATL | RF | V | 4 | 44 | 0.282 | 171 | 8 | 71 |
| Dozier, Brian | MIN | 2B | R | 4 | 20 | 0.252 | 156.5 | 35 | 88 |
| Hosmer, Eric | KC | 1B | V | 2 | 13.9 | 0.282 | 169.5 | 21.5 | 98.5 |
| Jones, Adam | BAL | CF | V | 6 | 85.5 | 0.275 | 169.5 | 29.5 | 92.3 |
| Ellsbury, Jacoby | NYY | CF | V | 7 | 153 | 0.264 | 139 | 10.7 | 53 |
| Encarnacion, Edwin | CLE | DH | V | 3 | 29 | 0.27 | 144 | 37.8 | 110 |
| Gardner, Brett | NYY | LF | V | 4 | 52 | 0.26 | 145.5 | 11.5 | 53.5 |
| Mauer, Joe | MIN | 1B | V | 8 | 184 | 0.288 | 135.8 | 8.2 | 55.3 |
| Escobar, Alcides | KC | SS | V | 4 | 10.5 | 0.259 | 157.5 | 4.3 | 51 |
| Santana, Carlos | CLE | DH | V | 5 | 21.0019 | 0.248 | 137 | 25 | 82.8 |
| McCutchen, Andrew | PIT | CF | V | 6 | 51.4 | 0.301 | 173.8 | 24.8 | 87.6 |
| Headley, Chase | NYY | 3B | V | 4 | 52 | 0.256 | 134 | 12.5 | 56.5 |
| Bruce, Jay | NYM | RF | V | 6 | 51 | 0.245 | 138 | 28.8 | 92.8 |
| Perez, Salvador | KC | C | V | 6 | 52.5 | 0.272 | 127 | 22 | 64 |
| Upton, Justin | DET | LF | V | 6 | 132.75 | 0.246 | 140 | 31 | 87 |
| Ramirez, Alexei | TB | SS | V | 1 | 0.5075 | 0.241 | 115 | 6 | 48 |
| Bautista, José | TOR | RF | V | 5 | 65 | 0.256 | 118 | 30.4 | 84.8 |
| Frazier, Todd | CWS | 3B | V | 1 | 12 | 0.225 | 133 | 40 | 98 |
| Davis, Chris | BAL | 1B | V | 7 | 161 | 0.221 | 125 | 38 | 84 |
| LeMahieu, DJ | COL | 2B | R | 2 | 7.8 | 0.348 | 192 | 11 | 66 |
| Votto, Joey | CIN | 1B | V | 10 | 225 | 0.32 | 176 | 29 | 88.5 |
| Blackmon, Charlie | COL | CF | R | 1 | 3.5 | 0.324 | 187 | 29 | 82 |
| Pedroia, Dustin | BOS | 2B | V | 8 | 110 | 0.297 | 155 | 11.3 | 56.3 |
| Ramirez, José | CLE | 3B | R | 1 | 0.5182 | 0.312 | 176 | 11 | 76 |
| Molina, Yadier | STL | C | V | 5 | 75 | 0.296 | 142.8 | 7.8 | 59.3 |
| Ramos, Wilson | WSH | C | V | 1 | 5.35 | 0.307 | 148 | 22 | 80 |
| Martinez, JD | DET | RF | V | 2 | 18.5 | 0.307 | 141 | 22 | 68 |
| Braun, Ryan | MIL | LF | V | 5 | 105 | 0.295 | 150 | 27.5 | 87.5 |
| Freeman, Freddie | ATL | 1B | V | 8 | 135 | 0.29 | 156 | 23.3 | 78.3 |
| González, Carlos | COL | RF | V | 7 | 80 | 0.288 | 133.8 | 25 | 80.3 |
| Yelich, Christian | MIA | LF | R | 7 | 49.57 | 0.299 | 157.5 | 14 | 59.5 |
| Goldschmidt, Paul | ARI | 1B | V | 5 | 32 | 0.307 | 158.7 | 25.3 | 91.3 |
| Cabrera, Melky | CWS | LF | V | 3 | 42 | 0.284 | 173.5 | 13 | 81.5 |
| Beltrán, Carlos | HOU | DH | V | 1 | 12.5 | 0.295 | 163 | 29 | 93 |
| Arenado, Nolan | COL | 3B | R | 1 | 5 | 0.294 | 182 | 41 | 133 |
| Bogaerts, Xander | BOS | SS | R | 1 | 0.6505 | 0.294 | 192 | 21 | 89 |
| Hernández, César | PHI | 2B | R | 1 | 0.525 | 0.294 | 161 | 6 | 39 |
| Machado, Manny | BAL | 3B | R | 1 | 5 | 0.294 | 188 | 37 | 96 |
| Lucroy, Jonathan | TEX | C | V | 5 | 11 | 0.291 | 132.8 | 14.8 | 66.6 |
| Phillips, Brandon | CIN | 2B | V | 6 | 72.5 | 0.279 | 155.4 | 13.4 | 73 |
| Martinez, Victor | DET | DH | V | 4 | 68 | 0.27 | 134 | 19 | 75 |
| Nuñez, Eduardo | SF | 3B | R | 1 | 0.540027 | 0.288 | 159 | 16 | 67 |
| Cruz, Nelson | SEA | DH | V | 4 | 57 | 0.294 | 173.5 | 43.5 | 99 |
| Valencia, Danny | OAK | 3B | R | 1 | 3.15 | 0.287 | 135 | 17 | 51 |
| Ramirez, Hanley | BOS | 1B | V | 4 | 88 | 0.271 | 128.5 | 24.5 | 82 |
| Villar, Jonathan | MIL | SS | R | 1 | 0.5129 | 0.285 | 168 | 19 | 63 |
| Stanton, Giancarlo | MIA | RF | V | 13 | 325 | 0.25 | 86.5 | 27 | 70.5 |
| Eaton, Adam | CWS | RF | R | 5 | 23.5 | 0.286 | 175.5 | 14 | 57.5 |
| Harrison, Josh | PIT | 2B | R | 4 | 27.3 | 0.285 | 129 | 4 | 43.5 |
| Pagán, Ángel | SF | LF | V | 4 | 40 | 0.278 | 116.3 | 5.8 | 37.3 |
| Fowler, Dexter | CHC | CF | V | 1 | 13 | 0.276 | 126 | 13 | 48 |
| Gregorius, Didi | NYY | SS | R | 1 | 2.425 | 0.276 | 155 | 20 | 70 |
| Turner, Justin | LAD | 3B | V | 1 | 5.1 | 0.275 | 153 | 27 | 90 |
| Belt, Brandon | SF | 1B | R | 5 | 72.8 | 0.275 | 149 | 17 | 82 |
| Calhoun, Kole | LAA | RF | R | 1 | 3.4 | 0.271 | 161 | 18 | 75 |
| Rendon, Anthony | WSH | 3B | R | 1 | 2.8 | 0.27 | 153 | 20 | 85 |
| Pujols, Albert | LAA | DH | V | 10 | 240 | 0.266 | 150.4 | 29.2 | 97.6 |
| Kemp, Matt | ATL | RF | V | 8 | 160 | 0.277 | 134.6 | 22.4 | 79.8 |
| Bradley Jr., Jackie | BOS | CF | R | 1 | 0.5465 | 0.267 | 149 | 26 | 87 |
| Schoop, Jonathan | BAL | 2B | R | 1 | 0.5225 | 0.267 | 164 | 25 | 82 |
| Pillar, Kevin | TOR | CF | R | 1 | 0.5211 | 0.266 | 146 | 7 | 53 |
| Span, Denard | SF | CF | V | 3 | 31 | 0.266 | 152 | 11 | 53 |
| Ozuna, Marcell | MIA | CF | R | 1 | 0.57 | 0.266 | 148 | 23 | 76 |
| Forsythe, Logan | TB | 2B | V | 2 | 10.25 | 0.264 | 135 | 20 | 52 |
| Morales, Kendrys | KC | DH | V | 2 | 17 | 0.277 | 156 | 26 | 99.5 |
| Gennett, Scooter | MIL | 2B | R | 1 | 0.518 | 0.263 | 131 | 14 | 56 |
| Myers, Wil | SD | 1B | R | 1 | 0.5239 | 0.259 | 155 | 28 | 94 |
| Mercer, Jordy | PIT | SS | R | 1 | 2.075 | 0.256 | 133 | 11 | 59 |
| Trumbo, Mark | BAL | RF | V | 1 | 9.15 | 0.256 | 157 | 47 | 108 |
| Iglesias, Jose | DET | SS | R | 1 | 2.1 | 0.255 | 119 | 10 | 86 |
| Kendrick, Howie | LAD | LF | V | 2 | 20 | 0.255 | 124 | 8 | 40 |
| González, Marwin | HOU | 1B | R | 1 | 2 | 0.254 | 123 | 13 | 51 |
| Tulowitzki, Troy | TOR | SS | V | 10 | 157.75 | 0.293 | 120.2 | 20.8 | 69.2 |
| Alonso, Yonder | OAK | 1B | R | 1 | 2.65 | 0.253 | 122 | 7 | 56 |
| Saunders, Michael | TOR | LF | V | 1 | 2.9 | 0.253 | 124 | 24 | 57 |
| Cozart, Zack | CIN | SS | R | 1 | 2.925 | 0.252 | 117 | 16 | 50 |
| Utley, Chase | LAD | 2B | V | 1 | 7 | 0.252 | 129 | 14 | 52 |
| Vogt, Stephen | OAK | C | R | 1 | 0.5275 | 0.251 | 123 | 14 | 56 |
| Martin, Leonys | SEA | CF | R | 1 | 4.15 | 0.247 | 128 | 15 | 47 |
| Davis, Khris | OAK | LF | R | 1 | 0.5245 | 0.247 | 137 | 42 | 102 |
| Dickerson, Corey | TB | LF | R | 1 | 0.5229 | 0.245 | 125 | 24 | 70 |
| Werth, Jayson | WSH | LF | V | 7 | 126 | 0.267 | 120.7 | 16.5 | 60.7 |
| Harper, Bryce | WSH | RF | R | 2 | 7.5 | 0.287 | 147.5 | 33 | 92.5 |
| Miller, Brad | TB | 1B | R | 1 | 0.5276 | 0.243 | 133 | 30 | 81 |
| Galvis, Freddy | PHI | SS | R | 1 | 2 | 0.241 | 141 | 20 | 67 |
| Napoli, Mike | CLE | 1B | V | 1 | 7 | 0.239 | 133 | 34 | 101 |
| Upton Jr., Melvin | TOR | LF | V | 5 | 72.5 | 0.218 | 87.5 | 11.5 | 34.8 |
| Semien, Marcus | OAK | SS | R | 1 | 0.5125 | 0.238 | 135 | 27 | 75 |
| Granderson, Curtis | NYM | RF | V | 4 | 60 | 0.241 | 135.7 | 25.3 | 65 |
| Hechavarría, Adeiny | MIA | SS | R | 1 | 4.35 | 0.236 | 120 | 3 | 38 |
| Moreland, Mitch | TEX | 1B | V | 1 | 5.7 | 0.233 | 107 | 22 | 60 |
| Martin, Russell | TOR | C | V | 5 | 82 | 0.235 | 105.5 | 21.5 | 75.5 |
| Heyward, Jason | CHC | RF | V | 8 | 184 | 0.23 | 122 | 7 | 49 |
| Carter, Chris | MIL | 1B | R | 1 | 2.5 | 0.222 | 122 | 41 | 94 |
| Gordon, Alex | KC | LF | V | 4 | 72 | 0.22 | 98 | 17 | 40 |
| Espinosa, Danny | WSH | SS | R | 1 | 2.875 | 0.209 | 108 | 24 | 72 |