

An Analysis of Final-Offer Arbitration Outcomes for Batters in Major League Baseball from 2002 – 2006

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May 2007

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Abstract:

In 1974, Major League Baseball adopted final-offer arbitration to settle salary disputes between players and teams. Currently, a player is eligible for arbitration after 3 years of major league service. The paper analyzes arbitration salary outcomes for MLB batters from 2002 – 2006. The findings of this paper show that players who threaten arbitration earn 16% higher salaries than those players who settle before the exchange date specified in the Collective Bargaining Agreement. The data used in this paper also show that the criteria used in the salary determination process during arbitration are equivalent to those used in the free agent market. This paper concludes by suggesting possible alternatives to the current arbitration system and discusses the implications of the findings from both player and team perspectives.

Acknowledgements

I would like to thank my thesis advisor, Linda Bell, for all of her helpful advice throughout my research. I would also like to thank my father for teaching me the game

of baseball and encouraging all of my endeavors both on and off the field. Lastly, I would like to thank all of my baseball coaches throughout the years for giving me the opportunity to play the greatest sport ever created.

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I. Introduction

Professional baseball has captivated American society since its earliest forms when it was played in New York City among various gentlemen’s clubs in the 1840’s. The sport grew into America’s national pastime by the end of the Civil War and by 1870, over 400 amateur and professional baseball clubs were represented in the National

Association of Baseball Players.¹ In 1871, many of the professional clubs withdrew from the association to form the National Association of Professional Baseball Players which, during its first five years consisted of 25 clubs. Ultimately, many of the financially weaker clubs were stripped of their better players by the stronger clubs and were forced to disband. In 1876, the National League was formed which sought to increase the financial stability of the game and created the first player reservation rule in 1879. This counteracted the dominance of richer clubs by giving all clubs exclusive property rights to five players. If a particular player was reserved by his team, other clubs were forbidden to compete for his contract. If a player for some reason jumped his contract, he was blacklisted and clubs that employed these players were boycotted. By 1883, every player on a club's roster was protected by the reserve clause. The reserve clause forced players to negotiate their own salaries with their club's owner and were often forced to take lower than competitive wages because of the owner's exclusive rights. Professional baseball in the U.S. became increasingly profitable in the late 1800's and early 1900's and several new leagues emerged to compete for profits with the National League. Two of the leagues included the short-lived Player's League and the American League, which would eventually sign a peace treaty with the National League in 1903. Throughout the 1900's, professional baseball continued to grow in popularity but, the players were becoming increasingly skeptical of the owner's economic practices.

In the late 1960's and early 1970's the players organized a strong and directed player's union. Fred Hutchinson and "Pee Wee" Reese were the first player representatives to testify the necessity of the reserve clause. The first player strike

¹ *Organized Baseball*, Report of the Subcommittee on the Study of Monopoly Power of the Committee of the Judiciary, House Report no. 2002, 82d Congress, 1st sess., 1952, 16.

occurred in 1972 which led to numerous Congressional hearings and studies measuring the suppressive effects of the reserve clause. The first Collective Bargaining Agreement (CBA) between the Major League Players Association and the club owners to address the reserve clause was in 1974. The agreement ended the 1972 strike and in 1975 the Messersmith arbitration decision obtained free agency for the players allowing them to realize their full value.² Since the creation of the bargaining agreement in 1974, player salaries have grown exponentially and professional baseball has become a multi-billion dollar industry.

This paper will analyze empirical data on salaries produced during arbitration in Major League Baseball (MLB) and assess their economic efficiency. The first section of this paper will review previous literature on MLB's arbitration system and explain how it relates to and differs from this work. The second section will outline MLB's arbitration system and explain how it works. The third section will discuss the empirical work of this paper while also providing a summary of the data. The fourth section will present the results of the empirical work while, the fifth section will explain the results with respect to economic efficiency. The final section will summarize the conclusions of this paper and discuss the implications of the findings.

II. Previous Literature

The 1974 Collective Bargaining Agreement and its implementation of arbitration in Major League Baseball has been and continues to be a major topic of discussion in the baseball world. Vague language in the CBA like, "...the arbitration panel shall give whatever weight to such argument as is deemed appropriate," has sparked a multitude of

² Scully, Gerald W. The Business of Major League Baseball. Chicago: The University of Chicago P, 1989. 1-9.

empirical work among economists in an attempt to better understand the behavior of players, teams and arbitrators.

Literature on MLB's arbitration up to this point can be categorized into two main groups. The early work on arbitration focused modeling the decision behavior of players and teams and determining what characteristics created disputes that lead to arbitration hearings. These papers often use the Nash (1950) conditional bargaining model as a foundation for their work because of the similarities in the process of choosing whether or not to go to arbitration. The later works tended to focus on the efficacy of MLB's arbitration system. These works use comparisons of free agent salaries to those produced during arbitration to assess the arbitration system.

In *Salary Arbitration and Pre-Arbitration Negotiation in Major League Baseball*, Faurot and McAllister (1992) analyze the arbitration process by creating theoretical models for arbitrator behavior and applying risk models to formulate expected salary values. One of the requisites for this type of model, is the objectification of probabilities related to the outcomes of arbitration hearings. One of the major drawbacks to this type of modeling is the inconsistency in arbitration outcomes from year to year.

This inconsistency is perhaps best illustrated by Patrick Thomson (2006). From 1999 to 2004, teams (as opposed to players) won 82%, 60%, 57%, 80%, 71% and 57% of arbitration hearings in each respective year, and the total number of hearings (54 over the 6 year period) was small. As the number of arbitration hearings continue to decline, analyzing hearings on a case to case basis as opposed to using an aggregate statistical model may prove more practical.

In their empirical analysis, Faurot and McAllister run regressions for both hitters and pitchers using a set of independent variables specified in the CBA for fair arbitration settlements. Their conclusions suggest that a player should attempt to maximize their expected value of the arbitration result because they can do so without sacrificing potential negotiated outcomes. As stated above, this conclusion should be questioned because of diminishing number of arbitration hearings. Perhaps their most significant finding is that the criteria specified in the CBA are statistically significant in the determination of player salaries.

Phillip Miller's *An Analysis of Final Offers Chosen in Baseball's Arbitration System: The Effect of Pre-Arbitration Negotiation on the Choice of Final Offers* (February 2000), builds on Faurot and McAllister's (1992) paper by incorporating a more complex risk model explained below. More specifically, Miller analyzes the formulation of final-offers in Major League Baseball's arbitration system. Miller uses a two-stage bargaining model originally analyzed by Crawford (1982), where during the first stage, negotiators non-cooperatively choose final offers and during the second the negotiators bargain cooperatively. Miller's model also integrates risk profiles to predict changes in final offers during second stage bargaining.

Miller's empirical analysis is comprised of a log-linear regression which incorporates independent variables that include performance statistics, year dummies, player and club offers and salary statistics. The data suggests that the arbitration criteria defined in the CBA are the primary determinants of final offers. Miller also concludes that position players and teams are risk neutral in setting their final offers however, teams

do have differing attitudes toward risk when dealing with different types (position) of players.

In *Equilibrium Explanation of Bargaining and Arbitration in Major League Baseball* (2001), David Faurot continued to analyze risk and its relevance to the arbitration system using a game theoretical model to analyze Major League Baseball's salary negotiation process. Faurot's analysis is based on two previous explanations for legal disputes that result in a trial: asymmetric information (Bebchuk 1984) and divergent expectations (Priest and Klein 1984). Faurot constructs an equilibrium model for bargaining which is largely dependent on the risk profiles of the parties involved and uses a game tree to list all possible outcomes. Faurot also introduces the notion of a contract zone. The contract zone consists of all potential agreements that are as good as or better than having an arbitration hearing for both parties.

Faurot concludes that divergent expectations do not have a rational foundation in arbitration. He also concludes that arbitration is primarily a result of asymmetrical information regarding relevant risk attitudes. He explains that risk attitudes, while relatively neutral among teams, vary greatly among players creating the asymmetrical information that ultimately causes arbitration hearings.

The later literature that focused on analyzing the efficacy of the arbitration system started with Phillip Miller's *A Theoretical and Empirical Comparison of Free Agent and Arbitration-Eligible Salaries Negotiated in Major League Baseball (July 2000)*, in which he analyzes final-offer arbitration and its effects on the negotiation process between players and teams using an empirical model to compare free agents and arbitration-

eligible players. Miller uses the Nash (1950) model in his theoretical work while adding a 2 team league to simulate competition among teams for free agents. When modeling for arbitration-eligible players, Miller employs a variant of Farber's (1980) model of final offer arbitration which is also utility maximizing and conditional on agreements but, only considers bargaining between the player and a single team.

Miller's empirical work uses player salary and performance data from 1991-1994. Like Faurot and McAllister (1992), Miller uses regressions to compare arbitration-eligible and free agent position players and pitchers. Miller concludes that although arbitration and free agent bargaining models are structurally different, the salary outcomes of each are actually dependent on each other. Miller's comparison of free agents to arbitration eligible players provides a foundation for one of the central research questions addressed in this paper. If free agents' and arbitration eligible players' salaries are statistically equal, then the efficacy of MLB's arbitration system is in question.

In *Arbitrator Bias and Self Interest: Lessons from the Baseball Labor Market* (2005), John Burger and Stephen Walters too question the efficacy of MLB's arbitration system. In their paper, they adapt the basic model of arbitrator behavior to Major League Baseball to analyze possible biases in the arbitration process.

Burger and Walters use salary determination criteria set in the CBA to compare particular players' market wage to their actual wage as determined in 391 arbitration hearings since 1979. Their empirical work involves using probit regressions to investigate the probability that one side was chosen over the other.

Their conclusions suggest that arbitration outcomes in Major League Baseball favor the team over the player 61 percent of the time and give evidence that arbitrators

have acted in their own self-interest. This result implies that it may be more advantageous for players to bargain for free agency after their 3rd year instead of becoming eligible for arbitration.

In *Final-offer Arbitration in Major League Baseball: A Nonparametric Analysis* (2006), Lawrence Hadley and John Ruggiero again question the efficacy of baseball's arbitration system by conducting a nonparametric analysis of final offer arbitration in Major League Baseball. Their model creates two salary frontiers based on the perceptions of owners and players which allows for the contract zone to be defined for all arbitration-eligible players, not only those that file for arbitration.

Hadley and Ruggiero's model clearly identifies arbitration as a cost minimization problem for owners and a profit maximization problem for players. Their empirical analysis includes a sample of hitters eligible for arbitration or free agency during the 2001 and 2002 seasons. Hadley and Ruggiero use salary data, performance variables, position dummies and team variables in their construction of the contract zone.

The findings from the nonparametric model show that there is no statistically significant difference between the salaries of free agents and arbitration eligible players. In this respect, arbitration is eliminating team monopsonistic power and is therefore fulfilling its intended purpose. Their findings also suggest that there may not be a need for arbitration in Major League Baseball.

While the early literature made many interesting conclusions related to the behavior of players and teams during arbitration, this paper will relate more closely to the more recent literature as it too questions the efficiency of the outcomes produced during arbitration.

The previous literature has revealed many interesting conclusions however, it is important to understand that there have been several significant caveats in the empirical work of these papers that this paper will attempt to remedy.

One of the major differences in the data used for this paper is the statistics that will be used in the model for salary determination. Previous papers have primarily used conglomerations of statistics instead of the actual statistics in their empirical work. This paper will use the actual statistics because the actual statistics are used in the hearings each spring.

Another major caveat in the previous work is the lack of attention paid to each Collective Bargaining Agreement. The data used in this paper span the most recent CBA whereas earlier papers have used data which cover several CBA's without controlling for major differences like new revenue sharing policies or the imposition of the luxury tax. Several past papers were written while the service requirement for arbitration was only two years as compared to the three year requirement now required.

III. MLB's Arbitration System

Throughout the history of professional baseball in America there have been numerous legal battles over economic disputes between players and owners. The Sherman Antitrust Act of 1890 was the foundation for many of the early quarrels. The

first was in 1922 when an owner of a league (Federal League) competing with the original American and National Leagues sought relief under the Sherman Act because the National League was buying up some the Federal League's teams. They were therefore, according to the plaintiff, attempting to monopolize baseball. "Justice Holmes, who delivered the court's unanimous opinion, argued that baseball was not subject to the antitrust statutes, because it was not commerce."³ Holmes' decision also supported baseball's reserve clause ultimately giving monopsony power to team owners.

It was not until 1954 when the players decided to form the Major League Baseball Player's Association. The association continually attempted to renegotiate the rights of the players but, only achieved minor improvements. The first Basic Collective Bargaining Agreement between players and owners was in 1967. The agreement was groundbreaking for players' rights and the minimum salary increased by nearly 50%. Since the first agreement in 1967 there have been new agreements on average every 3-6 years but, perhaps the most significant is that of 1974. The 1974 Agreement created a grievance procedure for players and teams now known as arbitration. Arbitration is defined as, "The process by which the parties to a dispute submit their differences to the judgment of an impartial person or group appointed by mutual consent or statutory provision."⁴ Arbitration allowed baseball to keep its reserve clause but also gave negotiation power to established players. Arbitration was soon followed by the advent of free agency which would eventually release players from the reserve clause and allow them to test their value in an open market among all teams.

³ Scully, Gerald W. The Business of Major League Baseball. Chicago: The University of Chicago P, 1989. 27.

⁴ "arbitration." *The American Heritage® Dictionary of the English Language, Fourth Edition*. Houghton Mifflin Company, 2004. 08 Feb. 2007. <Dictionary.com <http://dictionary.reference.com/browse/arbitration>>.

Major League Baseball's arbitration system is similar to that used in many labor disputes and is clearly defined in the CBA. As will be seen in the agreement, MLB employs binding final-offer arbitration to encourage players and teams to settle on their own. In final-offer arbitration, the arbitrator can choose only the player's or team's offer and no value in between. It is essential to understand the many intricacies of the system and how they affect salary outcomes to assess whether or not the system is worth keeping.

In Major League Baseball amateurs typically enter the league through the First-Year Player Draft which takes place in June of each year. When a player is drafted by a team, the team has exclusive rights to the player until they are either traded or become eligible for free-agency. Although most players enter the league through the draft, some sign contracts as free-agents and are only bound to their team for the length of their contract.

Arbitration in Major League Baseball occurs only between a player's 3rd and 6th year of major league service. The CBA deems a player eligible after accumulating 3 years of major league service. A year in the major leagues is defined as 172 days on the major league roster. After a player is eligible for the first time, the agreement requires that they accumulate at least 86 days in the next season before they can be eligible a second time. After a player has accumulated 6 years of major league service, they then become eligible for free agency. There is an exception to the 3 year service requirement which is known as the Super 2 rule. The Super 2 rule specifies that if a player has accumulated 2 years of major league service but less than three and are in the top 17 percent of players that have accumulated 2 years but less than 3 in terms of service, they

too are eligible for arbitration given that they have accumulated at least 86 days of service in the immediately preceding season.

The CBA specifies time limits for teams and players to exchange salary offers if they cannot settle on their own. A player can submit their intent for arbitration by telephone and it is then up to the Player's Association to submit their offer via letter to the Major League Baseball Labor Relations Department. Teams must submit their offer in letter form mailed between January 2 and January 12.

After the player and team submit their offers, arbitration hearings are held between February 1 and February 20. The arbitration panel must decide on one of the offers within 24 hours of the hearing. All decisions are final and binding. If the player and team are able to settle after they have exchanged offers but before their hearing, their offers are withdrawn and their arbitration hearing is cancelled.

The CBA specifies 6 main criteria for determination of a player's salary. They include: the quality of the player's contribution to his team during the past season, the length and consistency of his career contribution, the player's past compensation, comparative baseball salaries, the existence of any physical or mental defects and the recent performance record of the club. The CBA also specifies several criteria which are not allowed be used while determining a player's salary which include: the financial position of the player or club, press comments regarding a player's ability or performance, previous offers made by the player or team, hearing costs to the player or team or salaries in other sports or occupations. Perhaps the most important is the clause

which treats all teams the same. Teams that operate in small markets are treated the same as those that operate in large markets.⁵

Perhaps the most important stipulation in the CBA is the requirement of a single year contract if a hearing is necessary.

The exact language of the 2003-2006 Collective Bargaining Agreement can be found in the appendix.

IV. Empirical Work

i.) The Data

⁵ 2002 – 2006 MLB Collective Bargaining Agreement

The empirical work for this paper uses data from every arbitration eligible batter in Major League Baseball from 2002 – 2006. The data used from this time period is most relevant because it is consistent with the most recent Collective Bargaining Agreement. In total, the primary dataset consists of 611 observations from the 5 years it spans. A secondary dataset was created which contains 420 observations but only consists of the cohort of players that were eligible for arbitration 3 consecutive times within the 5 years used. The core of the dataset was compiled by the player representation firm, The Wasserman Group, while some of the data was also collected from the USA Today's MLB salary database and baseballreference.com. There are numerous independent variables that determine baseball salaries and for purposes of this paper, the majority of these variants have been considered.

The first group of variables are the actual player salaries. The data includes every player's salary for the given year they were eligible for arbitration, their salary for the previous year and, in the cohort data, their salary in the year following their 3rd year of eligibility (free agent salary). A player's previous year salary is one of the salary determination criteria specified in the CBA for use in arbitration hearings. For the purposes of this paper, the natural log of the player salaries is used.

The second category of variables is the team specific variables. The CBA salary determination criteria specifies that the previous year performance of the given player's team may be used during arbitration. For this reason, the win percentage of the player's team during the previous year is included for every player. The CBA also specifies that the financial status of the team may *not* be considered during arbitration. Payroll data was collected from every team during the 4 years of the data and the teams were

separated into quartiles. For each player, the given quartile is specified for the team they signed a contract with during the given year of eligibility. This data is used to check the efficacy of the CBA's stipulations.

While there is no specific mention of a player's position in the CBA, the agreement does state that all comparative salaries may be used in arbitration salary determination. The dataset includes information on each player's position for each given year to detect any variation in salary determined by position.

The next set of variables used are the performance statistics. The dataset includes batting performance statistics for each player in the year preceding their year of eligibility. While many previous papers have used conglomerations of multiple statistics, this paper uniquely uses each statistic in its normal form. The previous season batting statistics include: plate appearances, games played, runs, hits, doubles, home runs, runs batted in (RBI), batting average and on-base plus slugging percentage (OPS). The dataset also includes career batting performance statistics for each player which include every season up to their year of eligibility. Career statistics are especially significant when considering a player's consistency. The same batting statistics are used for the career data as were used in the previous season data.

Perhaps the most unique data compiled in this dataset are eligibility statistics. A given player can be eligible for arbitration up to 4 times in a career. For the first time in MLB arbitration literature, the data identifies a given player's year of eligibility. This is especially important because of the Super 2 rule in the CBA. While service time may have served as a relevant proxy in the past, the Super 2 rule has created a necessity for the identification of year of eligibility. For example, a 3rd time eligible player would

previously have been required to have at least 5 years of major league service, however the Super 2 rule allows for the possibility of a 3rd time eligible player to have had only 4 years of service. From 2002 – 2006 there were 19 Super 2's representing almost 15% of the observations. Table 1 illustrates the changes in salary from year to year of eligibility. Salaries increased nearly 50% with each additional year of eligibility.

As explained in the section on arbitration, the CBA sets specific dates in the arbitration process. The dataset includes variables for the time of agreement. There are three variables which include: pre-exchange, post-exchange and arbitration. Pre-exchange are those cases which the salary was settled before the player and team exchanged salary offers through the MLB Labor Relations Department. Post-exchange are the cases which salary offers were exchanged but, the final salary was settled before the arbitration hearing occurred. Arbitration cases are those that were settled in an arbitration hearing.

Another important variant in salary determination is the length of contract and because of this, the dataset includes a variable for multiyear contracts. In Major League Baseball players are often willing to take a pay cut in each individual year for the security of guaranteed money over a multiyear contract however, if a player cannot settle with his team before an arbitration hearing he can only sign a single year contract.

The final variables are year variables. Year dummy variables are included to detect inflationary changes in salary from year to year.

ii.) Methodology

The empirical work for this paper evaluates the importance of the criteria defined in the CBA in determining salaries. The key variable for the purpose of this analysis is dispute, which tells directly the importance of arbitration in the determination of salary. Much of the previous empirical work on arbitration has used conglomerations of statistics to analyze arbitration. Since 1974, when arbitration was implemented, there has been a growing debate as to which performance statistics should be used in the salary determination process. This paper uses each player’s actual statistics (not conglomerations) because it is the actual statistics that are used in arbitration hearings. Specifically, the model uses career plate appearances, previous season plate appearances, previous season on-base plus slugging percentage, career home runs and career batting average. The model used for the empirical work is given below in equation 1:

$$(1) \ln\text{Salary}_{it} = \beta_0 \ln\text{PreviousSalary}_{i(t-1)} + \beta_1 \text{Career PA}_{it} + \beta_2 \text{OPS}_{i(t-1)} + \beta_3 \text{OPS}_{i(t-1)} + \beta_4 \text{Career HR}_{it} + \beta_5 \text{Career AVG}_{it} + \beta_6 \text{Top Quartile}_{it} + \beta_7 \text{Bottom Quartile}_{it} + \beta_8 \text{Win Perc.}_{i(t-1)} + \beta_9 \text{1B}_{i(t-1)} + \beta_{10} \text{2B}_{i(t-1)} + \beta_{11} \text{3B}_{i(t-1)} + \beta_{12} \text{SS}_{i(t-1)} + \beta_{13} \text{OF}_{i(t-1)} + \beta_{14} \text{Multiyr}_{it} + \beta_{15} \text{Dispute}_{it} + \beta_{16} \text{2002} + \beta_{17} \text{2003} + \beta_{18} \text{2004} + \beta_{19} \text{2005}$$

The dependent variable in all regressions is the natural log of salary.

Many of the independent salary variables are explicitly defined in the CBA, however some variables are subject to the discretion of the arbitration panel. The natural log of each player’s previous year salary is used because it is a key variable used in the arbitration proceedings. Career plate appearances are used as a proxy for major league service. Many players are credited with major league service but see limited playing time. Using career plate appearances as a proxy controls for these players and represents each player’s “real” service time. The win percentage of each player’s team during the previous year is used as a measure of the team’s recent performance record. Position

dummy variables were created to test for variation in salary with respect to the player's position. Throughout history, many positions have earned reputations for being power hitters or exceptionally better hitters than other positions. The position dummies will detect any salary differences caused solely by a player's position. A dummy variable for multiyear contracts was created to test for variation in salary with respect to multiyear contracts. Each player received a 1 if they were in a multiyear contract during the given year and a 0 otherwise. Dummy variables for each year were created to detect for changes in salaries specific to each given year.

The CBA specifically states that the financial status of each individual team may not be considered when determining salaries during arbitration. Dummy variables for teams in top and bottom quartile of payrolls were included in some of the regressions to test the efficacy of the CBA with respect to arbitration.

The only two previous year performance statistics used for this model are on-base percentage plus slugging percentage (OPS) and plate appearances. OPS is the best measure of an individual player's ability to get on base and hit balls hard which are strongly correlated to scoring runs, the ultimate goal of every team. Plate appearances are used to control for the amount of playing time for each player in the previous season. Other previous year performance statistics were tested but were ultimately left out because OPS and plate appearances explained the most variation. In addition, some variables were removed to avoid biases caused by multicollinearity.

The model uses two career performance statistics: career home runs and career batting average. Career home runs are an accurate indication of a player's power while, career batting average represents the best measure for a player's consistency at the plate

throughout their career. Career statistics are especially important because they prevent unfair salaries based on anomalistic years during contract renegotiations.

The key variable in this analysis was whether or not a player settled after the exchange date specified in the CBA. A dispute dummy variable was created to evaluate the importance of the arbitration process on salary outcomes. If a player could not settle before the exchange date specified in the CBA they received a 1 and a 0 otherwise. This variable is especially important because, if significant, it suggests that the arbitration process creates variations in salaries holding fixed for performance.

Using the variables listed above, the regression model created predicted salaries for each player used in the dataset. These predicted salaries are the basis for the analysis in the conclusions section that follows.

To assess the efficacy of arbitration, the same regression model is used for the cohort dataset. For the cohort data, the model is used to predict salaries during the given players' free agent year. During free agency, players are able to bargain their salaries among many teams which we should expect to inflate their salaries at a greater rate than the single team arbitration bargaining process.

V. Results

In 1974, Major League Baseball specifically chose the final-offer form of arbitration to encourage players and teams to settle salary disputes without a hearing.

According to MLB salary arbitrator Roger Abrams:

There are many advantages to settling a dispute before arbitration. First ...the arbitration hearing itself imposes costs on the parties by straining the relationship between the player and his club. Second, if they settle, the parties can be creative in designing a compensation package, including bonuses, for example, a no-trade clause, or a multiyear deal. By contrast, the product of salary arbitration is a standard player contract for a single year at a defined salary. Finally, a settlement can build the parties' relationship rather than rupture it. With settlement, both parties win to some degree; with salary arbitration, there is always one winner and one loser.⁶

From 2002 to 2006, only 10 of 611 cases involving hitters reached an arbitration panel.

The low number of hearings confirm that Major League Baseball achieved its goal with the implementation of final-offer arbitration. This section analyzes the determinants of salary for all arbitration eligible players in order to determine the effect, if any, of arbitration on salary outcomes.

i.) Data Summary Analysis

Table 1 provides a summary of the primary dataset used in the empirical work. This table shows that the players are evenly distributed with respect to position although there does seem to be a large number of catchers and a low number of designated hitters. Importantly, the table also shows that the majority of players settle before the exchange date specified in the CBA.

⁶ Abrams, Roger I. The Money Pitch: Baseball Free Agency and Salary Arbitration. Philadelphia: Temple UP, 2000.

Table 2 illustrates the mean salaries for all of the players in the primary dataset. Column 1 divides the players into groups based on year of eligibility, the type of settlement they used, and whether they were in a single or multiyear contract during a given year. The reason for this is to detect average salary differences among these groups of players. As is clear from the table (rows 1-3, column 2), there is great variation in year of eligibility. The variation can be explained by the competitive nature of professional baseball. Numerous players are injured and forced to retire while, some are released for better replacement players. Rows 1-3 also illustrate the difference in salary for each year of eligibility. On average, player salaries increase nearly 50% after each year of eligibility. According to CBS' online database, average salaries in MLB increased between 5 and 9% from year to year over the same period.⁷ This implies that a huge premium is created during arbitration eligible years. A possible explanation for this may be linked to the threat of an arbitration hearing.

Rows 4 and 5 illustrate the differences in salary based on the type of settlement each player chooses. Clearly, the majority of players (87%) chose to settle with their team before the exchange date specified in the CBA. While only 13% of players chose to exchange salary offers with their team, they earned 16% higher salaries, on average, than those that chose to settle early.

Rows 6 and 7 depict the salary differences of players with single year contracts compared to those with multiyear contracts. Nearly 30% of the players in the dataset were signed to multiyear contracts from 2002 – 2005. It is typically assumed that players are willing to take pay cuts for the security of a long term contract and the guaranteed

⁷ CBS Salary Database: <http://www.sportsline.com/mlb/salaries/avgsalaries>

money that comes with it. While this may be true, Table 2 shows that players with multiyear contracts made nearly 60% higher salaries than players with single year contracts. This premium may be explained by the risk assumed by teams who offer multiyear contracts. Multiyear contracts require a significant commitment by teams and, as will be shown below, players with multiyear contracts typically outperform players with single year contracts.

In order to control for differences in salaries based on year of eligibility, a balanced cohort dataset was created from the primary dataset of all players which included only players that were eligible 3 times from 2002 – 2006. Table 3 has been divided into two panels to illustrate the differences between the primary dataset and the cohort dataset.

Panel A is the cohort dataset. The players in the cohort that starts in 2002 were first time eligible in 2002, second time in 2003 and third time in 2004. This format remains the same for all of the cohorts considered. The change in salary for the balanced cohort data in Panel A illustrates strikingly different results than those for all players. There is a large jump in salary from the first year of eligibility to the second year but, then the salaries seem to increase at a decreasing rate from the second year to the third year.

The unbalanced data in Panel B shares similar characteristics with Table 2. There is a lot of variation in the numbers of players as they move from year to year of eligibility. The changes in salary from year to year of eligibility are also higher than those in Panel A. This may be because some of the lower paid players drop out from year to year which would further inflate the salary changes.

Clearly, there are some important differences between the cohort dataset and the primary dataset with respect to the path of salary outcomes over time. This is expected because the primary dataset does not distinguish between players that may not have a full 3 years of contract data and those that do, and it is therefore not as descriptive of the path of an individual player's salary over time. In essence, the two tables are measuring two different things.

Table 4 provides a summary of the cohort dataset. Like in Table 2, rows 1-3 illustrate the salary differences in each year of eligibility. The salaries increase from year to year but, at a decreasing rate going from a 44% increase from year 1 to year 2 to a 33% increase from year 2 to year 3. The data for all players suggests that the increase from year to year is constant at nearly 50% but, this does not control for the players that drop out from year to year. It seems logical that the players with less skill and coinciding lower salaries would be the players that drop out creating higher average salaries.

Rows 5 and 6 show features similar to those in the primary dataset. The majority of players in the cohort dataset chose to settle before the exchange date while, those players that held out made 25% higher salaries than those that settled early. The fact that there is a substantially greater premium to those that threaten arbitration questions the efficiency of the salary outcomes determined during arbitration eligible years.

Rows 7 and 8 summarize the differences between players that signed single year contracts versus those that signed multiyear deals. Players in the cohort dataset that signed multiyear contracts made nearly 100% percent more than those that signed single year contracts. While there is the argument that suggests players may be willing to take a pay cut for the security of a long term contract, there is also the team's perspective which

may suggest that the player must be considerably better than an alternative replacement player to make a long term commitment. Performance differences between single and multiyear contract players will be examined in the following section to analyze the difference in salary created by the length of contract.

Table 5 compares differences in performance between players that signed single year and those that signed multiyear contracts while, Table 6 compares the same differences between players that settled before the exchanged date and those that either threatened or went to an arbitration hearing. Players that signed multiyear contracts performed significantly better than their single year counterparts. Multiyear contracts are a significant risk for teams and intuitively it makes sense that teams are willing to take a chance on better players. Table 6 shows that players that settled after the exchange date performed significantly better during the previous season than those that settled without the threat of arbitration.

ii.) Regression Analysis

Previous literature on MLB's arbitration system has focused on explaining the salary outcomes of players during the arbitration eligible years using a set of conglomerated performance statistics. In this section, I test the importance of performance statistics similar to those used in previous analysis, and more importantly the effect of "arbitration threat" on salary outcomes.

Table 7 summarizes the key regression results. Column 1 shows that there is a positive and statistically significant relationship between the dispute variable and salary such that players who settle after the exchange date specified in the CBA earn nearly 25% higher salaries than those who settle before the exchange date. In Column 2, the

career performance statistics (career plate appearances, career home runs and career batting average) are added to the regression. All three variables are positive and statistically significant however, they increase the significance of the dispute variable instead of explaining it away as we might expect. Column 3 adds the previous year performance statistics (on-base plus slugging percentage and plate appearances). Only plate appearances are statistically significant but, the addition of the variables explain away more than half of the dispute variable.⁸ In Column 4, the log of the previous year salary and multiyear contract variable are added. Both variables are positive and statistically significant yet, the coefficient of the dispute variable increases from .107 to .162 from the previous regression. Column 5 incorporates the team specific variables (previous year win percentage, financial status). While these variables are statistically insignificant at the .05 level, their addition reduces the magnitude of the dispute variable by nearly 1 percent. Column 6 adds position variables and interestingly, catchers earn significantly higher wages than other positions. The addition of these variables causes very little change in the dispute variable. Column 7 illustrates the results of the full model, adding in year variables. As should be expected, performance variables and service time carry a large amount of weight when determining salaries however; they could not explain away the variation created by the dispute variable.

The significance of the dispute variable suggests that players that settle with their team after the salary offer exchange date earn statistically significantly higher wages than those players that settle before the deadline. This result questions the efficiency of salary determination during arbitration. In his 1974 paper, Gerald Scully suggests that a

⁸ The coefficient on dispute dropped from .250 in column 2 to .107 in column 3

player's salary should *only* be determined by their performance and contributions to their team.⁹

Other important findings from this regression include the lack of significance on the variables used to test the effect of a team financial position. The CBA states that teams cannot be treated differently based on their financial status and this regression confirms that this is the case. The year and position dummies were also insignificant variables for determining salaries. The regression also suggests that a player's previous year salary has no significant effect on the determination of the current year salary.

The CBA allows for hard to measure characteristics such as a player's character, leadership qualities and make-up to be considered when determining outcomes in arbitration hearings. Even without these characteristics the full model is still able to explain nearly 75% of the variation in salary for arbitration eligible players.

Table 8 represents the same regression used in Table 7 except it includes only players that signed single year contracts. This regression was used to detect any possible differences in salary determination based on length of contract. Column 5 shows that players with single year contracts are subject to the same salary determinants as those players with multiyear contracts. Every significant variable from Table 7 is also significant in Table 8.

Using the model shown in the methodology section and the regression data in Table 7 (Column 7), predicted salaries were created for every player in the primary dataset to identify significant differences between players with salaries higher than the model predicts and players with salaries lower than predicted.

⁹ Scully, Gerald W. "Pay and Performance in Major League Baseball." The American Economic Review 64 (1974): 915-930.

Table 9 provides summary statistics for players with salaries both higher and lower than the model predicts. As should be expected, every performance variable for players with salaries greater than the predicted was greater than those with salaries less than the model predicted. This confirms the positive relationship between pay and performance. Better players get paid more.

The table also shows that, contrary to the information revealed in Table 2, there is a significant difference in the number of multiyear contracts for each given group. 8% more players with salaries lower than their predicted salary signed multiyear contracts. Although Table 2 showed that players with multiyear contracts earn more than their single year counterparts, Table 9 shows that there is a significant difference in the number of multiyear contracts for players with lower than predicted salaries versus those with salaries less than predicted. This may be the case because players that settle in arbitration cannot sign multiyear contracts.

Perhaps the most significant difference revealed by Table 9, is the difference in salary between players that settled early and those that held out for arbitration. Roughly 6% percent more players chose to settle after the exchange date in the group of players whose salaries were greater than the model predicted than those with salaries lower than the model predicted. Like Table 5, this suggests that salary outcomes during arbitration eligible years show signs of inefficiency.

Table 10 provides the same data as Table 9 except it uses the cohort dataset. The cohort data reveals similar conclusions about the inefficiencies in salary determination during arbitration however, the data also shows that there are no significant differences in many of the performance statistics between the players with salaries higher than predicted

and those with salaries lower than predicted. Again, this indicates inefficiency because of the lack of importance in performance statistics.

In Tables 11 and 12, performance characteristics are compared for those players that settled either before the exchange date (Table 11) or after the exchange date (Table 12). Table 11 looks very similar to Table 9 which depicts higher performance statistics for players who earn salaries higher than the model predicts. Table 12, however, shows very unique results. For every performance statistic, players with salaries lower than predicted have higher values than those with salaries higher than predicted. This difference illustrates the explanatory power of the dispute variable in the model.

How well does the model predict actual salaries for free agents? Table 13 provides actual and predicted salary figures for every player in the cohort dataset that played during their free agent season immediately following their last year of arbitration eligibility. Predicted salaries were created using the same model used for arbitration. In total, there were 57 players that played during their free agent season immediately following their final year of arbitration eligibility. Of the 57 players, 27 players earned salaries greater than the model predicted during their first free agent season. The predicted salaries were nearly evenly distributed around the mean. On average, players earned roughly \$34,000 less than the model predicted, an unsubstantial amount considering the average salary was over \$5 million dollars. This suggests that the market created salaries very similar to those created using the arbitration criteria.

Rows 1-4 of Column 4 in Table 4 show the changes in average salary from year to year of eligibility and into the free agent year. Salaries increase from year to year but, they do so at a decreasing rate. The data shows that the expected free agent salary jump

was never actualized and was instead an increase at a lower rate than the first two years of arbitration eligibility.

Although the CBA does not provide specific salary determinants during free agency, the evenly distributed predicted salary outcomes suggest that the arbitration criteria creates salaries similar to those in a competitive market.

In Table 14, incremental F-statistics are provided to test which sets of variables are most significant in the determination of salaries during arbitration. Column 1 provides evidence that the career performance variables are most significant in salary determination. This suggests that higher consistency throughout a player's career yields higher salaries than each individual year.

VI. Economic Efficiency

In classical economic terms, salary is largely determined by performance and skill, each of which can be measured and ultimately valued in different ways. The important outcome though, which we learn from basic economic principles, is one of “pay for performance.” Loosely speaking, the MLB arbitration system is modeled after this principle. Indeed, as stated in the agreement, a player’s past performance and his career contributions are paramount in determining the outcome of an arbitration hearing. In addition, the ability of teams to pay, measured by annual revenues and conditioned on performance, matters as well. What the CBA does not specify, and what is not a part of classic economic theory, is the notion that arbitration itself, because of its inherent threats, should impact salary outcomes. Indeed, MLB’s Collective Bargaining Agreement defines specific criteria that must be used in the salary determination process during arbitration, and these were carefully modeled in the empirical results above. To the extent that variables other than those specified in the CBA are significant determinants of a player’s salary, the outcome could reasonably be deemed “inefficient” in the sense that there is no clear economic interpretation.

The empirical analysis provided above reveals that “arbitration threat” was a significant salary determinant for batters in arbitration from 2002 – 2006. The data shows that players who threatened to go to an arbitration hearing earned a salary premium nearly 16% higher than those players who settled before the exchange date. This premium created by a non-performance variable suggests the possibility of inefficiency.

Using the arbitration criteria to predict salaries during players' free agent year (where the threat of arbitration is no longer available) revealed results that reaffirm the significant effects of arbitration on salary. Without the dispute variable, the predicted free agent salaries were evenly distributed around the mean suggesting that the arbitration criteria defined in the CBA is consistent with those used in a competitive market.

VII. Conclusions

The 1974 Collective Bargaining Agreement and its implementation of final-offer arbitration and free agency transformed Major League Baseball into a multibillion dollar industry. Arbitration has evolved over the past quarter century into a finely tuned strategic process on the part of the owners and arbitration eligible players and their representatives.

The analysis of arbitration eligible batters from 2002 – 2006 reveals several interesting findings. First, the arbitration criteria specified in the CBA appears to be nearly identical to that used in the determination of salaries in the competitive markets in the years following arbitration. Second, the arbitration criteria are consistent with the economic notion of “pay for performance” since they rely on current and career contributions. Third the analysis also shows that there is a salary premium created during arbitration for those players that settle after the exchange date, or in other words, threaten to dispute. On average, players who threaten arbitration make 16% higher salaries holding fixed for on-field performance. This cannot be explained by standard economic models, but is probably best understood as resulting from the unique threat imposed by the process of final-offer arbitration. In some sense, the fact that players receive a premium for threatening arbitration suggests that teams are more risk averse than players. This suggests that alternatives to final-offer arbitration may produce more efficient salaries during years of arbitration eligibility.

What are some possible alternatives to the current final-offer arbitration system? One possible solution would be to end the current arbitration system and instead allow players to file for free agency after their 3rd full year of service. The empirical analysis of

free agency suggests that salaries determined in the free agent market use the same criteria specified for arbitration and actually follow the criteria closer than arbitration outcomes. Another possible alternative would be to change the current final-offer arbitration system to a more conventional arbitration system. This would allow for arbitrators to choose the most efficient salary instead of being limited to only the team or player's offer.

What matters most in the determination of salaries during arbitration years?

Although the data provides significant evidence that the threat of dispute creates a salary premium during arbitration years, consistency in performance throughout each player's career proves most important.

What do the conclusions suggest for players and teams during arbitration years?

From a team's perspective, settling before the exchange date proves most advantageous. Players however, should hold out and threaten arbitration during their arbitration eligible years. The threat of arbitration produces 16% higher salaries and allows for the possibility of signing a multiyear contract which is proven to yield higher salaries.

VIII. Tables

Table 1: Summary of the Data

Time of Settlement:	n	Previous Year Performance:	Mean	Career Performance:	Mean
Pre-Exchange	532	PA	416.697 (196.713)	Career PA	1720.223 (779.046)
Dispute	79	Runs	52.188 (30.367)	Career Runs	215.701 (116.401)
Position:		Hits	100.479 (53.074)	Career Hits	413.797 (205.812)
1B	60	Doubles	20.630 (11.983)	Career Doubles	83.851 (44.262)
2B	68	Home Runs	11.872 (9.972)	Career Home Runs	46.298 (36.475)
3B	67	RBI	49.700 (30.570)	Career RBI	199.926 (115.105)
SS	86	Batting Average	258.702 (42.061)	Career Batting Average	264.002 (21.746)
C	111	OPS	736.445 (129.338)	Career OPS	745.91 (77.854)
OF	191				
DH	8				

Table 2: Mean Salaries for All Players

	1	2	3	4	5
		Number	Salary	Difference	% Increase
1	First Time	221	\$1,574,711		
2	Second Time	187	\$2,333,759	\$759,048*	48%
3	Third Time	177	\$3,479,090	\$1,145,331*	49%
4	Pre-Exchange	516	\$2,354,820		
5	Dispute	79	\$2,699,721	\$344,901*	15%
6	Single Year	417	\$2,043,955		
7	Multi Year	178	\$3,236,154	\$1,192,199*	58%

Notes: * indicates significant at the .05 level

Table 3

Panel A: Mean Salaries of Balanced Cohort Data¹⁰

			Balanced			
Cohort Starting In:	#	1st Time	2nd Time	Δ in Salary	3rd Time	Δ in Salary
2002	51	\$1,788,910	\$2,529,057	41%	\$3,400,582	34%
2003	26	\$1,532,896	\$2,324,193	52%	\$3,014,602	30%
2004	28	\$1,938,323	\$2,811,421	45%	\$3,804,688	35%

Panel B: Mean Salaries of Unbalanced Cohort Data¹¹

			Unbalanced					
Cohort Starting In:	#	1st Time	#	2nd Time	Δ in Salary	#	3rd Time	Δ in Salary
2002	71	\$1,495,432	65	\$2,210,680	48%	49	\$3,400,582	54%
2003	36	\$1,456,953	31	\$2,044,484	40%	30	\$3,110,962	52%
2004	41	\$1,527,391	32	\$2,637,874	73%	29	\$3,699,353	40%

¹⁰ This table includes only players that played during 3 consecutive arbitration years

¹¹ This table includes those players that played at least one season during the 5 year span excluding those players in Panel A

Table 4: Mean Salaries for Cohort Data

		1	2	3	4
		Number	Salary	Difference	% Increase
1	First Time	105	\$1,773,233		
2	Second Time	105	\$2,553,414	\$780,181*	44%
3	Third Time	105	\$3,405,415	\$852,001*	33%
4	Free Agent Year	63	\$4,321,291	\$915,876*	27%
5	Pre-Exchange	273	\$2,493,896		
6	Dispute	41	\$3,114,615	\$620,719*	25%
7	Single Year	241	\$2,109,110		
8	Multi Year	74	\$4,085,763	\$1,976,653*	94%

Notes: *indicates statistical significance at the .05 level

Table 5: Single Year v. Multi Year: Performance Means

	Single Year	Multiyear	Difference
Time of Settlement:			
Pre-Exchange	.838 (.018)	.949 (.016)	.111*
Dispute	.162 (.018)	.051 (.016)	.111*
Previous Year Performance:			
PA	394.694 (9.524)	470.277 (13.834)	75.583*
Runs	49 (1.442)	59.949 (2.261)	10.949*
Hits	94.712 (2.546)	114.520 (3.838)	19.808*
Doubles	19.457 (.568)	23.486 (.901)	4.029*
Home Runs	10.768 (.447)	14.559 (.831)	3.791*
RBI	46.153 (1.408)	58.333 (2.413)	12.18*
Batting Average	256.570 (2.020)	263.888 (3.133)	7.318*
OPS	728.534 (6.065)	755.691 (10.126)	27.157*
Career Performance:			
Career PA	1620.009 (36.450)	1964 (58.215)	343.991*
Career Runs	200.820 (5.369)	251.899 (8.985)	51.079*
Career Hits	387.890 (9.629)	476.820 (15.425)	88.93*
Career Doubles	77.928 (2.048)	98.258 (3.374)	20.33*
Career Home Runs	41.457 (1.577)	58.416 (3.137)	16.959*
Career RBI	183.799 (5.104)	239.157 (9.464)	55.358*
Career Batting Average	262.282 (1.041)	268.185 (1.608)	5.903*
Career OPS	738.236 (3.602)	764.579 (6.126)	26.343*

* indicates significant at .05 level.

Table 6: Pre-Exchange v. Dispute: Performance Means

	Pre-Exchange	Dispute	Difference
Contract Length:			
Multiyear	.318 (.020)	.114 (.036)	.204*
Previous Year Performance:			
PA	405.372 (8.692)	492.532 (17.401)	87.16*
Runs	50.558 (1.337)	63.101 (2.835)	12.543*
Hits	97.195 (2.330)	122.468 (4.920)	25.273*
Doubles	19.815 (.520)	26.089 (1.207)	6.274*
Home Runs	11.507 (.434)	14.316 (1.082)	2.809*
RBI	48.134 (1.342)	60.177 (2.977)	12.043*
Batting Average	256.320 (1.884)	274.747 (2.932)	18.427*
OPS	729.293 (5.747)	784.608 (10.390)	55.315*
Career Performance:			
Career PA	1726.37 (33.813)	1678.823 (87.417)	47.547
Career Runs	215.733 (5.072)	215.481 (12.733)	.252
Career Hits	414.066 (8.922)	411.987 (223.314)	2.079
Career Doubles	83.748 (1.927)	84.544 (4.875)	.796
Career Home Runs	46.727 (1.594)	44.177 (3.900)	2.55
Career RBI	200.842 (5.064)	193.760 (11.640)	7.082
Career Batting Average	262.932 (.957)	271.203 (2.012)	8.271*
Career OPS	743.446 (3.410)	762.506 (7.935)	19.06*

* indicates significant at .05 level.

Table 7: Multivariate Model of Arbitration for All Players
 Dependent Variable: Natural Log of Salary

Independent Variables	1	2	3	4	5	6	7
Dispute	.247** (.111)	.250*** (.062)	.107*** (.056)	.162*** (.057)	.154*** (.054)	.158*** (.052)	.156*** (.053)
Career PA		.001*** (.00004)	.0003*** (.00004)	.0003*** (.00004)	.0003*** (.00004)	.0003*** (.00004)	.0004*** (.00004)
Career HR		.007*** (.001)	.006*** (.001)	.006*** (.001)	.006*** (.001)	.005*** (.001)	.005*** (.001)
Career AVG		.008*** (.001)	.004*** (.001)	.004*** (.001)	.003*** (.001)	.004*** (.001)	.004*** (.001)
OPS			.0004 (.0002)	.0005** (.0002)	.0005** (.0003)	.001*** (.0003)	.001*** (.0002)
PA			.002*** (.0002)	.002*** (.0002)	.002*** (.0001)	.002*** (.0002)	.002*** (.0002)
LnPrvSal				.074*** (.021)	.059*** (.021)	.041** (.021)	.041** (.021)
Multiyr				.183*** (.042)	.197*** (.042)	.182*** (.040)	.183*** (.048)
Team Win Perc.					.004* (.002)	.004* (.002)	.004** (.002)
Top Quartile					.070 (.047)	.060 (.045)	.063 (.046)
Bottom Quartile					.028 (.047)	.029 (.045)	.027 (.045)
First Base						.038 (.154)	.060 (.155)
Second Base						.133 (.154)	.146 (.155)
Third Base						.301* (.151)	.317** (.152)
Short Stop						.202 (.154)	.212 (.155)
Catcher						.525*** (.151)	.538*** (.152)
Outfield						.241 (.147)	.253* (.148)
2002							.024 (.063)
2003							-.030 (.063)
2004							-.034 (.065)
2005							.056 (.066)
N	595	595	592	566	521	520	520
R-Squared	.006	.703	.764	.770	.775	.795	.795

Notes: LnPrvSal is the natural log of the previous year salary

*** indicates significant at .01 level, ** indicates significant at .05 level, * indicates significant at .10 level.

Table 8: Multivariate Model of Arbitration for Players with Single Year Contracts
 Dependent Variable: Natural Log of Salary

Independent Variables	1	2	3	4	5	6	7
Dispute	.379*** (.116)	.313*** (.068)	.150*** (.062)	.161*** (.063)	.150*** (.063)	.165*** (.060)	.159*** (.060)
Career PA		.001*** (.0001)	.0003*** (.0001)	.0003*** (.0001)	.0003*** (.0001)	.0004*** (.00006)	.0004*** (.00006)
Career HR		.007*** (.001)	.005*** (.001)	.004*** (.001)	.005*** (.001)	.005*** (.001)	.005*** (.001)
Career AVG		.008*** (.001)	.004*** (.001)	.004*** (.001)	.003** (.002)	.005*** (.001)	.005*** (.002)
OPS			.0005* (.0003)	.0007** (.0003)	.0007** (.0003)	.001*** (.0003)	.0008** (.0003)
PA			.002*** (.0001)	.002*** (.0002)	.002*** (.0002)	.002*** (.0001)	.002*** (.0002)
LnPrvSal				.050* (.027)	.046* (.028)	.024 (.027)	.025 (.027)
Team Win Perc.					.004 (.003)	.005* (.003)	.005** (.003)
Top Quartile					.080 (.060)	.065 (.057)	.074 (.057)
Bottom Quartile					.008 (.059)	.017 (.056)	.015 (.056)
First Base						-.066 (.193)	-.030 (.195)
Second Base						.116 (.189)	.136 (.190)
Third Base						.311 (.189)	.343* (.191)
Short Stop						.219 (.190)	.237 (.192)
Catcher						.538*** (.187)	.559*** (.188)
Outfield						.198 (.181)	.216 (.182)
2002							.022 (.116)
2003							-.055 (.117)
2004							-.053 (.119)
2005							.059 (.117)
N	417	417	415	395	364	364	364
R-Squared	.023	.680	.742	.737	.730	.759	.759

Notes: LnPrvSal is the natural log of the previous year salary

*** indicates significant at .01 level, ** indicates significant at .05 level, * indicates significant at .10 level.

Table 9: Predicted v. Actual Salaries by Select Characteristics

	Predicted > Actual	Actual > Predicted	Difference
Methods of Settlement:			
Pre-exchange	.895 (.017)	.835 (.022)	.06*
Dispute	.105 (.017)	.165 (.022)	.06*
Length of Contract:			
Multiyear	.338 (.027)	.255 (.026)	.083*
Previous Year Performance:			
PA	399 (11.710)	451.964 (10.239)	52.964*
Runs	50.022 (1.827)	56.741 (1.608)	6.719*
Hits	96.354 (3.199)	108.935 (2.765)	12.581*
Doubles	19.510 (.712)	22.697 (.641)	3.187*
Home Runs	11.331 (.591)	12.968 (.560)	1.637*
RBI	47.748 (1.797)	53.881 (1.690)	6.133*
Batting Average	255.426 (2.573)	264.554 (1.826)	9.128*
OPS	726.145 (7.914)	754.737 (5.917)	28.592*
Career Performance:			
Career PA	1700.271 (47.542)	1787.097 (41.152)	86.826*
Career Runs	213.924 (7.148)	223.957 (6.136)	10.033*
Career Hits	409.016 (12.623)	430.392 (10.264)	21.376*
Career Doubles	82.038 (2.678)	88.396 (2.375)	6.358*
Career Home Runs	46.139 (2.171)	48.130 (2.057)	1.991
Career RBI	198.577 (6.961)	207.335 (6.258)	8.758*
Career Batting Average	263.274 (1.314)	265.788 (1.124)	2.514*
Career OPS	744.196 (4.536)	751.432 (4.324)	7.236

* indicates significant at .05 level.

Table 10: Predicted v. Actual Salaries for Cohort Data

	Predicted > Actual	Actual > Predicted	Difference
Methods of Settlement:			
Pre-exchange	.892 (.026)	.849 (.028)	.043
Dispute	.108 (.026)	.151 (.028)	.043
Length of Contract:			
Multiyear	.268 (.031)	.265 (.034)	.003
Previous Year Performance:			
PA	436.486 (13.578)	462.940 (12.388)	26.454*
Runs	55.348 (2.180)	58.367 (1.983)	3.019*
Hits	106.7 (3.742)	111.548 (3.432)	4.848*
Doubles	22.138 (.824)	23.108 (.786)	.97
Home Runs	13.481 (.770)	13.247 (.703)	.234
RBI	54.562 (2.198)	55.675 (2.085)	1.113
Batting Average	265.391 (2.239)	264.898 (2.324)	.493
OPS	761.171 (7.759)	756.898 (7.486)	4.273
Career Performance:			
Career PA	2084.767 (61.912)	1812.843 (52.967)	271.924*
Career Runs	259.043 (9.345)	227.783 (7.857)	31.26*
Career Hits	502.610 (16.167)	437.428 (14.124)	65.182*
Career Doubles	102.833 (3.473)	90.217 (3.028)	12.616*
Career Home Runs	59.019 (3.096)	50.277 (2.679)	8.742*
Career RBI	251.229 (9.656)	214.054 (8.010)	37.175*
Career Batting Average	264.322 (1.869)	265.765 (1.560)	1.443
Career OPS	750.465 (6.223)	754.295 (5.766)	3.83

* indicates significant at .05 level.

Table 11: Predicted v. Actual Salaries for players who settled before the exchange date

	Predicted > Actual	Actual > Predicted	Difference
Previous Year Performance:			
PA	390.791 (11.990)	458.089 (9.924)	67.298*
Runs	48.645 (1.856)	57.866 (1.578)	9.221*
Hits	94.083 (3.250)	110.722 (2.718)	16.639*
Doubles	19.040 (.724)	23.041 (.628)	4.001*
Home Runs	11.007 (.600)	13.230 (.511)	2.223*
RBI	46.771 (1.842)	54.619 (1.642)	7.848*
Batting Average	254.362 (2.663)	265.258 (1.759)	10.896*
OPS	722.118 (8.103)	757.667 (5.815)	35.549*
Career Performance:			
Career PA	1681.776 (48.006)	1802.54 (41.235)	120.764*
Career Runs	211.003 (7.237)	226.560 (6.131)	15.557*
Career Hits	403.135 (12.641)	435.581 (10.975)	32.446*
Career Doubles	81.013 (2.721)	89.182 (2.352)	8.169*
Career Home Runs	45.924 (2.244)	48.265 (1.988)	2.341
Career RBI	196.865 (7.137)	208.732 (6.127)	11.867
Career Batting Average	262.523 (1.333)	266.461 (1.117)	3.938*
Career OPS	742.194 (4.599)	753.199 (4.275)	11.005*

* indicates significant at .05 level.

Table 12: Predicted v. Actual Salaries for players who settled after the exchange date

	Predicted > Actual	Actual > Predicted	Difference
Previous Year Performance:			
PA	439.316 (11.172)	402.744 (10.765)	36.572*
Runs	55.942 (1.777)	49.396 (1.599)	6.546*
Hits	107.216 (3.057)	95.484 (2.858)	11.732*
Doubles	22.020 (.696)	19.62 (.643)	2.4*
Home Runs	13.240 (.592)	10.54 (.523)	2.7*
RBI	53.781 (1.751)	46.316 (1.689)	7.465*
Batting Average	260.673 (2.372)	258.336 (2.058)	2.337
OPS	745.594 (7.429)	731.1 (6.350)	14.494
Career Performance:			
Career PA	1778.162 (43.610)	1689.332 (45.889)	88.83*
Career Runs	224.960 (6.620)	209.852 (6.706)	15.108*
Career Hits	430.473 (11.672)	403.176 (11.865)	27.297*
Career Doubles	87.965 (2.557)	80.928 (2.457)	7.037*
Career Home Runs	50.959 (2.107)	41.7 (2.040)	9.259*
Career RBI	213.142 (6.641)	188.216 (6.408)	24.926*
Career Batting Average	265.736 (1.225)	262.672 (1.214)	3.064*
Career OPS	756.536 (4.338)	735.212 (4.407)	21.324*

* indicates significant at .05 level.

Table 13: Actual v. Predict Salaries for Free Agents in Cohort Data

Player Name	Actual Salary	Predicted Salary	Difference
Bako, Paul	650,000	\$762,967	(\$112,967)
Barrett, Michael P.	3,133,333	\$2,974,689	\$158,644
Belliard, Ron	2,500,000	\$3,614,341	(\$1,114,341)
Beltran, Carlos	11,571,429	\$12,234,618	(\$663,189)
Beltre, Adrian	11,400,000	\$10,241,514	\$1,158,486
Bennett, Gary D.	800,000	\$811,151	(\$11,151)
Berkman, Lance	14,500,000	\$12,653,444	\$1,846,556
Blanco, Henry	1,200,000	\$1,174,015	\$25,985
Blum, Geoff	650,000	\$1,266,896	(\$616,896)
Cabrera, Orlando L.	6,000,000	\$5,586,983	\$413,017
Casey, Sean T.	7,800,000	\$7,205,463	\$594,537
Catalanotto, Frank	2,700,000	\$2,112,241	\$587,759
Chavez, Eric C.	8,500,000	\$9,443,054	(\$943,054)
Cora, Alex	1,300,000	\$2,102,190	(\$802,190)
Dellucci, David M.	850,000	\$1,410,775	(\$560,775)
Diaz, Einar	600,000	\$1,233,764	(\$633,764)
Drew, J.D.	9,400,000	\$9,041,539	\$358,461
Encarnacion, Juan	4,435,000	\$4,890,377	(\$455,377)
Furcal, Rafael	8,715,508	\$6,963,690	\$1,751,818
Glaus, Troy	9,000,000	\$7,371,045	\$1,628,955
Gonzalez, Alex	3,400,000	\$3,166,730	\$233,270
Greene, Todd	650,000	\$1,297,020	(\$647,020)
Guillen, Carlos A.	4,000,000	\$4,213,019	(\$213,019)
Guzman, Cristian	4,200,000	\$4,087,156	\$112,844
Helms, Wes	800,000	\$1,587,165	(\$787,165)
Hernandez, Ramon J.	4,000,000	\$4,305,268	(\$305,268)
Jenkins, Geoffrey S.	7,333,333	\$10,944,636	(\$3,611,303)
Kennedy, Adam	3,350,000	\$3,051,458	\$298,542
Konerko, Paul	8,750,000	\$9,954,348	(\$1,204,348)
Koskie, Corey L.	3,500,000	\$5,982,505	(\$2,482,505)
Ledee, Ricky	1,000,000	\$1,107,150	(\$107,150)
Lee, Carlos	8,000,000	\$12,264,261	(\$4,264,261)
Lee, Derrek	7,666,667	\$9,158,656	(\$1,491,989)
LoDuca, Paul	6,599,206	\$4,709,583	\$1,889,623
Lowell, Mike A.	7,500,000	\$6,407,758	\$1,092,242
Lugo, Julio	4,950,000	\$4,855,439	\$94,561
Marrero, Eli	3,200,000	\$1,948,772	\$1,251,228

Martinez, Ramon E.	1,025,000	\$900,450	\$124,550
Matthews Jr., Gary	2,387,500	\$2,090,220	\$297,280
Mientkiewicz, Doug A.	1,850,000	\$2,076,969	(\$226,969)
Millar, Kevin	3,500,000	\$4,930,545	(\$1,430,545)
Mirabelli, Doug	1,500,000	\$1,311,287	\$188,713
Molina, Bengie	4,500,000	\$3,860,395	\$639,605
Mora, Melvin	4,333,334	\$6,749,912	(\$2,416,578)
Nixon, Trot	7,500,000	\$3,729,632	\$3,770,368
Ortiz, David	5,250,000	\$8,058,355	(\$2,808,355)
Payton, Jason L.	4,000,000	\$3,994,105	\$5,895
Perez, Tomas O.	650,000	\$826,950	(\$176,950)
Polanco, Placido	4,600,000	\$4,299,331	\$300,669
Ramirez, Aramis	10,750,000	\$10,251,760	\$498,240
Redmond, Mike P.	900,000	\$1,268,696	(\$368,696)
Saenz, Olmedo	1,000,000	\$1,192,068	(\$192,068)
Sexson, Richie	6,000,000	\$4,485,408	\$1,514,592
Ward, Daryle	700,000	\$1,457,597	(\$757,597)
Wilson, Preston	12,500,000	\$4,531,574	\$7,968,426
Winn, Randy	3,750,000	\$5,016,284	(\$1,266,284)
Woodward, Chris	825,000	\$900,432	(\$75,432)

Table 14: Incremental F-Statistics

	1	2	3	4	5
Variable	F-Stat		F-Stat		
Dispute		Career Performance		Previous Year Performance	
Add:		Add:		Add:	
Career Performance	462.438*	Previous Year Performance	84.785*	Career Performance	105.857*
Add:		Add:		Add:	
Previous Season Performance	76.25*	Dispute	2.487	Dispute	2.487

*indicates significance at the .05 level

IX. Appendix

F. Salary Arbitration

The following salary arbitration procedure shall be applicable:

- (1) *Eligibility.* The issue of a Player's salary may be submitted of final and binding arbitration by any Player or his Club, provided the other party to the arbitration consents thereto. Any Club, or any Player with a total of three or more years of Major League service, however accumulated, but with less than six years of Major League service, may submit the issue of the Player's salary to final and binding arbitration without the consent of the other party, subject to the provisions of paragraph (4) below.

In addition, a Player with at least two but less than three years of Major League service shall be eligible for salary arbitration if: (a) he has accumulated at least 86 days of service during the immediately preceding season; and (b) he ranks in the top seventeen percent (17%) (rounded to the nearest whole number) in total service in the class of Players who have at least two but less than three years of Major League service, however accumulated, but with at least 86 days of service accumulated during the immediately preceding season. If two or more Players are tied in ranking, ties shall be broken consecutively based on the number of days of service accumulated in each of the immediately preceding seasons. If the Players remain tied, the final tie breaker will be by lot.

- (2) *Trade Demand-Club Consent to Arbitration.* Any Player whose Club has offered to proceed to salary arbitration pursuant to Article XX(C)(5) may elect salary arbitration in the same manner and at the same time as other Players.

- (3) *Notice of Submission*

(a) Player Submission. Election of submission shall be communicated by telephone or any other method of communication by the Player to the Association. Written notice of submission shall then be given, within the specified time limits, by the Association on behalf of the Player to the designated representative of the Major League Baseball Labor Relations Department ("LRD").

Within three days after notice of submission has been given, the Association and the LRD shall exchange salary figures. It shall be the responsibility of the Association during this three-day period to obtain the salary figure from the Player, and the LRD shall have a similar responsibility to obtain the Club's figure.

(b) Club Submission. Written notice of submission by the Club shall be communicated to the Player by registered letter mailed between January 2 and January 12 (both inclusive) to the last address the Player has supplied to the Club, with copies to the Association and the LRD. The submission shall be deemed to be made on the third day following the date of mailing by the Club. Salary figures shall be exchanged by the Association and the LRD as soon as practicable thereafter.

(c) Special Exceptions to Maximum Salary Reduction Rules

(i) A Club may submit a salary figure for salary arbitration that is at least 80% of the Player's previous year's salary and earned performance bonuses (and at least 70% of his salary and earned performance bonuses two year previous), the provisions of Section A(5) above notwithstanding. This exception shall not be used by any party, or considered by any salary arbitrator, in support of, or in opposition to, any argument regarding the evaluation of Player contracts.

(ii) A Club may submit a salary arbitration figure without regard to the provisions of Section D above if the figure submitted is with respect to a Player who, in the immediately preceding year, won a salary arbitration which increased the Player's prior year's salary by in excess of 50%.

The above exceptions to the maximum salary reduction rules do not alter the obligations of the Clubs to comply with Articles VI(D) and XX(A) of this Agreement and paragraph 10(a) of the Uniform Player's Contract for the purposes of contract tender and renewal.

- (4) *Withdrawal from Arbitration*. In the event the Club submits the matter to arbitration, the Player may within 7 days after receipt of the Club's salary arbitration figure notify the Club that he does not wish to arbitrate and the matter shall be deemed withdrawn from arbitration. In such event, or in the event that neither the Club nor the Player submits to arbitration, the rights and obligations of the Club and Player shall be as they would have been had the salary arbitration procedure never been invoked. In the event the Club and Player reach agreement on salary before the arbitration panel reaches a decision, the matter shall be withdrawn from arbitration.
- (5) *Timetable and Decision*. Submission may be made at any time between January 5 and January 15. In the event the offer of the Club is reduced on or subsequent to January 15, the Player's right to submit to arbitration shall be reinstated for a period of 7 days. Arbitration

hearings shall be held as soon as possible after submission and, to the extent practicable shall be scheduled to be held from February 1 to February 20. The arbitration panel may render the decision on the day of the hearing, and shall make every effort to do so not later than 24 hours following the close of the hearing. The arbitration panel shall be limited to awarding only one or the other of the two figures submitted. There shall be no opinion. There shall be no release of the arbitration award by the arbitration panel except to the Club, the Player, the Association and the LRD. The panel chair shall initially inform the Association and the LRD of the award only and not how the panel members voted. The panel chair shall disclose to the Association and the LRD the individual votes of the panel member on each March 15 following the February hearings. The panel chair shall insert the figure awarded in paragraph 2 of the duplicate Uniform Player's Contracts delivered at the hearing and shall forward both copies to the Office of the Commissioner.

- (6) *Form of Submission.* The Player and the Club shall exchange with each other in advance of the hearing single salary figures for the coming season (which need not be figures offered during the prior negotiations) and then shall submit such figures to the arbitration panel. At the hearing, the Player and Club shall deliver to the arbitration panel a Uniform Player's Contract executed in duplicate, complete except for the salary figure to be inserted in paragraph 2. Upon submission of the salary issue to arbitration by either Player or Club, the Player shall be regarded as a signed Player (unless the Player withdraws from arbitration as provided in paragraph (4) above).
- (7) *Selection of Arbitrators.* The Association and the LRD shall annually select the arbitrators. In the event they are unable to agree by January 1 in any year, they jointly shall request that the American Arbitration Association furnish them lists of prominent, professional arbitrators. Upon receipt of such lists, the arbitrators shall be selected by alternately striking names from the lists. All cases shall be assigned to three-arbitrator panels. The Association and the LRD shall designate one arbitrator to serve as the panel chair.
- (8) *Location of Hearings.* The single hearing site for each year will be agreed upon by the parties with preference being give to either Los Angeles, Tampa/Orlando, or Phoenix.
- (9) *Conduct of Hearings.* The hearings shall be conducted on a private and confidential basis. Each of the parties to a case shall be limited to one hour for initial presentation and one-half hour for rebuttal and summation. The aforesaid time limitations may be extended by the

arbitration panel in the event of lengthy cross-examination of witnesses, or for other good cause.

(10) *Continuances, Adjournments or Postponements.* There shall be no continuances or adjournments of a hearing, but the commencement of a hearing may be postponed by the arbitration panel upon the application of either the Player or Club based upon a showing of substantial cause. Any request for the postponement of a scheduled hearing shall be made to the panel chair in writing, with copies to the Association and the LRD. Disclosure of individual votes by panel members shall be in accordance with paragraph (5) above.

(11) *Hearing Costs.* The Player and Club shall divide equally the costs of the hearing, each shall be responsible for his own expenses and those of his counsel or other representatives.

(12) *Criteria*

(a) The criteria will be the quality of the Player's contribution to his Club during the past season (including but not limited to his overall performance, special qualities of leadership and public appeal), the length and consistency of his career contribution, the record of the Player's past compensation, comparative baseball salaries (see paragraph (13) below for confidential salary data), the existence of any physical or mental defects on the part of the Player, and the recent performance record of the Club including but not limited to its League standing and attendance as an indication of public acceptance (subject to the exclusion stated in subparagraph (b)(i) below). Any evidence may be submitted which is relevant to the above criteria, and the arbitration panel shall assign such weight to the evidence as shall appear appropriate under the circumstances. The arbitration panel shall, except for a Player with five or more years of Major League service, give particular attention, for comparative salary purposes, to the contracts of Players with Major League service not exceeding one annual service group above the Player's annual service group. This shall not limit the ability of a Player or his representative, because of special accomplishment, to argue the equal relevance of salaries of Players without regard to service, and the arbitration panel shall give whatever weight to such argument as is deemed appropriate.

(b) Evidence of the following shall not be admissible:

(i) The financial position of the Player and the Club;

(ii) Press comments, testimonials or similar material bearing on the performance of either the Player or the Club, except

that recognized annual Player awards for playing excellence shall not be excluded;

(iii) Offers made by either Player or Club prior to arbitration;

(iv) The cost to the parties of their representatives, attorneys, etc.;

(v) Salaries in other sports or occupations.

(13) *Confidential Major League Salary Data.* For its confidential use, as background information, the arbitration panel will be given a tabulation showing the minimum salary in the Major Leagues and salaries for the preceding season of all players on Major League rosters as of August 31, broken down by years of Major League service. The names and Clubs of the Players concerned will appear on the tabulation. In utilizing the salary tabulations, the arbitration panel shall consider the salaries of all comparable Players and not merely the salary of a single Player or group of Players.

(14) *Prohibition Regarding Competitive Balance Tax.* No participant in a salary arbitration hearing shall refer in any fashion, either orally or in writing, to any of the provisions in Article XXIII (Competitive Balance Tax). No salary arbitration panel shall consider in any fashion any of the provision in Article XXIII (Competitive Balance Tax).

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