Major League Baseball Draft Pick Compensation: How To Evaluate The Marginal Revenue Product Of Labor Of Drafted Players

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MAJOR LEAGUE BASEBALL DRAFT PICK COMPENSATION: HOW TO EVALUATE THE MARGINAL PRODUCT OF LABOR OF DRAFTED PLAYERS

by

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This thesis submitted by Matthew Peña in partial fulfillment of the requirements for the Degree of Master of Science in Applied Economics from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

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ABSTRACT

The Major League Baseball draft is virtually the only means by which US and US territory born players have access to becoming major league baseball players. As a condition of their initial contracts, players are subjected to initial contract terms, that limit their traditional free market ability to earn a salary commensurate with their actual worth. This research attempts to quantify the difference between what players would earn on the open market, as free agents, and what they earn by being controlled by baseball's reserve clause, by analyzing the current compensation system established by Major League Baseball, how drafted players have limited leverage in negotiations, and whether their compensation approximates actual provided value. The result of this analysis is clear that players on their initial contracts over perform relative to their compensation, relative to players who signed open-market contracts.

CHAPTER I

INTRODUCTION

Baseball economics are a dynamic and interesting system to study, as there are limited methods by which there are entries to the labor market, and a closed number of buyers in a virtual monopoly. Since the inception of Major League Baseball in the 1870's, they have developed and controlled the labor market for baseball players and the quantity of professional baseball games for the general public to watch. Over that time, there have been several collective bargaining agreements and several rule changes governing the method by which a player becomes employed by a team. The rule changes and the sometimes acrimonious bargaining negotiations have affected every aspect of baseball, from the existence of the minor leagues, to free agency, to competitive balance on the field, and to how players are compensated based on different employment statuses.

Major League Baseball (MLB) has consistently changed how players are compensated, what negotiating leverage they have, and how adequately their compensation approximates their marginal revenue product with the stated purpose of increasing parity on the field. Prior to the inception of the players' draft, the mechanism by which parity was intended to be maintained was the players' contracts (Rottenberg, 1956). The player draft was created to supplement that intended purpose.

The initial part of the paper will give a basic history of the First-Year Player Draft, including information about the inception of the draft, iterations of the draft, and perceived purposes of those changes. Next will be a discussion of MLB's reserve clause, and how that impacts negotiating leverage for drafted players. There will also be a description of the arbitration process built within the collective bargaining agreement, which determines "fair" pay for players at certain times in their initial contract.

Finally, there will be a methodology by which players' contributions can be evaluated, relative to their salaries, as well as what forecasted expected value can be derived based on draft position, field position, and entry status using a statistic called Wins Above Replacement (WAR).

CHAPTER II

HISTORY OF THE MLB DRAFT

The Major League Baseball Rule 4 draft, also known as the First-Year Player Draft, has occurred annually since 1965 (Staudohar, Lowenthal, and Lima, 2016). Since the inception of the draft, there have been many rule changes, generally designed to increase economic competitive balance, as well as reduce the overall compensation to drafted players.

Starting prior to WWII, the most talented young prospects were involved in bidding wars, where the wealthiest and most powerful teams were acquiring the majority of young talent. There was a system of rules in place that governed how players could enter the league, the uniform contract that players would sign, and how players could migrate from one team to another. In the cases of the most talented players, there would be multiple teams offering contracts, with the key differences being the annual salary and the signing bonus. Then, as still exists today, there was significant variance in the outcome of players signed at 17-22 years old, so wealthy teams signed as many of the top prospects as possible for redundancy. In order to address this, MLB created a series of rules designed to reduce overall costs and create competitive balance between teams. The latest iteration of this rule, first imposed in 1953, required that any player signed for a bonus of over $4,000 was required to spend two years on the major league roster. This limited teams from sending these players to their farms systems for seasoning, resulting in young, inexperienced players occupying roster spots, but not actively contributing to the team. The system was rife with loopholes; particularly use of disabled list slots for these players, resulting in the rule being rescinded in 1958. Although there were some Hall of Fame players among these “bonus babies,” like Sandy Koufax, Al Kaline, and Harmon Killebrew, there were many that never contributed to any substantial degree. The lack of playing time inhibited development. Additionally, the lack of free agency in baseball meant that teams that signed players controlled the players for the balance of their careers.

When the rule was rescinded in 1958, negotiations reverted to the way they were prior to 1953; that is, player bonuses were increasing substantially. Record-setting bonuses were being given annually to amateur players, reaching a breaking point when the Los Angeles Dodgers signed college outfielder Rick Reichardt for $205,000 in 1964. The competitive balance problem was magnified even further, and MLB determined that a fix was necessary.

The MLB Draft was instituted in 1965 as a method of improving parity and reducing the cost of young, unproven amateur players. The draft was intended to eliminate the power of economic imbalance allowing higher revenue teams to hoard the highest perceived talent, and allow teams to draft and control players based on their finish in the previous year’s season. Additionally, by allowing teams to control drafted players, it reduced player negotiating leverage. Bidding wars were no longer occurring. The first player picked in the 1965 MLB Rule 4 Draft was Rick Monday, by the Kansas City Athletics, and he signed for a comparatively paltry $104,000. It was not until Darryl Strawberry in 1980 that a player reached the $205,000 bonus mark set in 1964.

The structure of the draft has been essentially the same since instituted. The MLB draft consists of 50 rounds, with teams selecting in reverse order of the previous year's standings. Amateur players who have completed their senior year of high school and have not yet enrolled in college, players that are junior or seniors in a traditional college, players that are in junior college, or players that are 21 years old are eligible to be drafted. If a player is drafted, but chooses not to sign with the drafting team, the player is eligible to be re-drafted at the following period of eligibility. The length of negotiation has changed over time, and as of now the player has until August 15^{th} to sign with the drafting team. During that time, the team is required to make an offer to the drafted player; the player's right is limited to negotiating with that team, with the perceived leverage being that player's ability to re-enter the draft in the future. For example, if a high school player is drafted, the drafting team has exclusive negotiating rights with that player for a set period of time. If the player determines that the bonus offer is not sufficient to sign, the player can enroll and play in college or in junior college. After reaching the next eligibility threshold, that player can be drafted again, by either the same or a different team. Once again, there is an exclusive period of negotiation, and the player can determine whether to sign the contract.

Until 2012, teams were limited only by their own budget constraints in determining how much to offer. Between 2007 and 2012, MLB suggested confidential "slot values" for each draft position, but teams were not bound to those limitations. Players receive very minimal compensation for playing in the minor leagues, so the majority of their compensation for the first several years of their playing career was determined by the bonus amount. This is where negotiating leverage comes into play;

players that are drafted out of high school, junior college, or as juniors in a traditional college have the ability to return to school and negotiate anew in the future. College seniors lack that negotiating leverage; they are bound to the team that drafted them, or have the choice to play in an independent league. If the player chooses to play in an independent league, the player is subject to re-drafting the following year, while having lost a year of ML development.

Beginning in 2012, MLB again altered the structure of the draft and instituted draft pools. The draft pool is the amount of money that can be offered in bonuses to drafted players. The pool is determined by aggregating the total value of each draft position in the top ten rounds. Each draft position has a value relatively higher than the next position, so teams that have multiple and higher draft picks have larger draft pools. After the top ten rounds, players have a specific amount they are offered outside the draft pool, however, if a team chooses to offer higher than that slot value, it comes out of their overall draft pool. This was intended again to reduce the overall compensation going to entry-level players and to increase economic parity; until the draft pools were created, teams were routinely exceeding the recommended slot values. The impact of this was that players, prior to the draft, would make teams aware of their bonus demands. This led to lower budget teams drafting players they could more assuredly sign, and higher budget teams getting higher talent players later in the draft they could afford to sign. This had a different than intended impact on the draft as a whole, but still led to decreases in top player compensation (Garmon, 2011). Prior to 2012, draft bonuses were again setting records nearly every year. Per Baseball America, in 2011, Gerrit Cole was drafted first overall by the Pittsburgh Pirates, and signed for a record $8MM. Additionally, in 2009 and 2010, the Washington Nationals selected Stephen Strasburg and Bryce Harper, respectively, and offered both major-league deals with bonuses of $7.5MM and $6.25MM. After implementation of the draft pools, the highest bonus has been given to Kris Bryant of the Chicago Cubs, at $6.7MM on a traditional minor league contract.

This has led to a different sort of "gaming" the system. Teams now have incentive to draft players higher than their projected draft slot, allowing lower bonuses to be given to higher drafted players, saving the difference between their bonus and the slotted amount to be used to pay players drafted later in the draft. In some instances, high school players perceived as being more difficult to sign are being drafted by teams that have been able to save money earlier in the draft, and offered money beyond their draft slot value to entice them to sign. That said, it is considered a more equal playing field, as the penalties for exceeding the draft pool are significant. By MLB draft rules, a team that exceeds its bonus pool by 5%-10% will surrender their first round pick the following draft; higher excesses lead to even more significant penalties.

CHAPTER III

MLB'S RESERVE CLAUSE AND ARBITRATION

Baseball's reserve clause was first instituted by owners in 1879. Initially, it was a method for each team to "reserve" five players from their teams, such that no other team would negotiate with those players. Eventually, the clause expanded to encompass the entire major league roster. For the majority of baseball's history, the reserve clause restricted movement of players between teams; ultimately, each player was owned by the team that initially contracted him. Player movement could occur via trade, or if a player was released, however, in the first instance, the player would be owned by the acquiring team, and in the second, releases generally only occurred if a player no longer had any perceived value. This removed virtually all negotiating leverage for players. They were property of the team that signed them, and the only recourse they could take to demand higher compensation was to refuse to play. Naturally, taking that step led to reduced popularity among fans of the players, and teams would suspend payment to players that refused to play, so it was ineffective as leverage.

The reserve clause was, like the draft, instituted with the stated purpose of preserving competitive balance, to prevent high-revenue teams from acquiring all available talented players. Like the draft, however, it had the ultimate effect of reducing player compensation and saving teams significant amounts of money. The reserve clause was challenged early on in court, which led directly to baseball receiving an antitrust exemption in 1922. For nearly the next 50 years, teams continued to enjoy exclusive control over their players, until Curt Flood challenged a trade in 1969. Although he was ultimately unsuccessful in court, that case, combined with increasing strength of the MLB

Players Association (MLBPA), and the work of MLBPA President Marvin Miller in a case brought before arbiter Peter Seitz, led to the reserve clause being removed in 1976 as part of the collective bargaining agreement negotiated that year.

An important distinction to note is that the MLBPA represents only current MLB players. This means that there is significant incentive for the MLBPA to negotiate to the benefit of existing players, even at the expense of first year players entering the draft. The collective bargaining agreement struck in 1976 created the rule that players with six years of MLB experience (called "service time") would be allowed to become free agents. The inverse, however, is also true; players with fewer than six years of MLB experience are still constricted under the existing remnants of the reserve clause. This means the majority of the MLBPA, and in particular, the highest paid members of the MLBPA, will consist of players who have more than six years of experience. The subsequent collective bargaining agreements have reflected that; there have been many changes in the draft, in methods of free agent compensation, and in rights for experienced baseball players, but there has not been any reduction in the amount of time that teams control young players. From an ownership and team perspective, this is the correct result of the time, coaching, and money that goes into developing and compensating players who are contributing no marginal revenue product on an annual basis, and may never contribute any marginal revenue product. However, as will be discussed in the data portion of the paper, this is largely misleading.

Except in rare instances historically, players sign a minor-league contract after being drafted. In another attempt to improve parity and reduce negotiating leverage for drafted players, as of the most recent collective bargaining agreement, this is the required path; major league contracts may no longer be offered to drafted players. This leads to the player receiving the bonus, and minimal compensation on an annual basis as a minor league player. Baseball has two major league rosters; the 40-man and the 25-man. The 25-man roster is the daily roster that a team plays with. The players on the 40-man roster are eligible to be called up to the ML team at any time without releasing a player. When a player is on the 40-man roster, the player may still be playing in the minor leagues, but will be compensated differently. Per MLB contract rules, minor league players earn $1,150/month for short-season leagues, $1,300 month for low-A league baseball, and $1,500 for high-A league baseball, with annual increases of $50/month if a player repeats the same league. Players in AA receive $1,700/month with annual increases of $100 for repeating, and players in AAA receive $2,150/month initially with more substantial annual increases for repeating. Once a player is on the 40-man roster, as of 2015, the first year salary was $41,400 and second year was $82,700. More importantly, once a player reaches the 25-man roster, service time accrual begins.

Service time is defined as the number of years and days that a player has been on the 25-man roster, and is the sole measure of experience for purposes of determining benefits and free agency status. There are a maximum of 172 service days earned in a given baseball season, which equals one service year. In the first three years of service time, players will earn the major-league minimum; in years four through six, players will be eligible for arbitration. It is important to note that the measurement is based on full service years. Teams will often keep their best first-year players in the minor leagues long enough to ensure they will not exceed 172 service days in their first year; by doing this, the team gets nearly seven years of control. This is further complicated by the arbitration clause in initial contracts. Players will become eligible for arbitration depending on their service time; generally speaking, it's after three full year's accrual of service time, but the top 22% of each first-year class becomes eligible for arbitration after their second year. They are called "Super-Two" players, and will earn a higher salary in their third year after arbitration or through an agreement with the team.

Baseball arbitration is a variety of final-offer arbitration (Cassing and Douglas, 1980.) This is defined as arbitration where each side before the arbiter will make a "final offer," which the arbiter must choose between. The player and the team will submit their argument to the arbiter as to why their offer is fair. From both sides, there will be a study of players with similar statistics, and who earn similar salaries to the final offer. The arbiter cannot compromise a settlement; it must be either the player's offer, or the team's offer. This is important, because arbiters tend not to choose extremes; in other words, even if a player was exceptional, and thus asking for an amount that greatly exceeds previous arbitration agreements, the arbiter will tend to choose the team's offer. From a player's perspective, then, it makes sense to offer a safe, attainable salary as opposed to a fair one, and from a team's perspective, that limits the upside potential of salary. As is common in game theory situations, being risk-averse will inhibit your ability to achieve fairness, and so final-offer arbitration in baseball tends to be biased towards the teams.

There are obvious implications here in terms of efficient allocation of resources for major league teams. Since players in the first six to seven years of their major league careers are cost-controlled, they are a lot more likely to have a positive return on investment relative to players that are negotiated with on the free agent market. From an allocation of resources standpoint, having a player who can provide similar value at a discounted price allows for resources to be allocated elsewhere. Additionally, assuming an annual fixed budget for player salaries, this means that players within their control years earns less; allowing players in free agency to earn more. When collective bargaining agreements are negotiated, the players who would lose the most by eliminating or reducing the number of years under control are doing the negotiating. Similarly, if teams were to be forced to increase their salary outlay for drafted players by having to negotiate on fair terms, as opposed to with limited pools, they would reduce their potential salaries by a commensurate amount. This means that it is unlikely that collective bargaining will be a possible method to increase fair share salaries.

CHAPTER IV

PLAYER VALUATIONS AND COMPENSATION

Advanced baseball analytics, commonly referred to as sabermetrics (adapted from "Society for American Baseball Research"), have become the primary method of evaluating players and teams on an annual basis. The Society for American Baseball Research (SABR) was created in 1971 among a group of baseball researchers. Contemporarily, Bill James began releasing an annual book called *The Bill James Baseball Abstract.* Even prior to that, certain economically-oriented baseball personnel were using statistics that went further than the back of a baseball card. However, it was not until the proliferation of widely available baseball data with the advent of websites like BaseballProspectus.com in the 1990's, in conjunction with technological improvements allowing for faster and more powerful calculation that sabermetrics became a central component of every baseball front office. Even with that, drafted baseball player value is still difficult to predict (Burger and Walters, 2009).

Each team has its own internal mechanism to evaluate players. The easy availability of data, however, means that several publically available websites have developed methods to evaluate players and make projections. The most widely accepted all-in statistic at this time is known as Wins Above Replacement (WAR.) WAR is a statistic derived from a formula that uses a variety of statistics to approximate how many "wins" a player adds to his team over a fictional "replacement" player. The value in using WAR is that it is calculated such that it can be used to compare players across all positions, across leagues, and across teams. Statistics within WAR standardize for ballpark variability and positional differences. Variability from ballpark to ballpark causes substantial differences in traditional statistics; it is clearly easier to hit in Colorado than in San Diego, because of ballpark differences and climate differences. Similarly, an identical batting line as a first baseman and shortstop provide two different values, as shortstop is the far more difficult position to play defensively. Additionally, with a comprehensive statistic like WAR, position players and pitchers can be compared for their relative values provided. WAR is not standardized; there are several varieties of WAR widely available. For purposes of valuation, each has positives and negatives; for data gathering purposes, rWAR, from Baseball-Reference.com, had the most accessible database. rWAR is calculated with the following formula:

$$rWAR = (P_{runs} - A_{runs}) + (A_{runs} - R_{runs})$$

where batting runs, baserunning runs, runs added or lost in double plays, fielding runs, positional adjustment runs, and replacement level runs are aggregated. P_{runs} is player runs generated, A_{runs} is average runs generated, and R_{runs} is replacement level runs generated. Changes are made as necessary to positional adjustments, as there is variation over time in fielding performances. The definition of replacement level is a player that would be easily available on the open market or in a team's farm system at any given time. Currently, rWAR uses a .294 winning percentage as replacement level, which allows for 1000 WAR distributed across baseball. This has changed over time, as the number of teams or the number of games has varied. The formula is below.

30*162*(.500-.294) = 1,000 Wins above replacement

Wins are also divided between pitchers and hitters at a 41:59 ratio; this reflects team spending. Offensively, an average player is worth 20.5 more WAR than a replacement player; a pitcher 18.7 more WAR than a replacement player.

WAR does have some issues that limit its usefulness in evaluating single seasons. In particular, defensive metrics have wide variability by player from year to year. This implies that defensive measurements do not yet tell an accurate story of a player's ability. Further, defensive metrics do not measure first base or catcher well, as both positions have different responsibilities in terms of on-field actions. Catchers, in particular, provide additional value by "framing" pitches, or by how they receive and present the ball to the umpire, that can earn extra strikes, and in aggregate, extra outs. WAR does not measure this. Finally, WAR does not measure anything other than pure statistical input. Although this is valuable in economic terms, teams continue to place value on versatility, leadership, personality, and community orientation. Evaluating a player's value on these unmeasurable concepts becomes more difficult; clearly, they're built into their market value, however, it's impossible to quantify with current methods.

For the purposes of this analysis, the accuracy of the definition of a replacement player and the accuracy of fielding metrics is less critical. Taken in aggregate, we know for certain that the number of wins that occur during a baseball season is fixed, and that the credit for these wins can be broken out among players in a ratio that can give at least a roughly accurate picture of relative contributions to each team. Further, since the formula does not differentiate on age or service time, it is a useful tool to analyze the relative contributions of seasoned veteran players versus young players on their initial contracts.

Gauging the accuracy of WAR can be done by regressing WAR against the number of team wins for the year. It would not be anticipated to be an exact calculation; baseball games still have an element of "luck," that is defined as currently unmeasurable randomness, sequencing, and variability. An example of sequencing variability would be as simple as a walk followed by a triple producing a run; a triple followed by a walk would not. Aggregate team WAR for the season is still quite a good measurement, as seen in Figure 1 and Table 1. As more full seasons accumulate, the r-squared measurement increases.

Figure 1: War versus Wins, 2000-2015

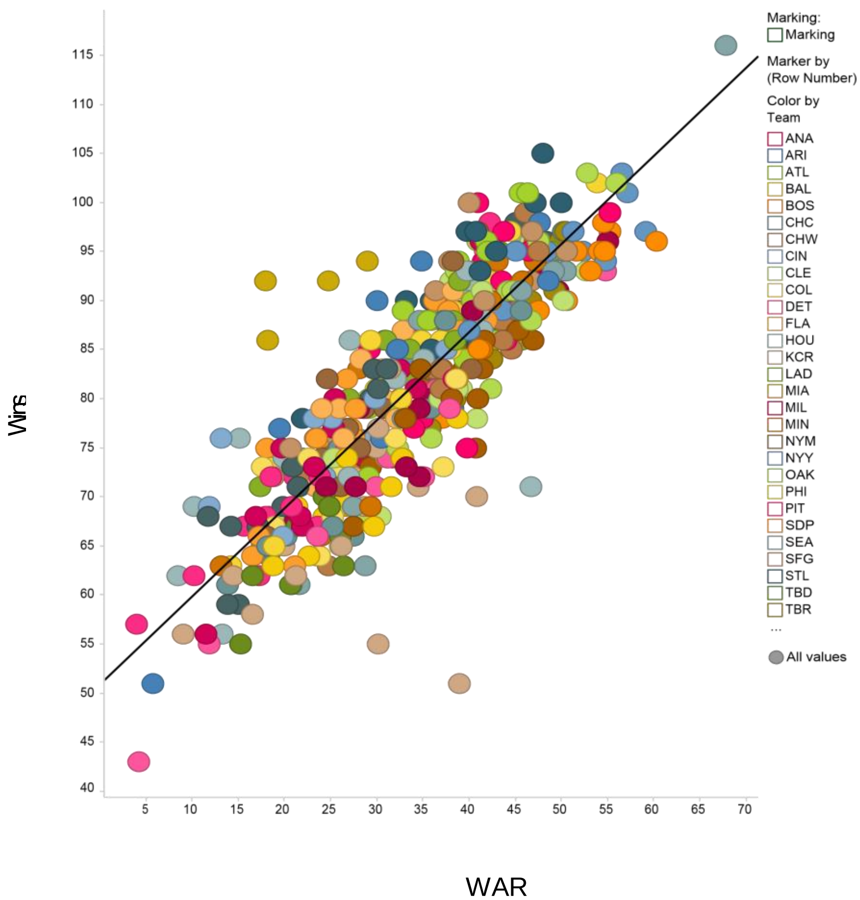

Table 1: Regression Statistics

Name	Estimate	StdError	t.value	p.value
(Intercept)	50.80	0.87	58.56	0.00
WAR	0.90	0.02	36.57	0.00

Model Summary

Model Name: MyModel
Model Type: Linear Regression
Model: Wins ~ WAR
Residual standard error: 5.865 on 478 degrees of freedom
Multiple R-squared: 0.7367, Adjusted R-squared: 0.7362
F-statistic: 1338 on 1 and 478 DF, p-value: 1.286e-140

There are a variety of ways to determine a player's value, and both have been explored in the past. A method used by Dave Cameron of Fangraphs was to determine value based on free agent contracts signed in that offseason, using a present-day value calculation for future player values. Alternatively, using the league as a whole, simply dividing total baseball payroll by 1,000 (Total WAR,) gives a rough estimate of how much each team is paying for each additional win. A third method is to use salaries of players that have been on the open market, against their previous year's WAR. That would take all players with in excess of 6 service years, and divide their salaries by their WAR. This does have the impact of leaving some players who had open-market contracts negotiated because they were not subject to the draft, particularly international players, in the other group; however, that number of players is relatively small and has a small impact on the aggregate. This also leaves players who have negotiated away their arbitration years in exchange for a longer-term contract in the group of under 6 service year players. This is intentional; going year to year on contracts and being potentially subject to arbitration is only one of the options available to young players. By accepting lower salaries in the future in order to gain higher amounts now, they are using the limited leverage they have in order to gain some long-term assurance. This does lead to significant discounting in future years.

The chart below shows the result of that calculation for the 2015 baseball season. Around 71% of WAR was generated by players on their initial contracts, yet they earned only 37% of total salaries for the year.

Table 2: Salary per WAR by Service Time Group			
Group	Annual Salary ($1MM)	WAR	$/WAR ($1MM)
Annual Aggregate Player Salaries:	3,866	1000	3.866
Players > 6 Service Years	2,450	286.9	8.539
Players <6 Service Years	1,417	713.3	1.986

The salary difference is stark. This shows that a majority of the best baseball and a majority of the wins being produced by individual players is being produced by players who are being paid less relative to other players producing less. In fact, of the 38 players who produced a rWAR of 5 or more in 2015, only 11 were players with greater than 6 service years. The average salary in that group for the year was a little over $17MM, the average for the players under 6 service years was a little over $4.3MM.

This shows some of the difficulty in assessing a true value of players. Were players on their initial contracts more accurately compensated, there would be less money available for those that are on their free agent deals. Using the $/WAR for players over six service years, it appears that teams are paying about $8.5MM for each WAR on the open market. Assessing after the fact makes some assumptions; specifically, that in the aggregate teams generally have a fairly accurate idea of how much value will be provided in the future. It also assumes that there is a linear return per WAR and that teams receive the same marginal value per WAR. These assumptions are not strictly true, however, in the aggregate, and in comparison to players on their first contracts, it still allows for an assessment of fairness to be made. Included in the average salary computation is also "dead contracts," or money given to players who have not retired, but who are not physically capable of playing, or who are no longer considered good enough to make a major league roster. Stripping out these salaries, it is fair to assess the value as $8MM per WAR for an open market value.

We know that there are 1,000 WAR divvyed out annually. We know that overall baseball salaries aggregate to nearly $4 billion. If salaries were given out after the fact based on performance, the amount given to each player would be $4MM per WAR generated. Free agent contracted players are earning twice that; first-contract players are earning well under half that amount. By itself, this is enough to say that salary equity based on performance is not occurring in baseball, and that the lack of leverage for drafted players is the primary cause of that.

CHAPTER V

PROJECTING VALUE OF DRAFTED PLAYERS

Major League Baseball has the reputation of having the least projectable draft pick results. There are a variety of reasons for this; unlike other sports, baseball is not played on a uniform field. Distance to the outfield fences, amount of foul territory, and other considerations can change the on-field results dramatically. Further, players develop at different paces, at least in part as a result of their geographic location. Baseball is generally played outdoors, in spring and summer conditions. In Western and Southern US, players have the ability to have that sort of weather a majority of the year. In the Midwest and Northeast, that time is reduced dramatically. Per the Baseball Almanac, f the 525 US-born players in the ML as of the beginning of this season, 49% are from California, Florida, Georgia, and Texas. On the other hand, North Dakota, New Hampshire, Montana, Utah, Vermont, and Wyoming combine for zero. A player from one of those states would have to be truly exceptional in a short period of time available to play to be drafted. Geography is one reason that Mike Trout, who has averaged a historic 9.4 rWAR since his first full season, was not drafted until 25th overall by the Anaheim Angels in 2009. Mike Trout was born and played in New Jersey; there are only 9 current major leaguers from New Jersey. Finally, age and injuries also make baseball’s draft unpredictable. As mentioned earlier, players are often drafted out of high school; there is a significant amount of projection necessary in drafting a high school player. Injuries, particularly to the shoulder and elbow of pitchers, are also very difficult to predict at this time, and can derail a major league career.

Given these projection difficulties, it has been the position of baseball ownership that unproven players should not be paid similar amounts to proven players. There is also a financial cost in acquiring these players, from their initial bonus, to development in the farm system, to the initial scouting and crosschecking required before making a draft pick commitment to the player. The data analyzed was from 1990 forward; there are two sets of data, one that ends in 2010, and one that ends in 2015. Using the more recent data, that ends in 2015, provides extra data points, but also includes a dampening effect of players that have only been in the major leagues for 0-5 years. Expected values were calculated in three different ways, each providing similar information. Ordinary least squares regressions were applied using a variety of variables, including dummy variables for field position, high school or college players, and more generally hitters versus pitchers. Draft position by round, by draft pick, and by a more customized round approach were also done. There is also average WAR by draft pick, and average WAR by draft round. In each of these cases, where a player was drafted is the best method of projecting future value of a player. Career WAR was used, rather than WAR in the first six years. There were two reasons for that; first, it is an added layer of data gathering complication to separate out WAR by year by player. Second, a team that drafts a player already owns the first six years of that player’s career. The team also maintains exclusive negotiating rights to that player for the years beyond the first six, until the initial contract expires. The team may not re-sign the player, and thus, the player’s future value will accrue for another team, but the team has the ability to sign the player at market value at that time. There is a certain value in that.

Table 3: Average WAR by Round 1990-2015								
Round	Average WAR	Max WAR	Total number	%MLB	Variance	St. Dev	Adj. WAR	Projected Value ($MM)
1	7.46	118.80	664.00	82.0%	185.73	13.63	6.1	17.4
2	4.76	70.00	333.00	41.1%	121.18	11.01	2.0	5.6
3	2.80	41.80	256.00	31.6%	40.98	6.40	0.9	2.5
4	2.39	44.30	217.00	26.8%	38.01	6.17	0.6	1.8
5	2.40	46.00	208.00	25.7%	42.11	6.49	0.6	1.7
6	3.01	58.70	167.00	20.6%	60.03	7.75	0.6	1.8
7	2.62	44.10	152.00	18.8%	42.07	6.49	0.5	1.4
8	3.98	45.50	131.00	16.2%	82.08	9.06	0.6	1.8
9	2.60	52.40	117.00	14.4%	56.04	7.49	0.4	1.1
10	2.68	28.60	126.00	15.6%	34.75	5.90	0.4	1.2

Table 4: Average WAR by Round 1990-2010								
Round	Average WAR	Max WAR	Total number	% MLB	Variance	St. Dev.	Adj. WAR	Projected Value ($MM)
1	7.97	118.8	608	77.4%	199.19	14.11	6.2	17.5
2	4.76	70	333	42.4%	121.18	11.01	2.0	5.7
3	2.80	41.8	256	32.6%	40.98	6.40	0.9	2.6
4	2.39	44.3	217	27.6%	38.01	6.17	0.7	1.9
5	2.40	46	208	26.5%	42.11	6.49	0.6	1.8
6	3.01	58.7	167	21.2%	60.03	7.75	0.6	1.8
7	2.62	44.1	152	19.3%	42.07	6.49	0.5	1.4
8	3.98	45.5	131	16.7%	82.08	9.06	0.7	1.9
9	2.60	52.4	117	14.9%	56.04	7.49	0.4	1.1
10	2.68	28.6	126	16.0%	34.75	5.90	0.4	1.2

Figures 3 and 4 show average WAR by round, per Baseball-Reference. Salary data was available at BaseballProspectus.com. The Average WAR column shows the average WAR provided from drafted players that have made it to the major leagues. Max WAR shows the highest number of wins provided, and Total number shows how many players in each round contributed. It also shows the likelihood that a player will make the major leagues by pick and by round. That is a key variable; players who do not make the major leagues provide zero value and are not included in the average WAR calculation. To evaluate by round, average WAR is multiplied by the percentage likelihood of making the ML, and to calculate the projected value. This results in a projected career value; naturally the players at the high end of the WAR spectrum would be worth quite a lot more. Additionally, one would expect a portion of that value would occur after the first six years of the player's career. To adjust for that, the projected value was multiplied by .73, which was, for 2015, the percentage of overall WAR contributed by players that had yet to reach their six full service years. In figures 4 and 5, it shows that the first round value is largely skewed towards the top, such that even the average first round projected value would fall well short of what the player could be reasonably expected to produce. Players that far exceed expectations do get compensated more; David Price has received the highest compensation at $19.75MM for 2015, however, he contributed 29.2 rWAR, for a value of $116.8MM at $4MM per WAR. In his 8 seasons, encompassing his 6 full service years, Price earned $53.5MM in salary, and a $5.6MM bonus, for a combined total of $59.1MM in cash compensation. That is slightly over half of the value he provided during that time based on an even distribution between all players for WAR contributed. Even for the highest paid players with successful arbitration results, there is a significant shortfall.

The results from Tables 3 and 4 are as one would expect in a non-random selection of players, with an emphasis on drafting better players earlier. In earlier rounds, there is a higher level of predictability that a player makes the major leagues, and certainly a higher level of expected value provided. Later rounds take on more of a "lottery ticket" aspect, where there are still significant contributors, but at a lower percentage and an overall lower value.

Table 5 shows regression statistics for drafted players. The only statistically significant variable is draft position; this is an expected result, as each MLB team has an analytics department with significant data evaluating capabilities. Even with bonus pools restricted, the MLB draft is a significant financial expenditure, and teams are highly incented to draft players with the highest likelihood of success. Within their draft calculations, the weighting given to position, age, and geography should result in a draft pick that mirrors the likelihood of reaching the major leagues, as well as succeeding at that level.

Table 5: WAR versus Draft Variables

Variable	Estimate
college	1.85
	(.33)
junior college	1.81
	(.31)
high school	4.01
	(.70)
round picked	-0.097
	(-5.09)
infield	2.48
	(1.46)
outfield	2.05
	(1.18)
pitcher	0.08
	(.05)
catcher	0.78
	(.43)
_cons	2.4
	(.40)
N	2371
Adj. R-Squared	0.0315
T-values in parenthesis	

CHAPTER VI

CONCLUSION

Major League Baseball and the Major League Baseball Players Association have consistently worked towards collective bargaining agreements that work to the benefit of existing, experienced players. There is certainly evidence that the bulk of the work is being done by players that are compensated less, in the expectation that "their time will come." This is a significant problem, however, in that there is additional risk being taken during that period of time that a player is earning less than the value being provided. There are any number of players whose careers have ended prior to having reached their sixth full year of service time; for those players, the value they have provided and the amount they have been paid will never be equal. In other instances, players will catch up; the aforementioned David Price signed a 7-year $217MM contract in the offseason; if he were to average 5.7 rWAR for the length of his contract, he would be at a break-even point for his career as a whole. He has only reached 5.7 rWAR in two seasons through his career thus far, however. In this case, the risk is no longer on the player, but on the team that acquired him through free agency.

It is possible that 2015 was an anomaly in the context of the value being provided by younger players relative to more experienced players. 2015 was an exceptional year for first year players, heralded in the media as one of the greatest rookie classes of all time, per Fangraphs.

That would have the effect of overvaluing the .71 multiplier in value calculation. There is some evidence, as well, that the past 5 rookie classes have been better as a cohort than previous cohorts as well, which does skew the results. Even with that information, the ratio of compensation between free-agent players and first-year contract players is still so distinct, that it is clear that the draft restrictions and the reserve clause artificially and unfairly limits compensation for drafted players to a significant degree. The largest pool for the team with the most draft picks for the 2016 MLB draft is held by the Cincinnati Reds, with a pool of $13,923,700. Cincinnati has the second overall pick and supplemental first round pick, as well as a single pick in rounds 2-10. For comparison, adding up the expected value from average draft picks in the first ten rounds from 1990-2015 is $36.2MM. The $22MM shortfall is a very large difference, and is being added as compensation to players who provide less value.

It will be valuable to analyze the direction of this over the course of the next several years; the MLB draft has become increasingly data driven, relative to scouting driven, and there is a higher likelihood of drafting successfully today than many years in the past. Additionally, the careers of several of the players in this analysis are current and ongoing; the correlations between draft position and rWAR will change over time.

Another valuable aspect of information that is lacking, but would have been helpful for this analysis is a comprehensive list of international amateur free agents signed over time; those players, until 2012, were not restricted in terms of signing bonus, which allowed higher bonuses to be paid. It is not an ideal comparison; these players are typically 16 years old, which leads to higher variance in performance, but it does give a line of sight on what bonuses could be if players were unrestricted by the draft.

APPENDIX

Table 6: Average WAR by pick 1990-2015

Overall Pick	Average of WAR	Max of WAR	Count of WAR	% MLB
1	24.18	118.8	21	84.0%
2	13.24	44.9	22	88.0%
3	8.44	42.7	21	84.0%
4	7.04	34.9	22	88.0%
5	14.03	52.4	16	64.0%
6	10.21	71.8	15	60.0%
7	11.48	48.5	19	76.0%
8	9.61	61.2	14	56.0%
9	8.64	32.6	17	68.0%
10	9.67	37.4	22	88.0%
11	8.07	38.1	15	60.0%
12	11.79	44.2	18	72.0%
13	12.02	69.2	15	60.0%
14	9.31	34.3	17	68.0%
15	10.24	62.3	14	56.0%
16	9.08	51.7	16	64.0%
17	10.60	64.6	16	64.0%
18	2.61	21.3	14	56.0%
19	5.01	27.6	20	80.0%
20	17.50	83	16	64.0%
21	4.71	24.3	15	60.0%
22	7.33	29.4	18	72.0%
23	6.66	41.5	17	68.0%
24	4.32	28.1	14	56.0%
25	5.27	37.9	18	72.0%
26	1.26	5.5	12	48.0%
27	1.68	11.2	10	40.0%
28	5.00	22.6	17	68.0%
29	7.63	36.6	10	40.0%
30	1.95	10.2	13	52.0%
31	3.04	28.5	11	44.0%
32	1.45	12.9	14	56.0%
33	0.99	11	9	36.0%
34	1.63	15.3	14	56.0%
35	6.06	56	16	64.0%
36	1.19	7.6	16	64.0%
37	6.82	37.9	12	48.0%
38	7.81	50.1	13	52.0%
39	2.36	11.2	9	36.0%
40	4.12	16.7	9	36.0%
41	1.29	7.5	14	56.0%
42	2.63	15.7	12	48.0%
43	2.75	16.5	13	52.0%
44	6.83	43.4	13	52.0%
45	2.14	9.1	10	40.0%
46	12.45	70	12	48.0%
47	0.23	3.5	12	48.0%
48	4.33	25.1	9	36.0%
49	8.94	68.3	11	44.0%
50	4.47	30.3	13	52.0%
51	-0.23	3.2	8	32.0%
52	4.76	39.9	13	52.0%
53	1.73	16.3	10	40.0%
54	5.46	23.1	9	36.0%
55	8.99	61.2	8	32.0%
56	4.64	26.8	8	32.0%
57	6.72	34.8	15	60.0%
58	6.27	50.4	12	48.0%
59	2.08	13.5	13	52.0%
60	3.49	10.5	9	36.0%
61	1.31	11.8	14	56.0%
62	4.90	22	10	40.0%
63	1.99	16.1	15	60.0%
64	6.13	27.9	9	36.0%
65	7.38	45.1	10	40.0%
66	5.32	22.3	10	40.0%
67	6.62	20.9	6	24.0%
68	7.59	34	8	32.0%
69	4.02	26.5	9	36.0%
70	3.55	17.2	11	44.0%
71	4.66	24.6	8	32.0%
72	6.39	35.4	10	40.0%
73	0.44	4.6	11	44.0%
74	1.60	11	11	44.0%
75	5.41	27.2	10	40.0%
76	8.62	62.3	11	44.0%
77	0.50	2.1	6	24.0%
78	2.66	15.7	10	40.0%
79	2.19	9.6	11	44.0%
80	5.58	41.8	12	48.0%
81	0.55	3.7	6	24.0%
82	2.48	17.5	12	48.0%
83	5.96	32.6	8	32.0%
84	7.30	18.2	8	32.0%
85	3.49	8.3	11	44.0%
86	2.21	12.4	11	44.0%
87	3.28	7.2	4	16.0%
88	1.89	7	8	32.0%
89	7.94	27	9	36.0%
90	1.19	7.7	7	28.0%
91	3.05	12.6	8	32.0%
92	2.65	9	4	16.0%
93	0.04	0.9	7	28.0%
94	2.73	11	11	44.0%
95	0.53	5.3	11	44.0%
96	2.96	13.6	7	28.0%
97	0.55	9	10	40.0%
98	1.31	6.5	8	32.0%
99	1.32	6.5	5	20.0%
100	0.31	3.2	8	32.0%
101	2.37	15.8	10	40.0%
102	0.63	5.1	8	32.0%
103	1.53	13.6	7	28.0%
104	2.39	23	13	52.0%
105	9.51	44.3	7	28.0%
106	0.65	3.8	6	24.0%
107	-0.44	1.2	9	36.0%
108	1.86	10.4	8	32.0%
109	5.35	26.9	8	32.0%
110	2.00	14.3	8	32.0%
111	0.52	4.4	9	36.0%
112	2.84	16.3	7	28.0%
113	5.05	30.4	10	40.0%
114	2.98	23.9	9	36.0%
115	2.80	23.1	8	32.0%
116	-0.10	0.4	8	32.0%
117	3.76	13.9	10	40.0%
118	3.44	11	7	28.0%
119	0.10	0.8	5	20.0%
120	0.47	2.6	7	28.0%
121	0.40	3.5	9	36.0%
122	2.48	8.5	6	24.0%
123	0.32	3.2	6	24.0%
124	1.06	3.9	7	28.0%
125	5.30	25.6	6	24.0%
126	1.48	2.9	5	20.0%
127	2.46	8.3	8	32.0%
128	2.54	11.9	5	20.0%
129	-0.11	1	8	32.0%
130	9.54	44.2	7	28.0%
131	0.80	4.8	8	32.0%
132	9.23	33.6	7	28.0%
133	2.88	8.5	4	16.0%
134	3.92	22.6	10	40.0%
135	3.81	16.1	8	32.0%
136	1.44	16	8	32.0%
137	2.06	14.7	9	36.0%
138	-0.11	0.8	8	32.0%
139	1.26	8.8	8	32.0%
140	6.82	46	10	40.0%
141	2.70	16.6	6	24.0%
142	-0.41	0.6	7	28.0%
143	5.08	8.7	5	20.0%
144	2.62	11.1	6	24.0%
145	-0.25	0.7	8	32.0%
146	0.83	4.5	6	24.0%
147	2.55	12.6	6	24.0%
148	3.68	14.9	4	16.0%
149	4.57	24.2	7	28.0%
150	2.25	5.2	4	16.0%
151	-0.04	1.4	5	20.0%
152	0.72	3	6	24.0%
153	2.60	3.5	3	12.0%
154	-0.06	2.2	7	28.0%
155	4.71	19.2	9	36.0%
156	1.05	8.8	6	24.0%
157	0.40	3.7	6	24.0%
158	0.46	2.5	7	28.0%
159	5.28	26.8	8	32.0%
160	1.30	5.3	6	24.0%
161	6.97	29	7	28.0%
162	2.76	20.2	8	32.0%
163	1.63	11	10	40.0%
164	2.01	8.8	8	32.0%
165	1.84	10.9	8	32.0%
166	1.64	5.4	8	32.0%
167	0.00	0.2	3	12.0%
168	2.02	7.7	6	24.0%
169	1.49	4.6	7	28.0%
170	0.10	2.2	6	24.0%
171	0.58	1.9	5	20.0%
172	1.28	8.1	6	24.0%
173	1.71	11.2	7	28.0%
174	1.55	6.8	4	16.0%
175	0.35	2.2	6	24.0%
176	1.84	9.6	7	28.0%
177	-0.12	2.7	6	24.0%
178	0.18	1.9	6	24.0%
179	3.09	17.5	7	28.0%
180	2.79	18.1	7	28.0%
181	4.87	21.8	6	24.0%
182	1.50	6.9	5	20.0%
183	0.16	0.6	7	28.0%
184	19.20	38.5	2	8.0%
185	9.94	58.7	9	36.0%
186	0.45	3.2	4	16.0%
187	2.48	17.5	8	32.0%
188	1.83	6.2	3	12.0%
189	3.25	24.9	8	32.0%
190	4.62	15.2	6	24.0%
191	2.23	8.6	6	24.0%
192	0.98	7.5	5	20.0%
193	1.03	6.6	6	24.0%
194	5.53	31.2	6	24.0%
195	2.65	19.7	8	32.0%
196	0.46	3.2	5	20.0%
197	-0.15	-0.1	2	8.0%
198	-0.45	3	8	32.0%
199	3.97	19.4	9	36.0%
200	4.34	23.4	5	20.0%
201	5.02	19.4	5	20.0%
202	0.00	2	3	12.0%
203	-0.20	1.9	4	16.0%
204	4.70	16	5	20.0%
205	10.28	29.6	5	20.0%
206	8.87	45.5	6	24.0%
207	6.22	20.7	6	24.0%
208	-0.05	0.2	2	8.0%
209	2.50	8.2	5	20.0%
210	8.74	44.1	5	20.0%
211	0.48	2.1	6	24.0%
212	6.75	12.3	4	16.0%
213	0.43	1.7	3	12.0%
214	6.76	34.5	5	20.0%
215	5.43	25.4	7	28.0%
216	1.40	8.4	5	20.0%
217	9.93	29.2	3	12.0%
218	4.59	13.1	7	28.0%
219	-0.02	3.7	9	36.0%
220	-1.10	-1.1	1	4.0%
221	2.11	12	7	28.0%
222	14.20	28.7	2	8.0%
223	5.29	20.3	7	28.0%
224	-0.25	0	2	8.0%
225	2.16	10.5	5	20.0%
226	0.91	4.3	7	28.0%
227	1.18	4.1	5	20.0%
228				0.0%
229	0.38	1.3	4	16.0%
230	0.02	0.9	6	24.0%
231	0.18	0.5	5	20.0%
232	-0.10	-0.1	1	4.0%
233	0.34	1.3	5	20.0%
234	0.23	2.2	4	16.0%
235	1.03	1.5	4	16.0%
236	-0.35	0.4	6	24.0%
237	0.36	1.8	5	20.0%
238	6.60	8.3	2	8.0%
239	-0.60	0.5	3	12.0%
240	0.35	1.1	4	16.0%
241	6.49	24.3	7	28.0%
242	2.68	11.3	5	20.0%
243	6.98	32.7	6	24.0%
244	0.23	2.3	3	12.0%
245	0.84	4.1	7	28.0%
246	7.57	44.3	10	40.0%
247	0.70	3.5	5	20.0%
248	2.68	7.6	5	20.0%
249	10.47	31.4	3	12.0%
250	1.60	3.6	2	8.0%
251	-1.60	-1.6	1	4.0%
252	4.80	11.9	4	16.0%
253	3.22	12.2	5	20.0%
254	1.86	10.7	9	36.0%
255	0.20	0.5	4	16.0%
256	8.63	20.9	3	12.0%
257	-0.20	0.5	2	8.0%
258	5.44	23.5	5	20.0%
259	5.90	22.2	4	16.0%
260	0.87	4.6	6	24.0%
261	0.40	0.9	3	12.0%
262	8.13	24.7	3	12.0%
263	0.22	2.2	5	20.0%
264	4.33	15.1	6	24.0%
265	12.20	52.4	5	20.0%
266	-0.10	0.5	4	16.0%
267	-0.04	0.2	5	20.0%
268	0.67	2.1	3	12.0%
269	0.23	0.8	4	16.0%
270	-0.34	0	5	20.0%
271	8.33	33.4	4	16.0%
272	7.73	13.8	4	16.0%
273	2.25	9.5	4	16.0%
274	9.85	23.9	4	16.0%
275	0.36	3	5	20.0%
276	0.34	2.5	5	20.0%
277	8.48	21.3	4	16.0%
278	3.58	8.7	6	24.0%
279	4.76	22.3	5	20.0%
280	8.90	14.6	2	8.0%
281	-0.50	0	3	12.0%
282	-3.50	-3.5	1	4.0%
283	0.31	2.6	7	28.0%
284	4.45	11.1	4	16.0%
285	0.70	0.7	1	4.0%
286	-0.57	0.1	3	12.0%
287	8.55	15.4	2	8.0%
288	0.05	0.6	2	8.0%
289	2.85	12.2	4	16.0%
290	-0.18	0.5	5	20.0%
291	1.40	4.7	6	24.0%
292	0.36	1.1	7	28.0%
293	9.05	18.5	2	8.0%
294	11.73	28.6	3	12.0%
295	-0.60	0	2	8.0%
296	-1.10	-0.1	4	16.0%
297	1.33	4.8	3	12.0%
298	5.60	9.2	2	8.0%
299	-0.10	0.3	2	8.0%
300	1.33	3.9	3	12.0%
301	2.55	6.2	4	16.0%
302	0.28	1.6	5	20.0%
303	1.60	1.6	1	4.0%
304	-0.50	0.1	2	8.0%
305	1.43	6.2	4	16.0%
306	13.33	25.2	3	12.0%
307	1.00	2.6	2	8.0%
308	0.17	1.2	3	12.0%
309	3.47	8.1	3	12.0%
310	5.45	10.3	4	16.0%
311	0.74	2.1	5	20.0%
312				0.0%
313	4.05	9.1	2	8.0%
314	-0.40	-0.4	1	4.0%
315	0.03	0.2	3	12.0%
316	1.10	3.9	3	12.0%
317	0.03	0.9	3	12.0%
318				0.0%
319				0.0%
320	0.10	0.1	1	4.0%
321	0.00	0	1	4.0%
322				0.0%
323	-3.70	-3.7	1	4.0%
324				0.0%
325				0.0%
326				0.0%
327	1.30	1.3	1	4.0%
328	-0.20	-0.2	1	4.0%
329	0.20	0.2	1	4.0%
330				0.0%
331				0.0%
332				0.0%
333				0.0%
334				0.0%
335				0.0%
336				0.0%
337				0.0%
338				0.0%

Table 7: Average War by Pick 1990-2010

Overall Pick	Average of WAR	Max of WAR	Count of WAR	%MLB
1	26.11	118.8	19	95.0%
2	14.26	44.9	20	100.0%
3	10.17	42.7	17	85.0%
4	7.94	34.9	19	95.0%
5	14.03	52.4	16	80.0%
6	10.45	71.8	14	70.0%
7	12.76	48.5	17	85.0%
8	9.99	61.2	13	65.0%
9	9.73	32.6	15	75.0%
10	10.41	37.4	20	100.0%
11	8.60	38.1	13	65.0%
12	12.38	44.2	17	85.0%
13	12.86	69.2	14	70.0%
14	9.29	34.3	16	80.0%
15	10.24	62.3	14	70.0%
16	9.69	51.7	15	75.0%
17	12.06	64.6	14	70.0%
18	2.04	21.3	12	60.0%
19	5.56	27.6	17	85.0%
20	17.50	83	16	80.0%
21	4.71	24.3	15	75.0%
22	7.80	29.4	16	80.0%
23	7.50	41.5	15	75.0%
24	4.68	28.1	13	65.0%
25	5.86	37.9	16	80.0%
26	1.34	5.5	11	55.0%
27	1.68	11.2	10	50.0%
28	5.24	22.6	16	80.0%
29	7.98	36.6	9	45.0%
30	1.95	10.2	13	65.0%
31	3.59	28.5	9	45.0%
32	1.45	12.9	14	70.0%
33	0.99	11	9	45.0%
34	1.63	15.3	14	70.0%
35	6.40	56	15	75.0%
36	1.26	7.6	14	70.0%
37	6.82	37.9	12	60.0%
38	8.48	50.1	12	60.0%
39	2.89	11.2	7	35.0%
40	4.30	16.7	8	40.0%
41	1.20	7.5	13	65.0%
42	2.63	15.7	12	60.0%
43	2.83	16.5	12	60.0%
44	7.39	43.4	12	60.0%
45	2.14	9.1	10	50.0%
46	13.68	70	11	55.0%
47	0.23	3.5	12	60.0%
48	4.33	25.1	9	45.0%
49	8.94	68.3	11	55.0%
50	4.47	30.3	13	65.0%
51	-0.23	3.2	8	40.0%
52	4.76	39.9	13	65.0%
53	1.73	16.3	10	50.0%
54	5.46	23.1	9	45.0%
55	8.99	61.2	8	40.0%
56	4.64	26.8	8	40.0%
57	6.72	34.8	15	75.0%
58	6.85	50.4	11	55.0%
59	2.08	13.5	13	65.0%
60	3.49	10.5	9	45.0%
61	1.31	11.8	14	70.0%
62	4.90	22	10	50.0%
63	1.99	16.1	15	75.0%
64	6.13	27.9	9	45.0%
65	7.38	45.1	10	50.0%
66	5.32	22.3	10	50.0%
67	6.62	20.9	6	30.0%
68	7.59	34	8	40.0%
69	4.02	26.5	9	45.0%
70	3.55	17.2	11	55.0%
71	4.66	24.6	8	40.0%
72	6.39	35.4	10	50.0%
73	0.44	4.6	11	55.0%
74	1.60	11	11	55.0%
75	5.41	27.2	10	50.0%
76	8.62	62.3	11	55.0%
77	0.50	2.1	6	30.0%
78	2.66	15.7	10	50.0%
79	2.19	9.6	11	55.0%
80	5.58	41.8	12	60.0%
81	0.55	3.7	6	30.0%
82	2.48	17.5	12	60.0%
83	5.96	32.6	8	40.0%
84	7.30	18.2	8	40.0%
85	3.49	8.3	11	55.0%
86	2.21	12.4	11	55.0%
87	3.28	7.2	4	20.0%
88	1.89	7	8	40.0%
89	7.94	27	9	45.0%
90	1.19	7.7	7	35.0%
91	3.05	12.6	8	40.0%
92	2.65	9	4	20.0%
93	0.04	0.9	7	35.0%
94	2.73	11	11	55.0%
95	0.53	5.3	11	55.0%
96	2.96	13.6	7	35.0%
97	0.55	9	10	50.0%
98	1.31	6.5	8	40.0%
99	1.32	6.5	5	25.0%
100	0.31	3.2	8	40.0%
101	2.37	15.8	10	50.0%
102	0.63	5.1	8	40.0%
103	1.53	13.6	7	35.0%
104	2.39	23	13	65.0%
105	9.51	44.3	7	35.0%
106	0.65	3.8	6	30.0%
107	-0.44	1.2	9	45.0%
108	1.86	10.4	8	40.0%
109	5.35	26.9	8	40.0%
110	2.00	14.3	8	40.0%
111	0.52	4.4	9	45.0%
112	2.84	16.3	7	35.0%
113	5.05	30.4	10	50.0%
114	2.98	23.9	9	45.0%
115	2.80	23.1	8	40.0%
116	-0.10	0.4	8	40.0%
117	3.76	13.9	10	50.0%
118	3.44	11	7	35.0%
119	0.10	0.8	5	25.0%
120	0.47	2.6	7	35.0%
121	0.40	3.5	9	45.0%
122	2.48	8.5	6	30.0%
123	0.32	3.2	6	30.0%
124	1.06	3.9	7	35.0%
125	5.30	25.6	6	30.0%
126	1.48	2.9	5	25.0%
127	2.46	8.3	8	40.0%
128	2.54	11.9	5	25.0%
129	-0.11	1	8	40.0%
130	9.54	44.2	7	35.0%
131	0.80	4.8	8	40.0%
132	9.23	33.6	7	35.0%
133	2.88	8.5	4	20.0%
134	3.92	22.6	10	50.0%
135	3.81	16.1	8	40.0%
136	1.44	16	8	40.0%
137	2.06	14.7	9	45.0%
138	-0.11	0.8	8	40.0%
139	1.26	8.8	8	40.0%
140	6.82	46	10	50.0%
141	2.70	16.6	6	30.0%
142	-0.41	0.6	7	35.0%
143	5.08	8.7	5	25.0%
144	2.62	11.1	6	30.0%
145	-0.25	0.7	8	40.0%
146	0.83	4.5	6	30.0%
147	2.55	12.6	6	30.0%
148	3.68	14.9	4	20.0%
149	4.57	24.2	7	35.0%
150	2.25	5.2	4	20.0%
151	-0.04	1.4	5	25.0%
152	0.72	3	6	30.0%
153	2.60	3.5	3	15.0%
154	-0.06	2.2	7	35.0%
155	4.71	19.2	9	45.0%
156	1.05	8.8	6	30.0%
157	0.40	3.7	6	30.0%
158	0.46	2.5	7	35.0%
159	5.28	26.8	8	40.0%
160	1.30	5.3	6	30.0%
161	6.97	29	7	35.0%
162	2.76	20.2	8	40.0%
163	1.63	11	10	50.0%
164	2.01	8.8	8	40.0%
165	1.84	10.9	8	40.0%
166	1.64	5.4	8	40.0%
167	0.00	0.2	3	15.0%
168	2.02	7.7	6	30.0%
169	1.49	4.6	7	35.0%
170	0.10	2.2	6	30.0%
171	0.58	1.9	5	25.0%
172	1.28	8.1	6	30.0%
173	1.71	11.2	7	35.0%
174	1.55	6.8	4	20.0%
175	0.35	2.2	6	30.0%
176	1.84	9.6	7	35.0%
177	-0.12	2.7	6	30.0%
178	0.18	1.9	6	30.0%
179	3.09	17.5	7	35.0%
180	2.79	18.1	7	35.0%
181	4.87	21.8	6	30.0%
182	1.50	6.9	5	25.0%
183	0.16	0.6	7	35.0%
184	19.20	38.5	2	10.0%
185	9.94	58.7	9	45.0%
186	0.45	3.2	4	20.0%
187	2.48	17.5	8	40.0%
188	1.83	6.2	3	15.0%
189	3.25	24.9	8	40.0%
190	4.62	15.2	6	30.0%
191	2.23	8.6	6	30.0%
192	0.98	7.5	5	25.0%
193	1.03	6.6	6	30.0%
194	5.53	31.2	6	30.0%
195	2.65	19.7	8	40.0%
196	0.46	3.2	5	25.0%
197	-0.15	-0.1	2	10.0%
198	-0.45	3	8	40.0%
199	3.97	19.4	9	45.0%
200	4.34	23.4	5	25.0%
201	5.02	19.4	5	25.0%
202	0.00	2	3	15.0%
203	-0.20	1.9	4	20.0%
204	4.70	16	5	25.0%
205	10.28	29.6	5	25.0%
206	8.87	45.5	6	30.0%
207	6.22	20.7	6	30.0%
208	-0.05	0.2	2	10.0%
209	2.50	8.2	5	25.0%
210	8.74	44.1	5	25.0%
211	0.48	2.1	6	30.0%
212	6.75	12.3	4	20.0%
213	0.43	1.7	3	15.0%
214	6.76	34.5	5	25.0%
215	5.43	25.4	7	35.0%
216	1.40	8.4	5	25.0%
217	9.93	29.2	3	15.0%
218	4.59	13.1	7	35.0%
219	-0.02	3.7	9	45.0%
220	-1.10	-1.1	1	5.0%
221	2.11	12	7	35.0%
222	14.20	28.7	2	10.0%
223	5.29	20.3	7	35.0%
224	-0.25	0	2	10.0%
225	2.16	10.5	5	25.0%
226	0.91	4.3	7	35.0%
227	1.18	4.1	5	25.0%
228				0.0%
229	0.38	1.3	4	20.0%
230	0.02	0.9	6	30.0%
231	0.18	0.5	5	25.0%
232	-0.10	-0.1	1	5.0%
233	0.34	1.3	5	25.0%
234	0.23	2.2	4	20.0%
235	1.03	1.5	4	20.0%
236	-0.35	0.4	6	30.0%
237	0.36	1.8	5	25.0%
238	6.60	8.3	2	10.0%
239	-0.60	0.5	3	15.0%
240	0.35	1.1	4	20.0%
241	6.49	24.3	7	35.0%
242	2.68	11.3	5	25.0%
243	6.98	32.7	6	30.0%
244	0.23	2.3	3	15.0%
245	0.84	4.1	7	35.0%
246	7.57	44.3	10	50.0%
247	0.70	3.5	5	25.0%
248	2.68	7.6	5	25.0%
249	10.47	31.4	3	15.0%
250	1.60	3.6	2	10.0%
251	-1.60	-1.6	1	5.0%
252	4.80	11.9	4	20.0%
253	3.22	12.2	5	25.0%
254	1.86	10.7	9	45.0%
255	0.20	0.5	4	20.0%
256	8.63	20.9	3	15.0%
257	-0.20	0.5	2	10.0%
258	5.44	23.5	5	25.0%
259	5.90	22.2	4	20.0%
260	0.87	4.6	6	30.0%
261	0.40	0.9	3	15.0%
262	8.13	24.7	3	15.0%
263	0.22	2.2	5	25.0%
264	4.33	15.1	6	30.0%
265	12.20	52.4	5	25.0%
266	-0.10	0.5	4	20.0%
267	-0.04	0.2	5	25.0%
268	0.67	2.1	3	15.0%
269	0.23	0.8	4	20.0%
270	-0.34	0	5	25.0%
271	8.33	33.4	4	20.0%
272	7.73	13.8	4	20.0%
273	2.25	9.5	4	20.0%
274	9.85	23.9	4	20.0%
275	0.36	3	5	25.0%
276	0.34	2.5	5	25.0%
277	8.48	21.3	4	20.0%
278	3.58	8.7	6	30.0%
279	4.76	22.3	5	25.0%
280	8.90	14.6	2	10.0%
281	-0.50	0	3	15.0%
282	-3.50	-3.5	1	5.0%
283	0.31	2.6	7	35.0%
284	4.45	11.1	4	20.0%
285	0.70	0.7	1	5.0%
286	-0.57	0.1	3	15.0%
287	8.55	15.4	2	10.0%
288	0.05	0.6	2	10.0%
289	2.85	12.2	4	20.0%
290	-0.18	0.5	5	25.0%
291	1.40	4.7	6	30.0%
292	0.36	1.1	7	35.0%
293	9.05	18.5	2	10.0%
294	11.73	28.6	3	15.0%
295	-0.60	0	2	10.0%
296	-1.10	-0.1	4	20.0%
297	1.33	4.8	3	15.0%
298	5.60	9.2	2	10.0%
299	-0.10	0.3	2	10.0%
300	1.33	3.9	3	15.0%
301	2.55	6.2	4	20.0%
302	0.28	1.6	5	25.0%
303	1.60	1.6	1	5.0%
304	-0.50	0.1	2	10.0%
305	1.43	6.2	4	20.0%
306	13.33	25.2	3	15.0%
307	1.00	2.6	2	10.0%
308	0.17	1.2	3	15.0%
309	3.47	8.1	3	15.0%
310	5.45	10.3	4	20.0%
311	0.74	2.1	5	25.0%
312				0.0%
313	4.05	9.1	2	10.0%
314	-0.40	-0.4	1	5.0%
315	0.03	0.2	3	15.0%
316	1.10	3.9	3	15.0%
317	0.03	0.9	3	15.0%
318				0.0%
319				0.0%
320	0.10	0.1	1	5.0%
321	0.00	0	1	5.0%
322				0.0%
323	-3.70	-3.7	1	5.0%
324				0.0%
325				0.0%
326				0.0%
327	1.30	1.3	1	5.0%
328	-0.20	-0.2	1	5.0%
329	0.20	0.2	1	5.0%
330				0.0%
331				0.0%
332				0.0%
333				0.0%
334				0.0%
335				0.0%
336				0.0%
337				0.0%
338				0.0%

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