SALARY DETERMINATION OF ARBITRATION AND FREE AGENT MAJOR LEAGUE BASEBALL PITCHERS: 1984 – 2003

by

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ABSTRACT

When a Major League Baseball player engages in salary negotiations with a team, what determinants are considered in their final salary figure are not black and white. As a result it is necessary to explore which factors contribute to a player's salary, and if these factors are different for free agents and arbitration eligible players. Every free agent and arbitration eligible pitcher between the 1984 and 2003 seasons were evaluated in an ordinary least squares regression analysis that measured player salary as a function of years of experience, innings pitched, earned run average, strike out to walk ratio, year of signing, starter or relief status, playoff experience, and performance relative to the league average; and it was determined that free agent and arbitration eligible pitcher salaries could not be pooled. An Oaxaca means/coefficient decomposition confirmed that the data could not be pooled, indicating that at least 60 percent of the higher salaries for free agents was due to higher returns to productivity characteristics of the players. Additionally, the results indicated that during the 1995 and 2003 seasons, pitchers saw increases of between $13,260 and $15,332 for arbitration eligible pitchers and between $25,186 and $25,840 for free agent pitchers for each additional nine innings pitched, between $20,720 and $24,864 for arbitration eligible pitchers and between $32,710 and $49,065 for an increase of 0.1 in of a pitcher's strike out to walk ratio, and a decrease of 1.0 in a pitcher's ERA resulted in an increase of between $435, 120 and $559,440 for

arbitration eligible pitchers and between $948,590 and $1,504,660 for free agents. Finally, for an arbitration eligible pitcher, each additional year of experience yields an increase of between $435,120 and $538,720 during the 1995-2003 seasons, while years of experience is not a significant contributor in determining a free agent's salary.

Chapter 1

INTRODUCTION

1.1 Cultural Importance

As America's pastime, Major League Baseball has provided stories of the triumphant events and accomplishments of its players and teams that will be revered in the annals of the game for generations to come. From the renowned called home run shot of Babe Ruth to the curse breaking 2004 World Series title of the Boston Red Sox, baseball has provided memories that will forever be engrained in the culture of baseball fandom. While players have created numerous memories on the field, they, along with team owners have also created several memories off the field that baseball fans have not forgotten.

The history of player and owner relations has been a constant tug-of-war with players and owners struggling to gain the upper hand. Prior to the 1975 actions of Andy Messersmith which resulted in the inception of free agency, owners had a strangle hold on player's contracts through a reserve clause that contractually obligated a player to play for a team with no room for negotiation. An example of this is the notorious 1919 Black Sox scandal in which Chicago White Sox owner Charlie Comiskey was paying his team

sub-par wages to a degree that it resulted in his team agreeing to throw the 1919 World Series in exchange for money from an outside source. Since free agency's inception, owners and players have battled to gain control over the other in what has been a highly adversarial relationship. Most recently, baseball fans witnessed the unforgettable strike of 1994 that halted play and canceled the World Series. This was a year which saw Tony Gwyn on a record breaking pace to finish the season batting over .400; the Montreal Expos on pace to have the best regular season record in baseball; Matt Williams within striking distance of breaking Roger Maris' single season home run record; and Frank Thomas and Albert Belle battling for a triple crown. Regardless of the particular dispute, every battle between owners and players has boiled down to one single issue, players' salaries.

1.2 Research Significance

The salary history of players and labor relations between Major League Baseball players and owners have provided economists with an ideal setting to evaluate a labor market over the course of time. Many have written on the struggle between players and owners and how player salaries are determined, focusing on different issues and time periods within baseball's history. However, the most telling evaluation can be conducted on players who have some negotiating power with owners in determining their salary, namely players eligible for arbitration or free agency. The arbitration eligible players, although they cannot sign with another team, possess some bargaining power. When they file for arbitration, they demand a specified salary and the team offers a specified

salary. These are the starting points of negotiations. During the period before filing for arbitration and an arbitration hearing, the team and player bargain, usually leading to a salary somewhere between the player's demand and the owner's offer. Free agents on the other hand have the ability to bargain with all interested teams for their services and have the final decision to sign with the team of their choice and at the salary of their choice. As a result it is important to explore the implications of these differences in negotiations to see if they result in similar or different salary figures for players.

1.3 Purpose and Direction

The purpose of this paper is twofold. First, light is shed on the question of whether free agency and arbitration predict similar salaries. Secondly, it will attempt to identify which factors are significant in determining a player's salary, and additionally if these factors are different for free agents and arbitration eligible players. In doing so, I will include in this paper every pitcher either eligible for arbitration negotiations or free agency between the 1984 and 2003 baseball seasons. Pitchers, unlike position players, are a unique subset of the overall group of players. Pitchers are the cornerstone of a successful team. Many baseball pundits argue that rock solid pitching, not hitting, is what wins championships. In the spirit of these pundits' claims, this study will be conducted on pitchers to explore how their salaries are determined under both free agency and arbitration.

This paper will first present a brief overview of the history of labor relations between players and owners, highlighting the major negotiations that have shaped the current relationship between players and owners. It will then review several other studies

that have been conducted previously in regard to determining player salaries under free agency and arbitration. Then an empirical model will be developed from player salary and performance data. Next an empirical analysis will be conducted to examine the question of whether free agency and arbitration produce similar or different salaries. Finally, this paper will conclude with a reconciliation of the findings with their historical context within baseball's labor relations.

Chapter 2

HISTORY

2.1 Free Agency's Inception

In 1974 the landscape of baseball player and owner relationships changed drastically when Los Angeles Dodgers pitcher Andy Messersmith filed a grievance when he and the Dodgers could not come to terms for his 1975 contract. Messersmith claimed that the owners' reserve system violated the terms of the 1973 collective bargaining agreement and as a result he was free to sign with any team of his choosing (Abrams 118).

Prior to this time the reserve clause had served as the foundation for baseball's labor system for nearly a century. The reserve clause itself was actually a series of provisions in numerous documents, all of which when combined equated to the reserve system as it was known. The reserve clause in essence meant that, "a player could negotiate only with one buyer of his services: the club that retained him on their reserve list" (Abrams 118). This system resulted in monospony power that owners had utilized to their advantage to suppress player salaries since a player had no choice but to play for the team that had signed him to a contract. The only alternative was not playing baseball at all.

Messersmith's grievance concentrated particularly on the option clause portion of the uniform player contract which stated that, "the club shall have the right…to renew this contract for the period of one year on the same terms" (Abrams 119). Prior to this time, owner's treated each one year renewal as also a renewing the one year option clause. Thus a team could continue to renew a player's contract indefinitely by renewing the one year contract each season. Messersmith argued that this renewal option was for one year only and that the exercising of that one year renewal did not renew the option clause as well.

This matter was resolved in arbitration. A well known labor relations arbitrator, Peter Seitz, was appointed to hear the proceedings over three days in New York City. On December 23, 1975, Seitz granted Messersmith's grievance and ruled that, "players were free of the reserve system" (Abrams 126). In his opinion, Seitz cited a prevailing New York precedent involving real estate transactions in which the law frowned upon perpetual contracts renewable by one party (Abrams 126). This ruling did not sit well with owners, and an appeal was filed immediately. After hearings in a federal court in Kansas City, the court ruled to uphold Seitz's opinion, resulting in the owners being forced to act in accordance with with the abolishment of the reserve clause.

In compliance with the courts rulings, the owners negotiated with the player's association new terms and agreements without a permanent reserve clause. A skilled labor relations expert, Marvin Miller, represented the players association and fully recognized that complete and total player free agency would, "drive down players' salaries, with players bidding against players" (Abrams 132). In what was crafted as an

appeasement to the owners, Miller on behalf of the players association proposed that owners would have the right to reserve the services of a player for six years, after which time the player had the right to declare free agency. This was structured to, "decrease the supply of available free agents in any one year", and as a result, "clubs bid against clubs for the available talent" (Abrams 133). The owners agreed to this provision, and as a result of free agency's inception in 1976, "players' salaries doubled the next year and tripled over the next five years" (Abrams 133).

2.2 The Collusion Years

In 1985 owners faced their next battle with the players association when it became apparent that clubs were not making offers to attractive free agents. This was recognized by players and action was taken when a group of players highlighted by Chicago White Sox All-Star catcher Carlton Fisk. A class action grievance was filed claiming that the owners had violated the collective bargaining agreement through collusion (Abrams 137). The particular passage of the 1985 collective bargaining agreement in question was Article 18 which stated that, "Players shall not act in concert with other players and Clubs shall not act in concert with other Clubs" (Abrams 138). As a result of this wording in Article 18, the alleged collusion was suggested by players to be in the form of owners agreeing, "not to make offers to any free agent as long as that player's prior club had an interest in re-signing him" (Abrams 137).

Proving collusion in court proved to be difficult as the players relied predominantly on circumstantial evidence to make their case. The players association

was not only able to meet this burden, but do so rather convincingly by presenting historical evidence indicating that collusion was indeed going on. In 1984 of the twenty-six major league clubs, sixteen had signed free agents from other teams. However of the twenty-nine players in the 1985 class of free agents only one had received a genuine offer from another club prior to the player's original team formally expressing their intentions to not resign him (Abrams 142). Due to the lack of offers from other teams, all but four of the twenty-nine free agents had failed to sign with their original team before the 1986 spring training season commenced. This was a drastic decrease when compared to the 1984 season in which twenty-six of the forty-six free agents signed with different clubs (Abrams 142).

While owners claimed that this behavior was due to the "unattractive" nature of the 1985 free agent class as a whole, arbitrator Tom Roberts viewed the case in a different light. Roberts' decision on September 21, 1987, found that the clubs had indeed violated the collective bargaining agreement and did act in a collusive manner (Abrams 141). Roberts in his opinion noted that the general "unattractiveness" of the free agent class did not accurately explain the overall low salary levels. He made the argument that, "even unattractive free agents with many years of major-league experience were worth something" (Abrams 143). Most importantly Roberts said that, "the 1985 class appeared to be unattractive only to the clubs other than the ones for which they had played during the prior season, and then only until those clubs indicated that they were no longer interested in signing their players" (Abrams 143). Robert's award to the players has yet to be calculated as the ruling is still to this day tied up in litigation.

The players union also filed grievances regarding contracts signed during the 1986 and 1987 seasons claiming that the owners acted in a collusive manner to suppress free agent salaries in what was coined as "Collusion II". Arbitrator George Nicolau found in his August 31, 1988, opinion that a "patent pattern" existed in which clubs were rigging bids in a way that, "defied fair play" (Abrams 145). On September 17, 1990, Nicolau ordered team owners to pay players affected by the collusive contract violations of the 1987 and 1988 seasons $102.5 Million in damages, the largest award in sports history (Abrams 146). Once the collusive actions of owners ceased, players saw a significant increase in salaries, "from an average salary of $430,000 in 1988 to more than $1 million by 1992.

2.3 The 1994 Player Strike

By the mid 1990's the business of baseball evolved into the most recent topic of dispute between players and owners. Many baseball franchises were becoming the property of corporate America, notably the St. Louis Cardinals being owned by Gussie Busch and the Atlanta Braves serving as a programming tool for media tycoon Ted Turner. Despite the fact that many teams were showing accounting losses, the attitude of corporate America resulted in players being viewed as "assets" of the team which could then be depreciated as a tax deduction over a five year period (Abrams 177). Additionally the first national television contract was signed by Major League Baseball in 1990, resulting in large revenue streams for every major league team.

The players association as well became a significant revenue generating machine and gained power as a union over time. Managing the licensing agreements with revenue sources such as, "baseball card companies, computer games, and clothing", the players association began to see revenues of around $90 million a year (Abrams 179). The union was collecting dues from each player in the amount of, "twenty dollars a day for every day of major-league service" to contribute to the managing of these revenue generating venues (Abrams 179). These revenues were then distributed to the players, with each player receiving a share that was proportionate to his major-league service.

Unlike the equity driven strategies of revenue sharing in other professional sports, baseball's owners did not have a similar system in place. As a result, visiting clubs only saw a small portion of the home team's gate profits, "20 percent in the American League and about 5 percent in the National League" (Abrams 177). Due to the local market conditions of each city, this disparity became a problem as ticket prices in smaller markets like Milwaukee and Kansas City were much lower than prices in large markets such as New York and Los Angeles. Intensifying the disparity between revenues of large and small market teams was the fact that there was no uniform television contract for all teams. This provided large market teams with highly lucrative opportunities for local television contracts while smaller market teams struggled to televise games. However this became challenging for large market teams to broadcast away games because copyright laws rendered a broadcast property of the home team (Abrams 180). As a result problems arose and questions such as, "how could George Steinbrenner sell to the MSG network and WPIX in New York City the right to televise a Yankees-Brewers

game in Milwaukee County Stadium?", were posed due to the fact that this, "required the consent of the Brewers, the home team" (Abrams 180). Until 1993 this was not a problem as club owners agreed to give permission to visiting teams to broadcast the game in their local market. Once that contract expired in 1993 however, small market teams attempted to use this as a bargaining tool to gain a larger share of baseball's overall revenue. In a January 1994 owners' meeting in Fort Lauderdale the owners agreed to continue the television arrangements under a new revenue-sharing formula with one stipulation, "the players would have to agree to a salary cap that would limit each club's total player costs" (Abrams 181).

Negotiations between players' representatives and owners commenced in Tampa in March 1994 and little to no headway was made. On June 14, 1994, owners' representatives proposed a salary cap in under which, "team payrolls would be limited to 84 to 110 percent of the average team payroll" and as an appeasement to the players, "the proposal abolished arbitration and lowered the free agency eligibility from six years of service to four" (Abrams 183). A month later the union rejected the owners' proposal and made a counteroffer which involved lowering the eligibility requirements of arbitration to two years and raising the minimum player salary to $175,000 (Abrams 183). A week later owners rejected this counteroffer, escalating tensions between the two parties.

On July 28, 1994, the players association set an August 12 strike deadline. The idea behind that date was to maximize its potential impact because, "half the owners' revenue comes from fan attendance, and the gate peaks in late August and early

September" (Abrams 184). This coupled with the fact that, "most management revenue from national television contracts results from World Series telecasts", posed huge threats of revenue losses to owners (Abrams 184). As an act of defiance to demonstrate that owners were not intimidated by the players' threat of a strike, the owners failed to make their payment to the players' pension fund in August. Accordingly, on August 12, 1994, the players walked out in what was the longest strike in professional sports history and the remainder of the 1994 baseball season was canceled.

Players and owners remained at a standstill until December 22, 1994, when the players association presented the owners with a proposal to ease the revenue disparities amongst teams through a luxury tax on those teams with payrolls significantly exceeding the major-league average (Abrams 187). Remaining steadfast on a salary cap, owners did not even respond to this proposal and negotiations remained deadlocked. During January 1995 the owners decided to continue with their proposal of continuing baseball under the current conditions and staff teams with replacement players. On January 26, 1995, the federal government intervened and President Clinton ordered mediator Bill Usery to bring both sides to the table. In an effort to make good faith negotiations owners abandoned the salary cap idea and proposed a, "75 percent luxury tax on payrolls between $35 and $42 million and a 100 percent tax on payrolls over $42 million" (Abrams 188). Unfortunately, Usery was unable to reach an agreement, and negotiations further stalled.

The National Labor Relations Board intervened on behalf of the players association claiming that owners violated the National Labor Relations Act due to the

failing negotiations and on March 26, 1995, Judge Sonia Sotomayor head proceedings (Abrams 193). Sotomayor issued an injunction ordering the parties to return the bargaining table until an agreement was made. While the court did not order the players to return to the field, the union in a good faith effort to keep negotiations progressive offered to do so and the 1995 season begin just a few days late on April 26.

The 1995 and 1996 seasons proceeded while negotiations continued between the players association and owners. Finally, an agreement was reached December 5, 1996, between the players and owners. Beginning with the 1997 season, interleague play would begin during the regular season between American League and National League teams. Additionally beginning with the 1997 season, "a maximum of five teams with payrolls exceeding a set amount - $51 million in 1994, $55 million in 1998, $58.9 million in 1999 – will pay a tax of 35 percent in 1997 and 1998 and 34 percent in 1999" (Abrams 197). This tax would be used in part to fund the revenue sharing mechanism geared toward eliminating disparities between small and large market teams. Players would also share a portion of this burden by, "paying a tax of 2.5 percent on their 1996 and 1997 salaries, with money coming from licensing income and other revenue sources" (Abrams 197). Salary arbitration was also addressed in the new agreement with a three arbitrator panel beginning to hear cases instead of a single arbitrator, and this panel of three arbitrators would being hearing all cases in 2000. Finally, owners and players requested that Congress repeal baseball's *Federal Baseball* antitrust exemption as it applies to labor relations, and as a result baseball would join all other professional sports under the rule of

national law (Abrams 198). On March 14, 1997, representatives from both sides signed the new agreement.

2.4 A Near Strike Averted

The finalized 1997 agreement expired at the end of the 2001 season, and during the 2002 season owner and the players association returned to the table to renegotiate. This time baseball commissioner Bud Selig dropped a bombshell on the players association when he announced that, "the owners had voted to contract (eliminate) two teams for the 2002 season" (Zamblist 95). This did not sit well with the players association as this contraction would result in, "reduction of union membership by eighty players; and lowering demand for players by eighty relative to supply would put downward pressure on salaries" (Zamblist 95). Negotiations labored for some time and no significant progress was made with the owners eventually conceding the notion of contracting two teams. Ultimately on August 16, 2002, the players set a strike date of August 30. Fortunately, "a last minute agreement was made just in time for the Cardinals and Cubs to play in an afternoon game at Wrigley Field on August 30" (Zamblist 95). Ironically, not much changed from the 1997 agreement, "other than the improvement in the players' benefit fund, the lifting of the minimum salary from $200,000 to $300,000, and the introduction of drug testing for steroids" (Zamblist 99). The agreement that was reached at the last minute to preserve the 2002 season continues to govern owner and player relations to this point, and surely will be renegotiated upon its expiration.

Chapter 3

LITERATURE

3.1 Early Studies

One of the first attempts to evaluate the labor market for major leaguers was in 1974 where Gerald Scully produced a groundbreaking result in which he argued that players were being exploited by the monopsony associated with Major League Baseball's reserve clause. Using data from the 1968 and 1969 seasons, Scully attempted to estimate the marginal revenue of players based on the relationships between team revenue, team winning percentage, and individual player statistics which included slugging average and the strikeout to walk ratio. In doing so, he compared his estimated marginal revenue product figure to the actual salaries that players were receiving and concluded that the best players were suffering the most from exploitation. In numerical terms Scully estimated that top players were only receiving fifteen percent of their marginal revenue net of costs, while an average player received about twenty percent of their marginal revenue net of costs. The remaining eighty to eighty-five percent of marginal revenue was captured as profits; ending up in the pockets of the owners in what Scully argued was

monopsonistic exploitation. Table 3.1 highlights all studies in this review, indicating the major findings and the baseball seasons evaluated in each study.

Table 3.1 Literature Review

Author	Study	Year(s) of Sample	Conclusion
Scully, Gerald (1974)	Pay and Performance in Baseball	1968-1969	Top players only receive 15% of their MRP, the remaining 85% is caputred as profit by owners
Blass, Asher (1988)	Does arbitration yeild a fair market value for salaries	1978-1988	Arbitrator preferences for batters conform closely to the overall wage structure in terms of productivity and seniority in terms of fair market value, but are probably influenced by FOA
Erekson, O. Homer and James W. Moser and Steen Schwartz (1989)	How arbitration impacts management's decisions	1974-1982	There is evenhandedness in the decisions made by arbitrators and salaries are deemed fair, but a more enriched study would likely yeild a different result.
Hadley, Lawrence and Elizabeth Gustafson (1991)	Impacts of arbitration & free agency	1989	FOA has a large positive impact on salaries. Free agency has a positive impact but smaller than arbitration
Faurot, David and Stephen McAllister (1992)	Comparison between pre-arbitration negotiation and FOA	1984-1991	A player who maximizes his expected value of arbitration avoids sacrificing potential negotiated agreemends
Frederick, David and William H Kaempfer and Richard L. Wobbekind (1992)	Salary arbitration as a market structure	1974-1991	the outcome of a previous arbitration negotiation can impact current negotiations as repeat coefficients as well market size and collusion coefficients are statistically significant
Coleman, Jay and Kenneth M Jennings and Frank S. McLaughlin (1993)	Convergence or Divergence in FOA	1986-1990	Both player and team are induced to depart from their "optimal" positions with little expected penalty due to very small efffects on expected monetary value.
Kahn, Lawrence (1993)	Free Agency and Long Term Contracts	1987-1990	There are no significant differences between the salaries of arbitration eligigbler players and those who are free agents.

Table 3.1 Literature Review Continued

Author	Study	Year(s) of Sample	Conclusion
Farmer, Amy and Paul Pecorino (1993)	The Use of FOA as a screening device for risk averse agents		When "hard offers" are made to risk-neutral agents they will be rejected and arbitration will result. Risk preferences are difficult to estimate regardless of whether it is in the best interest of both parties to do so.
Burgess, Paul and Daniel Margurger (1993)	Do negotiated and arbitrated salaries differ under FOA	1986-1991	Bargaining agents retain substantial freedom to negotiate salaries that are not determined solely by arbitrator preferences.
Marburger, Daniel (1994)	Bargaining power and structure of major league baseball salaries	1991-1992	By the time the player reaches free agency he can expect to earn the same single-season salary that he would as a free agent.
Hadley, Lawrence and Elizabeth Gustafson (1995)	Arbitration and Salary Gaps	1990	21.5 % of the salary gap between hitters and 40.5% for pitchers eligible for arbitration and those who are not is due to monopsonisitic exploitation
John Fizel (1996)	Bias in salary arbitration: the case of major league baseball	1974-1993	There is a strong external bias against Latin and Black players. Latin players had 33% less chance than Blacks 17% less chance than Whites to win an arbitration hearing.
Marburger, Daniel and John Scoggins(1996)	Risk and FOA usage rates	1986-1992	Higher quality (low risk) players are more likely to file for FOA and have their salries arbitrated then lower quality (high risk) players.
Bodvarsson, Orn and King Banaian (1998)	The value of Arbitration	1987-1998	Arbitration is a significant factor in determining a player's salary and those eligible for arbitration are paid more then those who are not.
Krautman, Daniel (1999)	Re-evaluation of Scully Findings	1968-1968	Length of experience is a significant factor determinant in MLB slaries.
Guis, Mark and Timothy R. Hylan (1999)	Effect of arbitration on hitters salaries prior to free agency in 1976	1965-1975	Before imposition of free agency arbitration did not have a significant impact on salaries, and had free agency not been enacted arbitration may have not had any significant impact on baseball slaries.

Table 3.1 Literature Review Continued

Author	Study	Year(s) of Sample	Conclusion
Miller, Philip (2000)	Salary comparison of free agent and arbitration negotiations	1991-1993	There is a significant positive relationship between arbitration and free agent salaries, but the systems do not determine equal salaries for comparable players.
Farmer, Amy and Paul Pecorino and Victor Stango (2000)	Causes for bargaining failure in arbitration negotiations	1990-1993	Learning occurs over time as previously eligible players and the clubs they are negotiating with submit bids with a lower varaince than do those in first time negotiations.
Miller, Philip (2000)	analysis of FOA: the effect of pre-arbitration negotiations on the choice of FOA	1986-1994	Relief pitchers and position players set final offers in a risk-neutral manner, but starting pitchers negotiations bargain in a non-risk neutral manner
Gorman, Keith (2001)	Analysis of FOA 1996-1999	1996-1999	Analysis shows that the expected gains from arbitration show that batters that file and settle earn 22.2% then those that don't file for FOA, and pitchers who file and settle earn 20.3% more then those who do not file for FOA.

As revolutionary as Scully's evaluation appeared, he neglected to consider one large contributing factor that many view as crucial to any analysis of player salaries, experience. The notion of considering the number of years a player has been in the major leagues originates from Gary Becker's general theory of human capital in which there is a correlation between improvement in skills through experience and increased earnings. Thus it can be inferred that the greater the number of seasons a player has seen in the majors, the higher his accompanying salary will be. This concept was affirmed in 1999 when Krautmann showed that the length of experience was a significant determinant in MLB salaries. Additionally, Krautmann also found a significant negative correlation between contract length and salary compensation.

3.2 Arbitration and the Inception of Free Agency

Scully's study in 1974 coincided with the introduction of final offer arbitration which helped to resolve player complaints that the system was biased towards owners. The inception of final offer arbitration by itself, however, did not truly eliminate the monopsonisitic characteristics of arbitration, as Mark Gius and Timothy Hylan showed in 1999. Their argument focused on the idea that because arbitrators could only judge what was considered sufficient compensation based on players who were considered of equal talent and who were already being paid the exploited low salary, arbitration did not significantly impact a player's salary. Gius and Hylan made the claim that players needed the competitive edge provided through free agency to achieve a figure above what was considered the "benchmark" salary awarded under arbitration. As final offer arbitration was enacted in 1974 and free agency in 1976, Gius and Hylan tested for the significance of differences in hitter salaries between the 1965 and 1975 seasons. Evaluating 592 hitters between 1965 and 1975 seasons they showed in a panel analysis that during the combined years of 1974 and 1975 arbitration proved to make no significant differences in the salaries of eligible players. However after free agency had been enacted, the results show structural differences between the salaries of players eligible for arbitration and their less experienced counterparts who are not eligible for arbitration. Most importantly, Gius and Hylan's results indicate that, "if free agency were not enacted, arbitration may have not had a significant impact on baseball player's salaries" (32).

Gius and Hylan's findings are further solidified by the 1998 study conducted by Bodvarsson and Banaian where they tested the benefits of arbitration in evaluating what impact it had on employee compensation. Concentrating on the 1987 and 1988 seasons, they tested for significant differences between players who were eligible for and filed for arbitration with players who were eligible but did not file for arbitration. The model used in the analysis was an ordinary least squares regression analysis with a dummy variable included for a player who was eligible for and did file for arbitration. Most notably, Bodvarsson and Banaian found that arbitration was indeed a significant factor in the determination of a player's salary. Those eligible for arbitration were paid more than those who were not. Furthermore, they concluded that the mere act of filing the paperwork for arbitration gave players a higher salary. Ceteris paribus, they argued that this was perhaps due to the extra fees associated with arbitration, both monetary and psychological. Overall the work of Gius and Hylan accompanied with that of Bodvarsson and Banaian proved that after the inception of free agency, arbitration has played a significant role in determining the salaries of major league players.

The failure to include experience in his estimation ultimately spelled the demise of Scully's conclusion that monopsonistic exploitation existed in the player market. In 1994 Daniel Marburger evaluated 1360 player salaries from the 1991 and 1992 seasons in an in depth estimation of both position players and pitchers to determine if there was a significant difference in the expected salary of a player as his years of experience increased. In a much more extensive evaluation that estimated salary as a function of innings pitched, earned run average, saves, career innings pitched, career saves,

experience, experience squared, and a dummy variable indicating whether or not the player signed their current contract in 1991, Marburger's ordinary least squares estimation yielded a most noteworthy finding that eligibility of final offer arbitration did not result in a specific level of reduction in monopsonistic exploitation. In the case of separate regressions for both free agents and arbitration eligible pitchers, the coefficient of experience squared was found to be significant. As a result, he argued that, "the level of exploitation diminishes markedly in the first seasons of eligibility and continues to decrease in subsequent seasons. By the time the player reaches free agent eligibility, "he can expect to earn the same single-season salary that he would as a free agent" (433). This conclusion refutes Scully's claim of monopsonistic exploitation and suggests an idea of a fair market valuation in player contracts.

In 1995 Lawrence Hadley and Elizabeth Gustafson attempted to quantify how much monopsonistic exploitation in arbitration eligibility had been eliminated since it was coupled with free agency. Using player salaries from the 1990 season, they found that 25.1 percent of the salary difference between arbitration eligible hitters and those hitters ineligible for arbitration were not due to performance. As a result, they concluded that 25.1 percent of the salary gap for hitters was due to monopsonistic exploitation. For pitchers they found that the figure was higher at 40.5 percent. In this study, Hadley and Gustafson also looked for evident structural changes in the salary variation for arbitration eligible players and ineligible players, finding that ineligible players had much less variability in salaries than those who were eligible for arbitration. While this study found some monopsonistic exploitation was still present, its findings coupled with those of

Marburger negate the earlier claims of significant levels of exploitation and salary suppression below fair market value that Scully argued existed prior to free agency.

3.3 The Arbitration Negotiation Process

Due to the nature of arbitration as a negotiation process litigated by an independent arbitrator, there is some risk taken on by both the player and the team when engaging in arbitration negotiations. As a result, this can impact a player's decision to even file for final offer arbitration or seek a negotiated contract. In 1996 Marburger and Scoggins evaluated 1256 final offer arbitration eligible players during the 1986 to 1992 seasons in an attempt to forecast the probability of a player filing for arbitration. They found that this probability was directly related to the quality of the player in question and that the risk of employing a particular individual was inversely related to player quality. Most notably they found that, "higher-quality (low risk) players are more likely to file for arbitration and seek an arbitrated settlement than lower-quality (high risk) players" (735). This finding suggests that owners classify players based on some risk characteristics that are directly related to their perceived quality and players classify themselves in a certain risk level based on their own perceived quality. As a result this apparent risk level, results in not every player eligible for final offer arbitration reaching that point.

This notion was further affirmed in a 1993 study by Farmer and Peccorino in which they evaluated final offer arbitration as a screening process for risk-averse agents. Due to the asymmetric nature of information when players and teams come to the table to

negotiate, a risk-averse player's attitude towards final offer arbitration will be different from a player who is risk neutral. In an analysis to forecast the expected value of a player's salary as a function of a player's risk characteristics, Farmer and Peccorino attempted to characterize each player's attitude towards risk in an asymmetric information environment. While they concluded that it is difficult and nearly impossible to classify the risk traits of each player since those characteristics are unobservable, they did characterize as a "hard offer" an offer made by a player in an attempt to extract the willingness of a risk-averse bargaining partner to pay to avoid the uncertainty of arbitration. When "hard" offers are made to a risk neutral agent, Farmer and Peccorino suggested that, "it will be refused and arbitration will result" (655). While this study may not have directly classified the risk preferences of individual players when making the final offer arbitration filing decisions, it made huge strides towards recognizing the existence of asymmetric information and its associated risk as a contributing factor to the arbitration filing decision process. Asymmetric information exists in the form of a player having knowledge of their abilities, ailments, and shortcomings that a team cannot expose via a physical, workout, past performance, or medical record. Therefore a player is able to hide this information from the team and this affects the negotiation process.

Asymmetric information was the subject of a 2000 study by Farmer, Peccorino, and Stango in which they explored the causes for bargaining failure in arbitration negotiations between players and teams. Evaluating players from the 1990 to 1993 seasons they investigated the variance of the bids submitted by first time arbitration eligible players with those players who have previously been eligible for arbitration in a

panel analysis of both position players and pitchers. They attempted to estimate the aggressiveness of a player's willingness to enter arbitration negotiations by measuring a player's expected salary as a function of the available information the player has when making the offer. The ultimate conclusion was that excessive optimism on the part of both the player and team was the major contributing factor causing bargaining failure in arbitration and that this was largely due to asymmetric information. They, however, rightfully noted that learning occurs over time as both players and teams are more accustomed to the bargaining experience over time when a player is previously eligible for arbitration. As a result, bids for previously eligible arbitration players are submitted by both the player and team with lower variance than first time eligible players.

Building on the idea of risk in arbitration and contract negotiations was the 1993 study of Coleman, Jennings, and McLaughlin in which they evaluated whether players and teams converged or diverged from what was considered their "optimal" final offer arbitration figures to an amicable figure that was agreed upon by both player and team. Using 115 arbitration cases during the 1986 to 1990 seasons, they attempted to evaluate the expected monetary value of a contract to management based on the probability of the optimum offer being accepted. Presumably a player would have an "optimal" figure that was higher than the figure of the team, and as a result negotiations would take place. In their analysis, they concluded that both players and teams are induced to deviate from their "optimal" positions or figures with little expected penalty due to very small effects on the expected monetary value. As a result, convergence is most likely to occur, as players and teams will reach amicable agreements. The authors suggest the reason for

this result is due to the idea that particularly from the perspective of management that, "arbitration hearings are unpleasant experiences they would just as soon avoid" (245). Additionally, the variation in the empirical evidence shows little difference in salaries of final offer arbitration eligible players, implying that the combined effect of management's view of negotiations and little variation in salaries results in the player and team coming to terms. This study helps explain the role risk plays in contract negotiations as players and teams are likely to stray from their initial positions and refrain from a hardnosed stance due to the minimal monetary penalties that are associated with such deviation.

If in general it can be assumed that players and teams are willing to stray from their initial positions due to minimal monetary penalties, then the question should be raised whether this is the case for every player or only a subcategory of all players. In 2000 Miller attempted to answer this matter when he investigated the effect of pre-arbitration negotiations on the choice of final offer arbitration. In an ordinary least squares analysis of 560 position players and 414 pitchers during the 1986 to 1994 seasons, he attempted to evaluate a player's salary based on team performance measures and the individual performance measures for pitchers. The performance measures included were of the average number of players reaching base per game, saves in the previous season, career games played, career innings pitched, and a measure of a pitcher's defense that was defined as the number of runs prevented after the ball has been pitched. In his analysis Miller found that relief pitchers and position players set their final offers in a risk neutral manner. Interestingly he found that starting pitcher

negotiators do not bargain in a risk neutral fashion, however he was not able to suggest a reason for why this phenomena existed and noted that further studies needed to be conducted before this argument could soundly be made.

In addition to the inherent risk that is present when engaging in arbitration negotiations, both players and teams face the question of what degree of fairness the arbitrator is using in his analysis. This is an important factor in negotiations because the arbitrator is supposed to be a fair and unbiased independent agent that attempts to aide both parties in reaching a fair and amicable resolution. If an arbitrator is biased or sympathetic towards players or owners this could significantly impact the decision to engage in arbitration. In 1996 John Fizel explored the bias existing in salary arbitration by evaluating 358 arbitration cases during the 1974 to 1993 seasons. Using a probit model to estimate the probability of winning an arbitration hearing, Fizel concluded that there was a strong external bias against Black and Latin players. He estimated that Latin players had a thirty-three percent less chance than whites, and that Blacks had a seventeen percent less chance than whites of winning an arbitration hearing. Fizel's study indicates that some bias may exist in the awarding of salaries through arbitration. One shortcoming of Fizel's study is the extremely small sample size over the number of seasons in question as he evaluated only a sample of the overall population of arbitration hearings. This leads researchers to question whether this result holds true for the entire population of players or just the sample of players in this study. Further investigation under the current composition of the major league player market has the potential to drastically alter his findings.

In regard to the partiality of an arbitrator when a player is deciding whether to negotiate with the team or file for arbitration, Burgess and Marburger investigated this matter in a 1993 study in which they looked at 708 players during the 1986 to 1991 seasons who filed for final offer arbitration. In an ordinary least squares regression analysis for both position players and hitters, they tested to see if there was a significant difference between the player salaries that were negotiated and those that were arbitrated. In the case of pitchers, team performance measures were used in the analysis as well the individual performance measures of innings pitched in the previous season, career innings pitched, saves in the previous season, career saves, earned run average in the previous season, career earned run average, and a dummy variable for relief pitchers. Burgess and Marburger found that there was a significant difference between the salaries of players who negotiated and those whose salaries were arbitrated. They argued that as a result, "arbitrated settlements are of 'low quality' relative to negotiated ones, in the sense that they tend to fall outside the bounds of potential negotiated settlements" (548). Additionally they noted that bargaining agents, "retain substantial freedom to negotiate salaries that are not determined solely by arbitrator preferences" (548). This suggests that a player has the ability to extract a higher salary out of a negotiated contract rather then an arbitrated one providing a clear incentive for players to negotiate contracts and avoid arbitration.

The 1992 study of Faurot and McAllister attempted to shed more light on the question of whether or not an incentive existed for players to negotiate a contract and avoid arbitration as they evaluated select arbitration cases from the 1984 to 1991 seasons.

Using a model that estimated an arbitrator's salary award based on performance during previous season, the length and consistency of player's career performance, previous salary, team's performance in the previous season, and the player's position they found that if the assumption is made that players are risk neutral, then arbitration proposals can influence bargaining. They concluded that a player who attempts to maximize the expected value of arbitration avoids falling into the trap of sacrificing income in potentially negotiated agreements. Additionally, they suggested that the figure awarded by the arbitrator could be calculated if offers made by players and teams were risk neutral. As a result, they concluded that the basic criteria that arbitrators were supposed to consider for relative player's salaries based on the collective bargaining agreement included: "the player's performance during the previous season, the length and consistency of the player's career performance, previous compensation, and the club's recent performance", along with the player's position all were being taken into considered by the arbitrator when awarding a contract (697). Based on this study, it could be suggested that arbitrators are awarding contracts in a fair and unbiased manner, and in addition that they are doing so based on the suggested criteria in the collective bargaining agreement. If this is the case, then it provides little incentive for players to avoid arbitration and attempt to achieve success in negotiations, making them virtually indifferent between negotiation and arbitration each season.

If players are truly indifferent between negotiating a contract and letting it go to arbitration, then the decisions of the arbitrators must be evaluated and critiqued for a full analysis. The 1989 study by Erekson, Moser, and Schwartz attempted to expose the

degree of evenhandedness in arbitration decisions. Their goal was to look at how arbitration impacts management's decision to negotiate or go to arbitration based on previous arbitrator decisions. Looking at select arbitration cases from 1974 to 1982 including 28 starting pitchers and 23 relief pitchers, they attempted to estimate any bias that existed in an arbitrator's awarded salary as a function of the salary demanded by a player, the salary offer by the team, and an estimated marginal revenue product of the player. Based on this approach, they concluded that arbitrators' awards were fair and unbiased towards both the team and the player, which weakens the idea that players have incentives to avoid arbitration.

Another possible source of arbitration outcomes could be based on previous experience in the arbitration system. If a player is not engaging in arbitration for the first time, this could not only change his expectations of negotiations but impact the demands that he will make as well as the offer that he will receive from the team. This idea was explored by Frederick, Kaempfer, and Wobbekind in their study on the market structure of salary arbitration. Looking at 37 players between the 1974 and 1991 seasons that faced arbitration negotiations with a team two or more times, they attempted to evaluate the salary spread between offers made by the player and the team in a regression analysis that most notably included variables for years of experience and correlation between the arbitration hearings in the past and present. The most important finding in this study was that based on the coefficients, it was suggested that the outcome of a previous arbitration negotiation can impact current negotiations. This study confirms the idea that a player's

experience in the arbitration system does have an impact on the salary that they will receive as a result of arbitration.

As it was determined that arbitration figures were being awarded fairly and were based in part on previous arbitration awards that were also awarded in a fair manner, it can be surmised that the arbitration system as a whole is unbiased and conforms to the market structure for player salaries. Blass attempted to assess this concept during a study in which 2477 position players eligible for arbitration between the 1978 and 1988 seasons were evaluated to answer the question of whether or not arbitration yielded a fair market value in player salaries. In a regression analysis Blass concluded that position players' salaries were awarded in a way that the arbitrators' preferences conform closely to the overall wage structure in regard to productivity and seniority in terms of wage structure. This finding is an important affirmation that arbitrators are awarding salaries in an unbiased manner and are displaying complete neutrality in the decision making process.

3.4 Free Agency's Impact on Arbitration

Based on studies done thus far on arbitration, it appears that arbitration is a significant contributor in player salary determination since the inception of free agency and has continued to award salaries in a fair and unbiased manner. Prior to the inception of free agency, arbitration did not significantly contribute to player salaries making it worthwhile to question whether there are significant differences between salaries awarded in arbitration and those awarded in free agency. Hadley and Gustafson addressed this issue in a 1991 study in which they evaluated the impacts of arbitration and free agency on

player salaries. In an ordinary least squares regression analysis of both pitchers and position players during the 1989 season, they attempted to estimate player salaries based on individual performance measures. In the case of pitchers, the regression analysis estimated salary as a function of number of years of experience, experience squared, dummy variables for arbitration, free agency, a player whose contract ends in either 1990 or 1991, and Black and Hispanic players, the team's average attendance in the 1988 season, the team's winning percentage in 1988, the population of the metropolitan area of the player's team, a dummy variable for players in the National League, innings pitched, the ratio of career wins to career innings pitched, the ratio of career losses to career innings pitched, the ratio of career saves to career innings pitched, earned run average, the ratio of career strikeouts to career innings pitched, the ratio of career walks to career innings pitched, and the ratio of career complete games to career innings pitched. A chow test was conducted to test the stability of the equations for both pitchers and hitters over time. In the case of both pitchers and hitters, the results of the chow test indicated that there was no structural break in the equations. This in depth analysis found that final offer arbitration does have a large positive impact on salaries as the coefficients for experience, experience squared, arbitration, free agency were all found to be significant. Additionally, they concluded that free agency has a positive impact, but smaller than arbitration. This is due to the nature of the coefficients for free agency compared to that of arbitration. The estimated coefficient for arbitration was a positive 0.707 while the estimated coefficient for free agency was negative at -0.355. Hadley and Gustafson said that the nature of these two coefficients implies that, "some players have used the

arbitration process to extract above-market salaries. Therefore it is concluded that it would be in the interest of owners to replace arbitration with earlier eligibility for free agency" (111). This analysis indicated that there was little evidence of a significant difference in the salaries of players who have either arbitration or free agent status.

Kahn found a similar result in his 1993 work in which he looked at not only performance characteristics and experience, but also the length of a player's contract. Using a panel analysis of players between the 1987 and 1990 seasons, he attempted to estimate a player's salary as a function of performance, contract length, and the city characteristics of the player's team. Following the findings of Hadley and Gustafson's study Kahn found that there are no significant differences between the salaries of arbitration eligible players and those who were free agents. One finding of note in Kahn's work was that he made the argument that free agents and players in the last year of arbitration eligibility do seem to have significantly longer contracts. This could possibly be due to their established reputation and longevity prior to the point at which they signed their current contract as well as owners' desire to secure a player for a longer period time by awarding contracts that put off free agency.

Previous studies had not examined player contracts with as much in depth analysis in regard to the number of contracts analyzed or the spread of seasons analyzed. Small sample sizes and limited years of analysis are areas of potential bias in results and leave researchers questioning whether studies that included more observations in their analysis would yield the same result. Philip Miller put some of those questions to rest in his 2000 study of salary comparisons between free agents and arbitration eligible players.

Miller used a straightforward ordinary least squares regression analysis to evaluate the salaries of 537 position players and 377 pitchers during the 1991 to 1993 seasons. In Miller's analysis the regression function he used estimated salary as a function of previous salary, the number of runs created in the previous season, the number of runs saved defensively, the previous season's team win percentage, the pitchers pitcher's defense as measured by the number of runs prevented after the ball has been pitched, the number runners that a pitcher has allowed to reach base in the previous season, the number of career saves, and the number of career games pitched. Controlling for productivity, years of experience, and potential selection bias Miller found that there is a significant positive relationship between arbitration and free agent salaries. However he noted that, "the systems do not determine equal salaries for comparable players" (87). In Miller's analysis separate regressions were run for free agents and arbitration eligible players. The estimated coefficients of each regression indicate different structures as the estimated coefficient for team winning percentage was negative for free agents while positive for arbitration eligible players. Additionally, the estimated coefficient for left handed pitchers was significant for free agents but insignificant for arbitration eligible players, and the estimated coefficient for career innings pitched was significant for arbitration eligible players but not for free agents. A Chow test confirmed this result that there were indeed structural differences for each regression model. Miller's findings conflict with those of the Hadley and Gustafson, and Kahn studies where they both found that there were no significant differences between arbitration and free agent salaries. Miller argues that arbitration and free agency do not determine equal salaries for equal

players, indicating that the structures of each are different. This leaves one questioning whether a significant difference in the salaries of free agents and players eligible for arbitration truly exists. The study that will be conducted in this paper will attempt to improve on past analysis through the inclusion of a significantly greater number of observations over a greater span of seasons.

Chapter 4

DATA & METHODOLOGY

4.1 The Data Set

All data used in this study was taken from a larger data set complied and prepared by Charles Link over the past eighteen years. All data was checked against other published sources to ensure the accuracy of the data being used in this study. The data set that will be used will consist of all Major League Baseball pitchers who are either eligible for free agency or eligible for salary arbitration between the 1984 and 2003 seasons.

4.2 Estimation Periods

Due to the changing nature of labor relations over time, the overall data set will be broken into three subsets for evaluation purposes: the years of 1984-1989, 1990-1994, and 1995-2003. Ordinary least squares regression models in log-linear form will be estimated for each time period. Performance measurements were obtained for each player 1 year, 2 years, and 3 years prior to the signing of their most recent contract. For each subset of years, a total of nine regressions will be performed, three regressions estimating salary based on 1 year statistics, three on 2 year statistics, and three on 3 year

performance measurements. Of the three regressions on each set of performance statistics, one pooled or restricted regression was run on all free agent and arbitration eligible players for the period. Separate unrestricted regressions were then run for both free agents and arbitration eligible players individually.

4.3 Empirical Methodology

The sums of squared residuals were obtained from each regression and a Chow test was performed to answer the question of whether a significant difference exists between the structures of the salary equations for of free agents and arbitration eligible players. The formula for the Chow test is as follows:

$$F = \frac{(RSS_R - RSS_{UR})/\mathrm{k}}{(RSS_{UR})/(n_1 + n_2 - 2k)}$$

where $\sim F_{[k,(n1 + n2 - 2k)]}$

RSS_R is the sum of squared residuals for the pooled or restricted regression and RSS_{UR} is the sum of the sum of squared residuals for each of the unrestricted regressions on free agents and arbitration eligible players. n_1 and n_2 are the number of observations in the unrestricted regression for free agents and arbitration eligible players respectively, and k is the number of parameters estimated in the regression model. The null hypothesis of the Chow test is that no statistically significant difference exists between the salary equations of arbitration eligible players and free agents. If the calculated F statistic of the Chow test is greater than the critical F statistic, then the decision will be made to reject the null hypothesis, and the conclusion will be drawn that there is a significant difference between the salary equations of free agents and players eligible for arbitration. For each

subset of years, a total of three Chow tests will be performed to see what impact estimating salary based on 1 year, 2 year, and 3 year prior performance measures has on a player's salary.

This process will be conducted twice under two different regression models. The main model will estimate salary based strictly on individual performance measures and nine Chow tests will be performed, three on each subset of years. A variation regression model will also estimate a player's salary based on both individual performance statistics and a ratio of the league average relative to a player's individual performance. Nine Chow tests will also be performed on these regressions to capture any implications that performance relative to a player's peers has on their salary. Regression results for each regression run in the main model are provided in Appendix II and variation models output is provided in Appendix III.

Chapter 5

MODEL & VARIABLES

5.1 Models Estimated

The main regression model specification used in this evaluation is: $LNSALARY_i = \beta_0 + \beta_1 EXPCUR_i + \beta_2 THROWS_i + \beta_3 LONGREL_i + \beta_4 CLOSER_i + \beta_5 IP1YRPR_i + \beta_6 ERA1YRPR_i + \beta_7 SVLRDUM1YRPR_i + \beta_8 SVCLDUM1YRPR_i + \beta_9 DIVWIN_i + \beta_{10} SOBB1YRPR_i + \beta_{11} LEAGUE_i + \beta_{12} YR85_i + \beta_{13} YR86_i + \beta_{13} YR87_i + \beta_{14} YR88_i + \beta_{15} YR89_i$. While this particular specification is estimating salary based on 1 year prior performance statistics of players during the 1984-1989 seasons, each regression specification in the main model will work in a similar fashion for 2 year and 3 year performance statistics.

A variation of the main regression model will also be evaluated and is as follows: $LNSALARY_i = \beta_0 + \beta_1 EXPCUR_i + \beta_2 THROWS_i + \beta_3 LONGREL_i + \beta_4 CLOSER_i + \beta_5 IP1YRPR_i + \beta_6 LGERA1YRPR_i + \beta_7 SVLRDUM1YRPR_i + \beta_8 SVCLDUM1YRPR_i + \beta_9 DIVWIN_i + \beta_{10} SOBB1YRPR_i + \beta_{11} LEAGUE_i + \beta_{12} YR85_i + \beta_{13} YR86_i + \beta_{13} YR87_i + \beta_{14} YR88_i + \beta_{15} YR89_i$. As for the main model this particular example is for evaluation of 1 year prior performance statistics of players between the 1984 and 1989 seasons, and all other regressions of the variation model will follow in a similar manner.

5.2 Variable Definitions

$LNSALARY_i$ is the logarithm of player i's salary, and is the dependent variable in the model. Each player's salary figure is measured in 2003 dollars and includes the player's base pay, any performance bonuses that were received during that year, and any signing bonuses. In the case of multiple year contracts, a player's signing bonus is allocated to the player's annual salary over the length of the contract by dividing the total signing bonus by the contract length unless there is a contract stipulation indicating how the signing bonus is to be paid. For each year in a player's contract they are included in the model. Therefore, if a pitcher signs a three year contract, then they are counted in the sample once in each of the three years of the contract. Table 5.1 highlights all variables included in the model and a brief description of each.

$EXPCUR_i$ is the number of years of experience that player i has in the majors. Based on general labor theory, as a player gains experience his salary should increase, therefore the number of years of experience a pitcher has in the majors should impact his salary.

$THROWS_i$ is a dummy variable taking the value of 0 for all right-handed pitchers and 1 for all left-handed pitchers. This variable is important because managers use pitchers systematically based on whether they are left or right-handed, particularly in the later innings of a game, in order to ensure victory. Pitching match-ups are an integral part of game play as a left-handed pitcher in many cases will be brought into the game to face a left-handed batter, and vice versa for right-handed match-ups. As a result this could have some affect on the salary that a pitcher can command.

Table 5.1 Variables Included

Variable	Definition
$LNSALARY_i$	Log of Player salary including signing & performance bonuses
$EXPCUR_i$	Years of Experience in the current year
$THROWS_i$	Dummy variable for throwing arm, 0 = right-handed, 1 = left handed
$STARTER_i$	Dummy variable for starters, 1 = starter, else = 0
$LONGREL_i$	Dummy variable for long relievers, 1 = long reliever, else = 0
$CLOSER_i$	Dummy variable for closers, 1 = closer, else = 0
$IP1YRPR_i$	Innings Pitched 1 year prior
$IP2YRPR_i$	Average Innings Pitched per season 2 years prior
$IP3YRPR_i$	Average Innings Pitched per season 3 years prior
$ERA1YRPR_i$	ERA 1 year prior
$ERA2YRPR_i$	Average ERA per season 2 years prior
$ERA3YRPR_i$	Average ERA per season 3 years prior
$SVLRDUM1YRPR_i$	Number of Saves years prior season * *LONGRELi*
$SVLRDUM2YRPR_i$	Average Number of Saves per season 2 years prior * *LONGRELi*
$SVLRDUM3YRPR_i$	Average Number of Saves per season 3 years prior * *LONGRELi*
$SVCLDUM1YRPR_i$	Number of Saves 1 year * *CLOSERi*
$SVCLDUM2YRPR_i$	Average Number of Saves per season 2 years prior * *CLOSERi*
$SVCLDUM3YRPR_i$	Average Number of Saves per season 3 years prior * *CLOSERi*
$DIVWIN_i$	Dummy variable for playoff experieince, 1 = team made playoffs in previous season, else = 0
$SOBB1YRPR_i$	(Strike Outs/Walks) 1 year prior
$SOBB2YRPR_i$	Average (Strike Outs/Walks) per season 2 years prior
$SOBB2YRPR_i$	Average (Strike Outs/Walks) per season 3 years prior
$LEAGUE_i$	Dummy variable for league, 1 = NL, 0 = AL
$LGERA1YRPR_i$	(Leage average ERA/ERA) 1 Year Prior
$LGERA2YRPR_i$	Average (Leage average ERA/ERA) per season 2 Years Prior
$LGERA3YRPR_i$	Average (Leage average ERA/ERA) per season 3 Years Prior
$YR85_i$	Dummy Variable for Contract Signing Year, 1985 = 1, else =0
$YR86_i$	Dummy Variable for Contract Signing Year, 1986 = 1, else =0
$YR87_i$	Dummy Variable for Contract Signing Year, 1987 = 1, else =0
$YR88_i$	Dummy Variable for Contract Signing Year, 1988 = 1, else =0
$YR89_i$	Dummy Variable for Contract Signing Year, 1989 = 1, else =0
$YR91_i$	Dummy Variable for Contract Signing Year, 1991 = 1, else =0
$YR92_i$	Dummy Variable for Contract Signing Year, 1992 = 1, else =0
$YR93_i$	Dummy Variable for Contract Signing Year, 1993 = 1, else =0
$YR94_i$	Dummy Variable for Contract Signing Year, 1994 = 1, else =0
$YR96_i$	Dummy Variable for Contract Signing Year, 1996 = 1, else =0
$YR97_i$	Dummy Variable for Contract Signing Year, 1997 = 1, else =0
$YR98_i$	Dummy Variable for Contract Signing Year, 1998 = 1, else =0
$YR99_i$	Dummy Variable for Contract Signing Year, 1999 = 1, else =0
$YR00_i$	Dummy Variable for Contract Signing Year, 2000 = 1, else =0
$YR01_i$	Dummy Variable for Contract Signing Year, 2001 = 1, else =0
$YR02_i$	Dummy Variable for Contract Signing Year, 2002 = 1, else =0
$YR03_i$	Dummy Variable for Contract Signing Year, 2002 = 1, else =0

$STARTER_i$ is a dummy variable that takes the value of 1 for all starting pitchers and 0 otherwise. A starting pitcher is defined as a pitcher who has started at least fifty percent of the games he has played in during a particular season.

$CLOSER_i$ is a dummy variable that takes the value of 1 for all pitchers who are closers and 0 for all pitchers who are not closers. For a pitcher to be classified as a closer they must have started less than fifty percent of the games they have played in and closed more than one third of the games they appeared in that season. A reliable closer can enter the game in the ninth inning and shut down the opposing hitters to ensure victory. Since there is a limited supply of pitchers with such credentials, teams are willing to offer highly lucrative contracts to pitchers who possess the ability to close games and therefore it should have an impact on their salary

$LONGREL_i$ is a dummy variable taking the value of 1 for all pitchers who are considered long relievers and 0 otherwise. To be considered a long reliever a pitcher must have started less than fifty percent of the games they have played in a particular season and closed less than one third of the game they have played in. Such pitchers are typically considered "set up" men and are an integral part of a reliable bullpen. As a result, this should affect their salary.

$IP1YRPR_i$, $IP2YRPR_i$, and $IP3YRPR_i$ are variables representing the number of innings pitched 1 year, the average innings 2 years, and the average innings pitched 3 years prior to the signing of a pitcher's most recent contract. Innings pitched is a measure of a pitcher's prior experience and performance, as the greater the innings pitched equates to more experience as well as a pitcher's reliability to pitch deep into games. These

experience and performance implications make innings pitched a contributing factor to a pitcher's salary.

$ERA1YRPR_i$, $ERA2YRPR_i$, and $ERA3YRPR_i$ are variables that represent the earned run average (ERA) of a pitcher 1 year, the average ERA 2 years, and the average ERA 3 years prior to the signing of a pitcher's most recent contract respectively. ERA is one of the primary statistics that a pitcher's performance is evaluated on since ERA is a measure of the number of earned runs a pitcher has surrendered per nine innings he has pitched. One would expect that a lower ERA would translate to a more productive pitcher who surrenders fewer runs per outing and allows his team to remain in ballgames longer. As a result, a pitcher's ERA should have an impact on his salary.

$SVLRDUM1YRPR_i$, $SVLRDUM2YRPR_i$, and $SVLRDUM3YRPR_i$ are interactive variables which are formed by multiplying the dummy variable for long relievers by the number of saves that a pitcher received 1 year, the average saves 2 years, and average saves 3 years prior to the signing of the pitcher's most recent contract. This interactive term was created to account for the fact that saves as a measurement of past performance will only impact pitchers who are listed as long relievers or closers. As a result, if he is listed as a long reliever then, we would expect that the number of saves earned in the past would have some affect on his salary.

$SVCLDUM1YRPR_i$, $SVCLDUM2YRPR_i$, and $SVCLDUM3YRPR_i$ are interactive terms that are estimated by multiplying the dummy variable for closers by the number of saves that a pitcher earned 1 year, the average saves 2 years, and average saves 3 years prior to the signing of their most recent contract respectively. As for the case of the

interactive terms for long relievers, this variable was created to account for the fact that saves as a measurement of past performance and experience only have salary implications for pitchers who are classified as long relievers or closers.

$SOBB1YRPR_i$, $SOBB2YRPR_i$, and $SOBB3YRPR_i$ are variables representing the ratio of strike outs to walks that a pitcher had 1 year, the average strike out to walk ratio 2 years, and average strike out to walk ratio 3 years prior to the signing of their most recent contract. Strike outs are considered a positive measurement of pitcher performance while walks are viewed as a negative measurement of performance. This ratio is a very telling statistic that is used in evaluating a pitcher's overall performance since it measures positive versus negative performance, and as a result it should have an impact on the salary that a pitcher can command.

$LEAGUE_i$ is a dummy variable representing the league a pitcher's team is in. If a pitcher plays for a team in the National League, this is designated by a 1, and all pitchers for American League teams are assigned a 0. Due to the designated hitter rule in the American League a pitcher does not have to bat in the game. However this is not the case in the National League as pitchers are a part of the batting order and bat in each game. As a result, a pitcher's batting abilities could impact their desirability from National League teams; while American League teams are not concerned with hitting capabilities since a pitcher will not bat. Also, with the exception of interleague games played in a National League ballpark, American League pitchers do not face opposing pitchers as a batter. The pitcher in the American League may have a higher ERA as a

result. To account for this, the league variable was created to capture any salary implications of a pitcher signing with a team in a particular league.

$DIVWIN_i$ is a dummy variable representing prior postseason experience that a pitcher may have. A player is assigned a 1 if he was on a team that reached the postseason in the year prior to the signing of his most recent contract. Postseason experience is an intangible trait that many teams find desirable. Many players and owners alike would argue that previous playoff experience is invaluable during the postseason as players who have previously played in the postseason know what to expect and therefore are better suited to perform well in the high pressure playoff situations. As a result this could have an effect on a pitcher's salary.

$YR84_i$, $YR85_i$, $YR86_i$, $YR87_i$, $YR88_i$, $YR89_i$, $YR90_i$, $YR91_i$, $YR92_i$, $YR93_i$, $YR94_i$, $YR95_i$, $YR96_i$, $YR97_i$, $YR98_i$, $YR99_i$, $YR00_i$, $YR01_i$, $YR02_i$, and $YR03_i$ are all dummy variables representing each season from 1984 to 2003. If a player signed his contract in a given year, then a 1 is designed in that particular year's dummy variable, otherwise a 0 is assigned. Considering the history of player and owner relations in baseball through the collusion years of the 1980's and the strike of 1994, the year in which a player signed his contract has the potential to effect the salary received. To account for this individual season dummy variables were created to explore what impact signing a contract in a given year had on a player's salary.

$LGERA1YRPR_i$, $LGERA2YRPR_i$, and $LGERA3YRPR_i$ are variables that represent the ratio of the league average ERA to the ERA of an individual pitcher 1 year, the average of the ratio 2 years, and the average of the ratio 3 years prior to the signing of a

pitcher's most recent contract respectively. For American league pitchers this is the ratio of the American League average ERA to the individual pitcher ERA, and for National League pitchers the National League average ERA to the individual pitcher ERA. In this case a value greater than 1 would indicate a higher quality pitcher since their individual ERA is lower than the league average. Likewise, a pitcher of lower quality would have a ratio less than 1 since his ERA would be greater than the league average. This measurement was estimated in the variation model to explore the salary implications of a pitcher's performance relative to the league average.

Chapter 6

EMPIRICAL ANALYSIS

6.1 Decision Rule

In evaluating the regression output the first question to be answered is whether or not free agent and arbitration eligible pitchers' salary equations can be pooled. The results of each Chow test will answer this question. If the decision is to reject the null hypothesis in every Chow test then it will be concluded that free agent and arbitration eligible pitcher salary equations cannot be pooled and further evaluation is necessary to determine what exact difference lies between the salary equations. Regression results for the main regression model can be found in appendix II, and results for all regressions under the variation regression model can be found in appendix III.

6.2 Chow Test Results

In conducting the Chow test, the sum of squared residuals was obtained from each regression and used in the formula. k represents the number of parameters and $n_1 + n_2$ represents the total number of observations in the unrestricted regressions. All these varied from each subset of years. In the case of 1984-1989 data, $k = 17$, and $n_1 + n_2 =$

999; for 1990-1994 data, $k = 16$, and $n_1 + n_2 = 853$; and for 1995-2003, data $k = 20$, and $n_1 + n_2 = 1701$. If the calculated F statistic of the Chow test is greater than the critical F statistic, then the decision will be made to reject the null hypothesis, and the conclusion will be drawn that there is a significant difference between the salary equations of free agents and players eligible for arbitration. For all Chow tests conducted, the critical F value at the $\alpha = 0.05$ level of significance is 1.57, and at the $\alpha = 0.01$ level of significance the critical F value is 1.88 (Gujarati 967). A total of 6 Chow tests were performed on each subset of years. There were three model variations using the main regression model for one year prior statistics, two year average prior performance statistics, and three year average prior statistics. Identical Chow tests were done for the variation regression model. Tables 6.1 and 6.2 highlight the results of the Chow tests on the main regression models and the variation regression models, indicating the sum of squared residuals for both the pooled regression and each of the unrestricted regressions for free agents and arbitration eligible pitchers, the total sum of squared residuals for both of the unrestricted regressions, the calculated F value, and the null hypothesis decision that was made.

In evaluating data for the 1984-1989 seasons the main model yielded calculated F values of 7.933 for one year prior statistics, 6.5631 for two year average prior statistics, and 4.9448 for three year average prior statistics. In each of these cases the calculated F value exceeds the critical F value at both the $\alpha = 0.05$ and $\alpha = 0.01$ levels of significance. As a result the null hypothesis is rejected at both levels of significance, and it is concluded that there is a statistically significant difference between the salary equations of free agents and players eligible for arbitration. In evaluating 1984-1989 data

Table 6.1 Main Regression Model Chow Test Results

Years	RSS Restricted	RSS UR AE	RSS UR FA	RSS UR Total	F-Calc	Decision
1984-1989 1 Year Prior Stats	301.0460	117.9077	147.0201	264.9278	7.9333	Reject
1984-1989 2 Year Prior Stats	290.9951	110.1262	150.7111	260.8373	6.5631	Reject
1984-1989 3 Year Prior Stats	296.3599	111.7127	160.8999	272.6126	4.9448	Reject
1990-1994 1 Year Prior Stats	336.3540	114.7910	179.2204	294.0114	7.3899	Reject
1990-1994 2 Year Prior Stats	327.4383	107.4403	178.712	286.1523	7.4034	Reject
1990-1994 3 Year Prior Stats	312.4331	110.0231	174.6297	284.6528	5.0078	Reject
1995-2003 1 Year Prior Stats	781.9416	273.8959	400.4668	674.3627	13.2487	Reject
1995-2003 2 Year Prior Stats	713.4294	235.8934	385.909	621.8024	13.6375	Reject
1995-2003 3 Year Prior Stats	706.3418	239.1572	381.0029	620.1601	11.5412	Reject

*F-Crit=1.57 α = 0.05 **F-Crit=1.88 α = 0.01 (Gujarati 967)

Table 6.2 Variation Regression Model Chow Test Results

Years	RSS Restricted	RSS UR AE	RSS UR FA	RSS UR Total	F-Calc	Decision
1984-1989 1 Year Prior Stats	300.3863	118.0869	146.8012	264.8881	7.6072	Reject
1984-1989 2 Year Prior Stats	297.3715	114.1330	151.9527	266.0857	6.6743	Reject
1984-1989 3 Year Prior Stats	307.1225	116.3026	164.9834	281.2860	5.2139	Reject
1990-1994 1 Year Prior Stats	339.3174	114.5689	183.0990	297.6679	7.1796	Reject
1990-1994 2 Year Prior Stats	324.9430	104.4095	181.4882	285.8977	7.0078	Reject
1990-1994 3 Year Prior Stats	321.5307	112.8929	178.7356	291.6285	5.2613	Reject
1995-2003 1 Year Prior Stats	781.9416	269.6715	383.4504	653.1219	16.3805	Reject
1995-2003 2 Year Prior Stats	734.2298	243.7154	393.2504	636.9658	12.6816	Reject
1995-2003 3 Year Prior Stats	746.3099	245.5221	410.9194	656.4415	11.3697	Reject

*F-Crit=1.57 α = 0.05 **F-Crit=1.88 α = 0.01 (Gujarati 967)

under the variation model, the calculated F value was 7.6072 for one year prior statistics, 6.6743 for two year average prior statistics, and 5.2139 for three year average prior statistics. In all three cases the calculated F value exceeds the critical F value at both levels of significance and the null hypothesis is rejected. Under both the main model and variation model, the conclusion is made that there is a significant difference between the salary equations for free agents and players eligible for salary arbitration. Consequently, the conclusion can be drawn that the data cannot be pooled, and that the salary equations for free agents and arbitration eligible players during the 1984-1989 seasons must be evaluated separately.

For the years 1990 to 1994, the main regression yielded calculated F values of 7.3899 for one year prior statistics, 7.4034 for two year average prior statistics, and 5.0078 for three year average prior statistics. For the variation model, the calculated F value was 7.1796 for one year prior statistics, 7.0078 for two year average prior statistics, and 5.2631 for three year average prior statistics. All six calculated F values exceed the critical F value at both the $\alpha = 0.05$ and $\alpha = 0.01$ levels of significance, and therefore the null hypothesis is rejected. As a result, the conclusion can be made that the salary equations for free agents and arbitration eligible players during the 1990-1994 seasons are different and that the data cannot be pooled.

In the case of the 1995-2003 seasons, the calculated F values of the main regression model were 13.2487 for one year prior statistics, 13.6375 for two year average prior statistics, and 11.5412 for three year prior statistics, and 16.3085, 12.6816, and 11.3697 respectively for the variation model. As was the case in both the 1984-1989 and 1990-1994 Chow tests, all calculated F values exceed the critical F values at both the $\alpha = 0.05$ and $\alpha = 0.01$ levels of significance, and the null hypothesis is rejected. Accordingly, the conclusion can be drawn that there is a statistically significant difference between the salary equations for free agents and arbitration eligible players during the 1995-2003 seasons and that the data cannot be pooled.

6.3 Concluding Results

The overall decision was made to reject the null hypothesis in each Chow test performed and in all cases the salary equations for free agents and arbitration eligible pitchers are

significantly different. As a result, the restricted or pooled regressions for each time period can also be rejected, and further analysis should be conducted on the individual unrestricted regression results for free agents and arbitration eligible pitchers.

Chapter 7

EXTENDED ANALYSIS & COEFFICIENT INTERPRETATION

7.1 Oaxaca Wage Decomposition

Since each of the Chow tests indicated that free agent and arbitration eligible pitchers' salary equations cannot be pooled, further analysis is needed to explore why this happens. To do so, an Oaxaca-type wage decomposition will be employed to determine the extent of the wage gap between free agents and arbitration eligible pitchers that is due to the nature of having free agent status by using regression output on two year prior average statistics from the main regression model. The population means were collected for each variable for both arbitration eligible and free agent pitchers. Tables of the means for all variables in each set of years can be found in Appendix I. Two normal equations were then estimated

$$\overline{Y_0} = \overline{x_0} b_0 \text{ and } \overline{Y_1} = \overline{x_1} b_1$$

where $\overline{x_0}$ is the vector of means of all the explanatory variables for free agents and b_0 is the coefficient on each of the respective variables in the salary equation for free agents. The second normal equation is a product of the same vectors for arbitration eligible

pitchers. The difference between the two normal equations, $\overline{Y_0} - \overline{Y_1}$, represents the unadjusted difference in means, or the arbitration eligible/free agent gap. The vector $\hat{Y}_1 = \overline{x_1} b_0$ is the mean vector of arbitration eligible pitchers if they received the same returns to their attributes (i.e. have the same coefficients) that free agents receive. As a result, the sum of the difference between arbitration eligible salaries and free agent salaries is the sum of the two terms, $\hat{Y}_1 - \overline{Y}_1$ and $\overline{Y_0} - \hat{Y}_1$. The equation $\hat{Y}_1 - \overline{Y}_1$ represents the portion of the arbitration eligible/free agent gap that is due to free agents and arbitration eligible pitchers receiving different returns to their attributes (difference due to structure). The second equation, $\overline{Y_0} - \hat{Y}_1$, is the portion of the arbitration eligible/free agent gap that is due to free agents and pitchers eligible for arbitration possessing different characteristics. Tables 7.1, 7.2, and 7.3 indicate the results for each set of years, with totals indicated for the difference in means estimates. By dividing $\hat{Y}_1 - \overline{Y}_1$ by the equation for the entire salary gap, $\overline{Y_0} - \overline{Y_1}$, the percentage of the salary gap between free agent and arbitration eligible pitchers that could be due to simply having free agent status can be calculated. As indicated in the tables, approximately 88.9 percent of the gap between free agents and arbitration eligible pitchers during the 1984 to 1989 seasons was due to the mere fact of a pitcher having free agent status. During the 1990 to 1994 seasons 92.9 percent of the gap was due to a pitcher being a free agent, and during the 1995 to 2003 seasons 59.1 percent of the gap was due to simply being a free agent. The tables further reveal that the constant term is the factor that drives the gap between free

agent and arbitration eligible pitchers further apart while the years of experience variable narrows the gap.

7.2 Coefficient Interpretation

Additional analysis can also be conducted by making observations about the behavior of certain coefficients in each individual regression. In interpreting the coefficients of the unrestricted regressions, the following formula indicates the derivative of y with respect to x. Estimating the equation is:

$$ln(y) = a + \beta_i x.$$

Taking the differential of this equation yields:

$$\delta(ln(y)) = \delta(a) + \delta(\beta_i x).$$

$$(1/y) * \delta y = \beta_i * \delta x.$$

The derivative of y with respect to x is thus:

$$\delta y / \delta x = \beta_i * y, \text{ where } y = \bar{y}.$$

By multiplying the coefficient of each variable by the arithmetic mean salary, the effect of each variable on a player's salary can be calculated within a particular population of free agents or arbitration eligible players. The mean salary, $\bar{y}$, of the overall population for the years 1984-1989 was $510,556 for arbitration eligible pitchers and $659,301 for free agent pitchers; during the 1990-1994 seasons the mean salary was $1.398 million for arbitration eligible pitchers and $1.849 million for free agent pitchers; and for the 1995-2003 seasons the mean salary was $2.072 million for arbitration eligible pitchers and $3.271 for free agents (all in 2003 dollars). Complete regression output for both the main

Table 7.1 Decomposition of Difference in Means 1984 - 1989

Variable	b_0	b_1	$\overline{x_0}$	$\overline{x_1}$	$\overline{Y_0} = \overline{x_0} b_0$	$\overline{Y_1} = \overline{x_1} b_1$	$\hat{\overline{Y}}_1 = \overline{x_1} b_0$	$\hat{\overline{Y}}_1 - \overline{Y}_1$	$\overline{Y}_0 - \hat{\overline{Y}}_1$	$\overline{Y}_0 - \overline{Y}_1$	$\frac{\hat{\overline{Y}}_1 - \overline{Y}_1}{\overline{Y}_0 - \overline{Y}_1}$
Constant	5.811751	4.873957	1	1	5.811751	4.873957	5.811751	0.937794	0	0.937794	
Current Experience	-0.008239	0.120385	10.8072427	4.702357362	-0.089040873	0.566093291	-0.038742722	-0.604836013	-0.05029815	-0.655134164	
Throws	-0.094307	0.036735	0.32712766	0.329581994	-0.030850428	0.012107195	-0.031081889	-0.043189084	0.000231461	-0.042957623	
Long Reliever	-0.39519	-0.13831	0.164893617	0.168810289	-0.065164309	-0.023348151	-0.066712138	-0.043363987	0.00154783	-0.041816157	
Closer	-0.386305	0.030784	0.295212766	0.339228296	-0.114042168	0.010442804	-0.131045587	-0.141488391	0.017003419	-0.124484971	
Innings Pitched 2 YR PR AVG	0.005003	0.006293	142.0700239	137.7778923	0.71077633	0.867036276	0.689302795	-0.177733481	0.021473535	-0.156259946	
ERA 2 YR PR AVG	-0.155947	-0.210286	3.762047872	3.685471061	-0.58668008	-0.775002968	-0.574738156	0.200264812	-0.011941924	0.188322888	
Save LR 2 YR PR AVG	0.015247	0.026106	0.41356383	0.443729904	0.006305608	0.011584013	0.00676555	-0.004818463	-0.00045942	-0.005278405	
Save CL 2 YR PR AVG	0.030339	0.024549	3.345744681	3.176848875	0.101506548	0.077988463	0.096382418	0.018393955	0.00512413	0.023518085	
Division Winner	0.209798	0.177915	0.239361702	0.183279743	0.050217606	0.032608215	0.038451723	0.005843508	0.011765883	0.017609391	
SO/Walk 2 YR PR AVG	0.149382	0.048417	1.898901596	1.812086817	0.283661718	0.087735807	0.270693153	0.182957345	0.012968565	0.195925911	
LEAGUE	0.057697	0.07451	0.425531915	0.491961415	0.024551915	0.036656045	0.028384698	-0.008271347	-0.003832783	-0.01210413	
Year 1985	0.198594	0.107001	0.143617021	0.207395498	0.028521479	0.022191526	0.041187502	0.018995976	-0.012666023	0.006329953	
Year 1986	0.10718	0.208702	0.140957447	0.204180064	0.015107819	0.042612788	0.021884019	-0.020728768	-0.0067762	-0.027504969	
Year 1987	0.058645	0.291292	0.154255319	0.146302251	0.009046303	0.042616675	0.008579895	-0.03403678	0.000466408	-0.033570372	
Year 1988	0.313919	0.348786	0.17287234	0.135048232	0.054267912	0.047102932	0.042394206	-0.004708727	0.011873706	0.00716498	
Year 1989	0.361078	0.461206	0.234042553	0.131832797	0.084507617	0.060802077	0.047601923	-0.013200154	0.036905694	0.02370554	
										GAP	% FA
Total					6.294443999	5.993183989	6.26105839	0.267874401	0.033385609	0.30126001	0.889180085

Table 7.2 Decomposition of Difference in Means 1990 – 1994

Variable	b_0	b_1	$\overline{x_0}$	$\overline{x_1}$	$\overline{Y_0} = \overline{x_0} b_0$	$\overline{Y_1} = \overline{x_1} b_1$	$\hat{Y}_1 = \overline{x_1} b_0$	$\hat{Y}_1 - \overline{Y}_1$	$\overline{Y}_0 - \hat{Y}_1$	$\overline{Y}_0 - \overline{Y}_1$	$\frac{\hat{Y}_1 - \overline{Y}_1}{\overline{Y}_0 - \overline{Y}_1}$
Constant	7.11587	4.421878	1	1	7.11587	4.421878	7.11587	2.693992	0	2.693992	
Current Experience	0.010525	0.163205	10.08155563	4.648249425	0.106108373	0.758617547	0.048922825	-0.709694722	0.057185548	-0.652509174	
Throws	0.074713	-0.019305	0.343358396	0.356043956	0.025653336	-0.006873429	0.026601112	0.033474541	-0.000947776	0.032526764	
Long Reliever	0.122073	-0.273819	0.228070175	0.257142857	0.027841211	-0.0704106	0.0313902	0.1018008	-0.003548989	0.098251811	
Closer	0.128364	0.055543	0.268170426	0.285714286	0.034423429	0.015869429	0.036675429	0.020806	-0.002252	0.018554	
Innings Pitched 2 YR PR AVG	0.000757	0.007922	136.1391253	125.8142725	0.103057318	0.996700667	0.095241404	-0.901459263	0.007815914	-0.893643349	
ERA 2 YR PR AVG	0.051098	-0.07017	3.658914787	3.580874725	0.186963228	-0.25126997	0.182975537	0.434245516	0.003987691	0.438233207	
Save LR 2 YR PR AVG	0.012948	0.066039	0.878446115	0.904395604	0.01137412	0.059725381	0.011710114	-0.048015267	-0.000335994	-0.048351261	
Save CL 2 YR PR AVG	0.005476	0.033541	3.735588972	3.835164835	0.020456085	0.128635264	0.021001363	-0.107633901	-0.000545277	-0.108179179	
Division Winner	0.085992	0.174908	0.213032581	0.16043956	0.018319098	0.028062163	0.013796519	-0.014265644	0.004522579	-0.009743065	
SOWalk 2 YR PR AVG	0.038563	0.177044	2.13493985	1.985026374	0.082329685	0.351437009	0.076548572	-0.274888437	0.005781113	-0.269107324	
LEAGUE	0.071476	0.09396	0.436090226	0.465934066	0.031169985	0.043779165	0.033303103	-0.010476062	-0.002133118	-0.01260918	
Year 1991	0.108621	0.364604	0.200501253	0.173626374	0.021778647	0.06330487	0.01885947	-0.0444454	0.002919176	-0.041526224	
Year 1992	0.110825	0.441674	0.187969925	0.202197802	0.020831767	0.089305512	0.022408571	-0.066896941	-0.001576805	-0.068473745	
Year 1993	0.109425	0.60341	0.197994987	0.226373626	0.021665602	0.13659611	0.024770934	-0.111825176	-0.003105333	-0.114930508	
Year 1994	0.107372	0.57313	0.213032581	0.206593407	0.022873734	0.118404879	0.022182347	-0.096222532	0.000691387	-0.095531145	
										GAP	% FA
Total					7.850715617	6.883761988	7.782257501	0.898495513	0.068458116	0.966953628	0.929202276

Table 7.3 Decomposition of Difference in Means 1995 – 2003

Variable	b_0	b_1	$\overline{x_0}$	$\overline{x_1}$	$\overline{Y_0} = \overline{x_0} b_0$	$\overline{Y_1} = \overline{x_1} b_1$	$\hat{\overline{Y}}_1 = \overline{x_1} b_0$	$\hat{\overline{Y}}_1 - \overline{Y}_1$	$\overline{Y}_0 - \hat{\overline{Y}}_1$	$\overline{Y}_0 - \overline{Y}_1$	$\frac{\hat{\overline{Y}}_1 - \overline{Y}_1}{\overline{Y}_0 - \overline{Y}_1}$
Constant	7.058493	5.778985	1	1	7.058493	5.778985	7.058493	1.279508	0	1.279508	
Current Experience	-0.009118	0.24199	9.784013097	4.662990104	-0.089210631	1.128396975	-0.042517144	-1.170914119	-0.046693488	-1.217607607	
Throws	0.142539	0.036318	0.330729167	0.260450161	0.047141805	0.009459029	0.037124305	0.027665277	0.010017499	0.037682776	
Long Reliever	-0.398948	-0.415425	0.30078125	0.355841372	-0.119996078	-0.147825402	-0.141962204	0.005863198	0.021966126	0.027829324	
Closer	-0.139444	-0.262089	0.239583333	0.210075027	-0.033408458	-0.055058354	-0.029293702	0.025764652	-0.004114756	0.021649895	
Innings Pitched 2 YR PR AVG	0.007935	0.006745	116.8812214	105.888865	0.927452491	0.714220394	0.840228143	0.126007749	0.087224348	0.213232097	
ERA 2 YR PR AVG	-0.285221	-0.212676	4.146227865	4.298567403	-1.182591258	-0.914202121	-1.226041693	-0.311839572	0.043450435	-0.268389137	
Save LR 2 YR PR AVG	0.00218	0.027255	0.698567708	0.61789925	0.001522878	0.016840844	0.00134702	-0.015493824	0.000175857	-0.015317966	
Save CL 2 YR PR AVG	0.018713	0.026346	2.712239583	1.625937835	0.050754139	0.042836958	0.030426175	-0.012410783	0.020327965	0.007917181	
Division Winner	0.039696	0.120569	0.329427083	0.265809218	0.013076938	0.032048352	0.010551563	-0.021496789	0.002525375	-0.018971414	
SO/Walk 2 YR PR AVG	0.107479	0.125346	2.248009115	2.018272867	0.241613772	0.252982431	0.216921949	-0.036060481	0.024691822	-0.011368659	
LEAGUE	0.035394	-0.074218	0.526041667	0.560557342	0.018618719	-0.041603445	0.019840367	0.061443811	-0.001221648	0.060222164	
Year 1996	0.293214	0.11392	0.0859375	0.088960343	0.025198078	0.010134362	0.026084418	0.015950056	-0.00088634	0.015063716	
Year 1997	0.428736	0.147456	0.100260417	0.11039657	0.04298525	0.016278637	0.047330984	0.031052347	-0.004345734	0.026706613	
Year 1998	0.554995	0.250195	0.11328125	0.11039657	0.062870527	0.02762067	0.061269544	0.033648875	0.001600983	0.035249857	
Year 1999	0.703031	0.354574	0.110677083	0.115755627	0.077809421	0.041043936	0.081379794	0.040335859	-0.003570374	0.036765485	
Year 2000	0.779194	0.42558	0.104166667	0.124330118	0.081166042	0.052912412	0.096877282	0.04396487	-0.01571124	0.02825363	
Year 2001	1.030733	0.613093	0.127604167	0.125401929	0.131525826	0.076883045	0.129255907	0.052372862	0.002269919	0.054642781	
Year 2002	1.149795	0.71939	0.134114583	0.129689175	0.154204277	0.093297095	0.149115965	0.055818869	0.005088313	0.060907182	
Year 2003	0.912261	0.67209	0.130208333	0.0943194	0.118783984	0.063391125	0.08604391	0.022652785	0.032740074	0.055392859	
										GAP	% FA
Total					7.62801072	7.198641943	7.452475584	0.25383364	0.175535136	0.429368777	0.591178619

regression model and the variation regression models can be found in appendices II and III. Tables 7.4, 7.5, and 7.6 highlight the coefficients and their standard errors in parentheses for all regression output in the main regression model as well as each coefficient's significance at both the $\alpha = 0.10$ and $\alpha = 0.05$ levels.

7.3 Coefficient Results

In the case of the number of years of experience a pitcher has in a given year, $EXPCUR_i$, it was found to be significant for players eligible for arbitration and insignificant for free agents in all regressions in both the main and variation regression models. According to in the main regression model for arbitration eligible pitchers, each additional year of experience provides an increase of between $45,950 and $66,372 in salary for pitchers in 1984-1989, between $167,760and $237,660 in 1990-1994, and between $435,120 and $538,720 in 1995-2003. A potential explanation for this result stems from the fact that free agents have a minimum of six years of major league experience, while a player can become eligible for arbitration with as few as three (1984, 1985, and 1986 contracts were two years but the rule changed to three years in 1987) years of experience. Holding all other factors constant, the number of years of experience significantly impacts an arbitration eligible pitcher's salary but not a free agent's salary. This is most likely a result of experience being an explicit factor that arbitrators must consider when awarding salaries, while there are no defined factors that owners need consider in determining a free agent's salary. While very few arbitration negotiations actually reach final offer arbitration, both players and owners are aware that experience is an explicit factor

considered by an arbitrator, and as a result, this contributes to the offers made by both the player and team during the negotiation process prior to a potential arbitration hearing.

The $THROWS_i$ dummy variable for right and left-handed pitchers was found to be insignificant for all regressions in both models. This result implies that when determining the salary of both free agent and arbitration eligible pitchers, being right or left-handed has no impact.

The coefficient of the variable $LEAGUE_i$ representing the league of the team in which a pitcher signed his most recent contract was found to be insignificant for free agents but significant for pitchers eligible for arbitration over all years in both the main and variation regression models. While an explanation for the significance of the league variable on the salary of a pitcher who is eligible for arbitration is unknown, its insignificance for a free agent can be explained. If free agent pitchers are bargaining for salaries under free market conditions where competitive offers are received from all interested teams, then the league of the team making the offer should have no relevance on the salary offer being made. Accordingly, the league of the team that a pitcher signs his contract with should have no implications on salaries of free agents.

The $DIVWIN_i$ variable representing a pitcher making the postseason the year prior to the signing of his most recent contract behaves identically in both the main and variation regression models. During the 1984-1989 seasons, having postseason experience was found to be significant, and the main regression model suggests that an arbitration eligible pitcher would see between an additional $86,795 and $107,217 for having made the postseason the year prior to signing his most recent contract, and a free agent would

Table 7.4 Coefficient Output for Main Model 1984 – 1989

Variable	AE 1 YR	FA 1 YR	AE 2 YR	FA 2 YR	AE 3 YR	FA 3 YR
Constant	4.2016* (0.1322)	5.2342* (0.2252)	4.8739* (0.1689)	5.8118* (0.3617)	5.2506* (0.1923)	6.3258* (0.4233)
Current Experience	0.1382* (0.0099)	-0.0078 (0.0095)	0.1204* (0.0098)	-0.0082 (0.0096)	0.0949* (0.0103)	-0.0152 (0.0101)
Throws	0.0459 (0.0384)	-0.0524 (0.0728)	0.0367 (0.0369)	-0.0943 (0.0733)	0.0168 (0.0372)	-0.0889 (0.0758)
Long Reliever	-0.1575* (0.0614)	-0.3994* (0.1171)	-0.1383* (0.0627)	-0.3952* (0.1241)	-0.1259* (0.0638)	-0.3986* (0.1304)
Closer	-0.0079 (0.0593)	-0.3311* (0.1183)	0.0308 (0.0610)	-0.3863* (0.1215)	0.0343 (0.0624)	-0.3538** (0.1261)
Innings Pitched 1YRPR	0.0052* (0.0003)	0.0051* (0.0006)				
Innings Pitched 2 YR PR AVG			0.0063* (0.0004)	0.0050* (0.0008)		
Innings Pitched 3 YR PR AVG					0.0067* (0.0004)	0.0051* (0.0008)
ERA 1 YR PR	-0.0473* (0.0156)	-0.0091 (0.0182)				
ERA 2 YR PR AVG			-0.2103* (0.0265)	-0.1559* (0.0594)		
ERA 3 YR PR AVG					-0.2901* (0.0332)	-0.2689* (0.0762)
Save LR 1 YR PR	0.0207* (0.0098)	0.0183 (0.0237)				
Save LR 2 YR PR AVG			0.0261* (0.0120)	0.0152 (0.0252)		
Save LR 3 YR PR AVG					0.0181 (0.0118)	0.0061 (0.0266)
Save CL 1 YR PR	0.0269* (0.0032)	0.0305* (0.0053)				
Save CL 2 YR PR AVG			0.0245* (0.0036)	0.0303* (0.0066)		
Save CL 3 YR PR AVG					0.0244* (0.0041)	0.0229* (0.0073)
Division Winner	0.2176* (0.0473)	0.1643* (0.0812)	0.1779* (0.0458)	0.2098* (0.0812)	0.1933* (0.0459)	0.2218* (0.0836)
SO/Walk 1YR PR	0.1049* (0.0277)	0.1256* (0.0489)				
SO/Walk 2 YR PR AVG			0.0484 (0.0319)	0.1494* (0.0657)		
SO/Walk 3 YR PR AVG					0.0766* (0.0378)	0.1189** (0.0704)
LEAGUE	0.0990* (0.0363)	0.0678 (0.0689)	0.0745* (0.0351)	0.0577 (0.0703)	0.0632** (0.0355)	0.0441 (0.0725)
Year 1985	0.1034** (0.0578)	0.1840 (0.1226)	0.1070** (0.0558)	0.1986 (0.1238)	0.1201* (0.0562)	0.2445** (0.1278)
Year 1986	0.2009* (0.0584)	0.0909 (0.1234)	0.2087* (0.0563)	0.1072 (0.1248)	0.1837* (0.0568)	0.1404 (0.1290)
Year 1987	0.3260* (0.0634)	0.1052 (0.1211)	0.2913* (0.0612)	0.0586 (0.1224)	0.2526* (0.0621)	0.0862 (0.1264)
Year 1988	0.3666* (0.0647)	0.3522* (0.1198)	0.3488* (0.0625)	0.3139* (0.1197)	0.3145* (0.0635)	0.3339* (0.1237)
Year 1989	0.4275* (0.0653)	0.3783* (0.1117)	0.4612* (0.0632)	0.3611* (0.1136)	0.4003* (0.0640)	0.3686* (0.1176)

** significant at α = 0.10 * significant at α = 0.05

Table 7.5 Coefficient Output for Main Model 1990 – 1994

Variable	AE 1 YR	FA 1 YR	AE 2 YR	FA 2 YR	AE 3 YR	FA 3 YR
Constant	4.6177* (0.1823)	6.9409* (0.2547)	4.4219* (0.1843)	7.1159* (0.3228)	5.3245* (0.2632)	7.6481* (0.3559)
Current Experience	0.1791* (0.0196)	-0.0169 (0.0104)	0.1632* (0.0190)	-0.0247* (0.0105)	0.1236* (0.0199)	-0.0189** (0.0104)
Throws	-0.0077 (0.0521)	0.0094 (0.0746)	-0.0193 (0.0502)	0.0252 (0.0747)	-0.0006 (0.0509)	0.0603 (0.0740)
Long Reliever	-0.3077* (0.0830)	-0.6157* (0.1137)	-0.2738* (0.0816)	-0.5452* (0.1221)	-0.2611* (0.0840)	-0.503* (0.1209)
Closer	0.0458 (0.0867)	-0.6219* (0.1246)	0.0555 (0.0865)	-0.5102* (0.1284)	0.0178 (0.0885)	-0.4977* (0.1307)
Innings Pitched 1YRPR	0.0068* (0.0006)	0.0044* (0.0007)				
Innings Pitched 2 YR PR AVG			0.0079* (0.0006)	0.0053* (0.0008)		
Innings Pitched 3 YR PR AVG					0.0083* (0.0006)	0.0059* (0.0008)
ERA 1 YR PR	-0.0568* (0.0203)	-0.141404* (0.0324)				
ERA 2 YR PR AVG			-0.0702* (0.0216)	-0.2426* (0.0511)		
ERA 3 YR PR AVG					-0.2533* (0.0444)	-0.4093* (0.0646)
Save LR 1 YR PR	0.0506* (0.0077)	0.0507* (0.0139)				
Save LR 2 YR PR AVG			0.0660* (0.0095)	0.0463* (0.0129)		
Save LR 3 YR PR AVG					0.0564* (0.0106)	0.0332* (0.0109)
Save CL 1 YR PR	0.0271* (0.0034)	0.0357* (0.0054)				
Save CL 2 YR PR AVG			0.0335* (0.0037)	0.0305* (0.0055)		
Save CL 3 YR PR AVG					0.0331* (0.0042)	0.0305* (0.0058)
Division Winner	0.1311** (0.0677)	-0.0312 (0.0864)	0.1749* (0.0655)	-0.0037 (0.0860)	0.1322* (0.0663)	-0.0019 (0.0851)
SO/Walk 1YR PR	0.1083 (0.0321)	0.0443** (0.0242)				
SO/Walk 2 YR PR AVG			0.1770* (0.0413)	0.0875* (0.0386)		
SO/Walk 3 YR PR AVG					0.1547* (0.0465)	0.0624 (0.0386)
LEAGUE	0.0955** (0.0491)	0.0377 (0.0709)	0.0939* (0.0476)	-0.0022 (0.0715)	0.0678 (0.0483)	-0.0071 (0.0708)
Year 1991	0.4006* (0.0800	0.4116* (0.1088)	0.3646* (0.0774)	0.4197* (0.1086)	0.3477* (0.0786)	0.3879* (0.1073)
Year 1992	0.4323* (0.0770)	0.6387* (0.1108)	0.4417* (0.0745)	0.5959* (0.1108)	0.4220* (0.0755)	0.5542* (0.1097)
Year 1993	0.5902* (0.0750)	0.5646* (0.1096)	0.603* (0.0725)	0.5429* (0.1094)	0.5995* (0.0736)	0.4512* (0.1087)
Year 1994	0.5038* (0.0768)	0.4539* (0.1074)	0.5731* (0.0744)	0.4508* (0.1074)	0.6051* (0.0753)	0.3871* (0.1062)

** significant at α = 0.10 * significant at α = 0.05

Table 7.6 Coefficient Output for Main Model 1995 – 2003

Variable	AE 1 YR	FA 1 YR	AE 2 YR	FA 2 YR	AE 3 YR	FA 3 YR
Constant	4.9962* (0.1129)	6.0061* (0.1795)	5.7789* (0.1592)	7.0585* (0.2408)	5.9824* (0.1752)	7.9135* (0.2735)
Current Experience	0.2678* (0.0142)	-0.0037 (0.0091)	0.2419* (0.0133)	-0.0091 (0.0090)	0.2183* (0.0136)	-0.0169** (0.0091)
Throw s	0.0096 (0.0429)	0.1301* (0.0584)	0.0363 (0.0399)	0.1425* (0.0576)	0.0859* (0.0404)	0.1384* (0.0574)
Long Reliever	-0.3848 (0.0549)	-0.4674* (0.0860)	-0.4154* (0.0514)	-0.3989* (0.0922)	-0.4353* (0.0525)	-0.4492* (0.0919)
Closer	-0.1936* (0.0638)	-0.1449 (0.0954)	-0.2621* (0.0603)	-0.1394 (0.1021)	-0.2711* (0.0618)	-0.1658** (0.1027)
Innings Pitched 1YRPR	0.0064* (0.0004)	0.0079* (0.0006)				
Innings Pitched 2 YR PR AVG			0.0067* (0.0004)	0.0079* (0.0007)		
Innings Pitched 3 YR PR AVG					0.0074* (0.0005)	0.0077* (0.0007)
ERA 1 YR PR	-0.0150* (0.0050)	-0.0341 (0.0125)				
ERA 2 YR PR AVG			-0.2127* (0.0201)	-0.2852* (0.0306)		
ERA 3 YR PR AVG					-0.2726* (0.0242)	-0.4681* (0.0403)
Save LR 1 YR PR	0.0292* (0.0066)	0.0189* (0.0082)				
Save LR 2 YR PR AVG			0.0273* (0.0066)	0.0022 (0.0083)		
Save LR 3 YR PR AVG					0.0351* (0.0078)	-0.0005 (0.0081)
Save CL 1 YR PR	0.0317* (0.0033)	0.0225* (0.0041)				
Save CL 2 YR PR AVG			0.0263* (0.0034)	0.0187* (0.0043)		
Save CL 3 YR PR AVG					0.0285* (0.0041)	0.0171* (0.0044)
Division Winner	0.1499* (0.0418)	0.0845 (0.0576)	0.1206* (0.0389)	0.0397 (0.0566)	0.1131* (0.0392)	-0.0238 (0.0565)
SO/Walk 1YR PR	0.1035* (0.0210)	0.1588* (0.0311)				
SO/Walk 2 YR PR AVG			0.1253* (0.0274)	0.1075* (0.0359)		
SO/Walk 3 YR PR AVG					0.1279* (0.0318)	0.0454 (0.0405)
LEAGUE	-0.0407 (0.0368)	0.0531 (0.0538)	-0.0742* (0.0342)	0.0354 (0.0528)	-0.0386 (0.0346)	0.0097 (0.0526)
Year 1996	-0.0501 (0.0828)	0.1515 (0.1249)	0.1139 (0.0771)	0.2932* (0.1227)	0.0841 (0.0777)	0.3049* (0.1220)
Year 1997	-0.0438 (0.0786)	0.2430* (0.1206)	0.1475* (0.0731)	0.4287* (0.1187)	0.2419* (0.0741)	0.5869* (0.1188)
Year 1998	0.0242 (0.0789)	0.3327* (0.1176)	0.2502* (0.0734)	0.5549* (0.1158)	0.3664* (0.0748)	0.7506* (0.1160)
Year 1999	0.1379** (0.0786)	0.5542* (0.1182)	0.3546* (0.0733)	0.7030* (0.1159)	0.4567* (0.0748)	0.8828* (0.1160)
Year 2000	0.2477* (0.0769)	0.6230* (0.1209)	0.4256* (0.0716)	0.7792* (0.1186)	0.5226* (0.0728)	0.9910* (0.1189)
Year 2001	0.3773* (0.0770)	0.8877* (0.1154)	0.6131* (0.0717)	1.0307* (0.1134)	0.7188* (0.0732)	1.2089* (0.1141)
Year 2002	0.5399* (0.0767)	1.0011* (0.1155)	0.7194* (0.0721)	1.1498* (0.1144)	0.8267* (0.0736)	1.3012* (0.1148)
Year 2003	0.5257* (0.0828)	0.7988* (0.1149)	0.6721* (0.0774)	0.9123* (0.1140)	0.8017* (0.0787)	1.1109* (0.1152)

** significant at α = 0.10 * significant at α = 0.05

receive between an additional $111,248 and $146,013. However, for free agent pitchers in both the 1990-1994 and 1995-2003 seasons, the division winner variable was not a statistically significant determinant of player salaries. While postseason experience continues to be valued by teams when bargaining with players eligible for arbitration in the later periods, this appears to no longer have the same impact that it previously had when making salary offers to free agents. One potential explanation for this result is that it may simply imply that owners are forced to adhere to market forces by paying higher salaries because of competition from other teams. Another potential explanation for this result is that when making offers to free agents, owners are no longer considering postseason experience as a factor contributing to their salary. Holding all other factors constant, an owner is indifferent between free agent pitchers whose teams made the postseason in the previous year and those that did not. This holds true especially for pitchers due to the fact that a highly regarded free agent pitcher will not receive lower salary offers because he pitched for a team with a poor record or whose team did not make the playoffs in the prior year. In many cases, a quality pitcher in the final year of his contract leading up to free agency will stand out even more on a poorly performing team, and as a result this should nullify any effects that playing for a team making the postseason would have on his salary.

Coefficients of the variable for innings pitched were found to be significant in both the main and variation models for both free agents and pitchers eligible for arbitration. According to the main model regression results, each additional nine innings pitched results in an increase in salary of between $2,654 and $3,420 for arbitration

eligible pitchers and between $3,476 and $3,546 for free agents in 1984-1989. For the 1990-1994 period, these increases were between $9,506 and $11,603 for arbitration eligible pitchers and between $8,135 and $10,909 for free agent pitchers during the 1990-1994 seasons. For 1995-2003, the increases were between $13,260 and $15,332 for arbitration eligible pitchers and between $25,186 and $25,840 for free agent pitchers. Since innings pitched is considered a measure of past experience, the innings pitched variable conforms to the expected result under general labor theory. As a pitcher pitches more innings and in doing so gains experience, he can expect an increase in salary. This is also a measure of durability, as a pitcher who pitches more innings proves to his team's owner that he is able to stay in a game longer and in doing so improves his value to his current team.

Another performance measurement that was considered in the model is the strike out to walk ratio of a pitcher. In each salary regression using both the main and variation models measuring worker productivity based on 1 year prior and 2 year average prior statistics, the coefficients of the strike out to walk ratio was found to be statistically significant. The regression output in the main regression model suggests that for every increase of 0.1 in a pitcher's strike out to walk ratio yielded an increase in salary of between $2,042 and $5,106 for arbitration eligible pitchers and between $7,648 and $10,430 for free agent pitchers during the 1984-1989 seasons. In the 1990-1994 seasons, the increase was between $13,980 and $23,766 for arbitration eligible pitchers and between $7,396 and $14,792 for free agents. Finally, during the period of 1995-2003, the increase was between $20,720 and $24,864 for arbitration eligible pitchers and between

$32,710 and $49,065 for free agent pitchers. However, the coefficient of the variable measuring the average strike out to walk ratio three years prior to the signing of his most recent contract, the coefficient was not statistically significant for free agents in all time periods. This is most likely due to the nature of free agency. As owners mostly concern themselves with a player's most recent performance, this is what is most heavily weighted when determining a player's salary as a free agent. On the other hand, when engaging in arbitration negotiations, the arbitrator, and more importantly the owners who bargain with the player, must consider all past statistics in awarding a player's salary, including three year prior average statistics. However, examining statistics that include performance three years prior may not be viewed as important to owners when making salary offers to free agents, and as a result this, is not significant in determining their salary.

All coefficients of ERA in the main model and the ratio of league ERA to pitcher ERA in the variation model were found to be significant for both free agents and pitchers eligible for arbitration with one exception, free agents during the 1984-1989 seasons. During this period the regression based on statistics one year prior to the signing of the most recent contract yielded a statistically insignificant coefficient. This result most likely reflects the effects of the owners' collusion that took place during the mid 1980's as owners attempted to suppress the salaries of free agents by not bidding for their services.

The coefficients of the year dummy variables for all three time periods appeared to trend upward, indicating that a pitcher's salary increased in each subsequent year in

which he signed his most recent contract, holding all other factors the same (including experience). There were however two exceptions. During the 1990-1993 baseball seasons, pitchers saw steady increases in their salary as the national television contract created increased revenue streams for owners, and this was reflected in the salaries of pitchers signing contracts in those years. However, signing a contract during the 1994 season saw a decrease of roughly $125,820 for arbitration eligible pitchers and a decrease of roughly $166,410 in salary for free agents when compared to signing a contract in the 1993 season. This was indicative of the turmoil between players and owners that led up to the strike that ended the 1994 baseball season on August 12. The second exception was during the 2003 baseball season. This was the result of the new collective bargaining agreement that was signed on August 30, 2002. Between the 1995 and 2002 seasons, players saw steady increases in salaries each year. However, after the strike threat that nearly ended the 2002 season on August 30, pitchers saw costly decreases in salary during the 2003 season. The regression output of the main regression model suggests that pitchers eligible for arbitration who signed contracts in 2003 saw a decrease in salary of roughly $207,200 when compared to pitchers who signed contracts in 2002. The impact on free agents of the 2002 collective bargaining agreement between the Major League Players Association and the owners, however, was felt in the contracts negotiated for the 2003 season.

Further strengthening the argument for collusion's impact on a free agent pitcher's salary are the year dummy variables for free agents pitchers who signed contracts in 1985,1986, and 1987, which were all found to be statistically insignificant.

When compared to the year dummy variables for pitchers eligible for arbitration during the 1984-1989 seasons, which were all found to be statistically significant, this also suggests the notion that collusion suppressed the salaries of free agents during the mid 1980's.

Chapter 8

CONCLUSION

8.1 General Statements

This paper estimates the effects of free agency status and arbitration eligibility on the salaries of Major League Baseball pitchers. Baseball provides an extremely accessible set of performance measurements, which allow a comprehensive salary model to be developed with a level of credibility. What previous studies have not had is access to the actual contracts of players, which we do. While several previous studies have evaluated the salary relations of free agents and arbitration eligible players, this study extends the literature by addressing the implications on salary based on a much larger sample size and longer period of time, 1984 through 2003, and under a much more extensive assessment of the contributing factors to a player's salary. Additionally, previous studies have focused primarily on position players with little analysis of pitchers while this study is the first to evaluate pitchers under the analysis employed. As a result, the findings of this thesis are consistent with the literature, and further strengthen the findings that free agency and arbitration produce significantly different salaries.

8.2 Empirical Reconciliations

The results of this study indicate that free agent and arbitration eligible pitchers are subject to different salary equations. Moreover, these differences in salary can be attributed to the differences in returns to different player characteristics (e.g. Major League experience, productivity characteristics etc.) that determine their salaries. Players eligible for arbitration have salaries that are driven by the number of years of experience they have, as it is an explicit factor that is considered in arbitration negotiations. Free agents on the other hand receive salaries that are dictated by both their free agent status and their individual performance measures in the years leading up to and during free agency. The Oaxaca means/coefficient decomposition confirmed this indicating that at least 60 percent of the higher salaries for free agents was due to higher returns to productivity characteristics of the players.

It also appears as though the salaries of both free agents and arbitration eligible pitchers have to be viewed in an historical context. The collusion of owners during the mid 1980's drove down the salaries of free agents, and this was reflected in the results of this study by the behavior of coefficients of the 1985, 1986, and 1987 year signing dummy variables for free agents, which were all found to be statistically insignificant. That is, holding other factors the same, salaries for contracts signed in the 1985 – 1987 period are not statistically different from those earned in 1984. Additionally, this study indicated that in 1994 both free agent and arbitration eligible pitchers saw decreases in salary which was indicative of the backlash that players faced as a result of the eventual strike. The coefficient for signing a contract in 1994 indicated that both arbitration

eligible pitchers saw a decrease of roughly $125,820, and for free agents there was a decrease of roughly $166,410 in salary when compared to signing a contract in the 1993 season. Most recently, the threatened strike during the 2002 season saw arbitration eligible and free agent pitchers receive another decrease in salary during the 2003 season, and this study confirmed that conclusion. The coefficients suggest that a pitcher saw a decrease of approximately $207,200 if he signed a contract in 2003, when compared to signing a contract in 2002. Overall, the results of this study confirm these happenings and adhere to their historical context in player and owner relations.

In evaluating the individual salary equations for free agents and arbitration eligible pitchers, certain factors are significant contributors. The innings pitched coefficients is a significant factor in determining a pitcher's salary. For 1995-2003, the coefficients suggest increases were between $13,260 and $15,332 for arbitration eligible pitchers and between $25,186 and $25,840 for free agent pitchers for each additional nine innings pitched. The strike out to walk ratio of a pitcher also appears to contribute significantly in determining a pitcher's salary equation. The coefficients indicated that an increase of 0.1 in of a pitcher's strike out to walk ratio yields an increase of between $20,720 and $24,864 for arbitration eligible pitchers and between $32,710 and $49,065 for free agent pitchers during the 1995-2003 seasons. It also appears that ERA as a performance measurement is a significant contributor to a player's salary. The coefficients suggest that a decrease of 1.0 in a pitcher's ERA results in an increase of between $435, 120 and $559,440 for arbitration eligible pitchers and between $948,590 and $1,504,660 for free agents. The number of years of experience a pitcher has is a

significant contributor to arbitration eligible pitcher's salary equations, but not for free agents. For an arbitration eligible pitcher, each additional year of experience yields an increase of between $435,120 and $538,720 during the 1995-2003 seasons. Additionally, the results indicate that the coefficients for the league of the team with which a pitcher signs his contract and the right or left-handed status of a pitcher are both insignificant and do not contribute to the salary equations of pitchers.

8.3 Research Implications

While this study provides both teams and players with some guidance when engaging in salary negotiations as to which factors contribute to determining a pitcher's salary, further analysis should be conducted to incorporate both pitchers and position players. In doing so, both players and owners will be able to engage in negotiations with a true estimate of which factors should be considered and which should be overlooked.

APPENDIX I

Table of Means

Table of Mean Statistics 1984 – 1989

	Mean Statistics 1984-1989			
Variable	AE Mean (n=622)	AE Std Dev	FA Mean (n=376)	FA Std Dev
Mean of Salary	510.5562701	14.12936219	695.3005319	21.14408474
Mean of EXPCurrent	4.702357362	0.073058468	10.8072427	0.196072352
Mean of Throws	0.329581994	0.018862914	0.32712766	0.024227541
Mean of IP - 1 Yr PR	142.3596077	2.951149886	142.4441117	3.735743153
Mean of IP - 2 Yr AVG PR	137.7778923	2.561716798	142.0700239	3.317909867
Mean of IP - 3 Yr AVG PR	132.151574	2.385477737	143.9429707	3.098870332
Mean of ERA - 1 Yr PR	3.75811254	0.053811139	3.941696809	0.105567554
Mean of ERA - 2 Yr AVG PR	3.685471061	0.032071988	3.762047872	0.037394685
Mean of ERA - 3 Yr AVG PR	3.653728296	0.027089523	3.695648936	0.031741662
Mean of Saves LR Dum 1 Year Prior	0.421221865	0.083072972	0.343085106	0.083570246
Mean of Saves LR Dum 2 Yr AVG Prior	0.443729904	0.071198155	0.41356383	0.086251357
Mean of Saves LR Dum 3 Yr AVG Prior	0.469980707	0.074115779	0.43793617	0.087088667
Mean of Saves CL Dum 1 Year Prior	3.459807074	0.306694946	3.656914894	0.453596675
Mean of Saves CL Dum 2 Yr AVG Prior	3.176848875	0.271518143	3.345744681	0.400483336
Mean of Saves CL Dum 3 Yr AVG Prior	2.845916399	0.241880104	3.355489362	0.389541335
Mean of Division Winner	0.183279743	0.015525589	0.239361702	0.022034378
Mean of SO/BB - 1 Yr PR	1.833898714	0.028991598	1.963210106	0.041501396
Mean of SO/BB - 2 Yr AVG PR	1.812086817	0.024009946	1.898901596	0.031724843
Mean of SO/BB - 3 Yr AVG PR	1.777559486	0.02119197	1.887928191	0.031129619
Mean of League	0.491961415	0.020061716	0.425531915	0.025531915
Mean of LG ERA/ ERA - 1 Yr PR	1.137223397	0.015087282	1.066316935	0.017192535
Mean of LG ERA/ERA - 2 Yr AVG PR	1.107236985	0.010740497	1.06602747	0.0122226
Mean of ERA/LG ERA - 3 Yr AVG PR	1.104129465	0.009481079	1.077630307	0.01193095
Mean of 1985	0.207395498	0.016269797	0.143617021	0.01811012
Mean of 1986	0.204180064	0.016175893	0.140957447	0.017969489
Mean of 1987	0.146302251	0.014181814	0.154255319	0.018651943
Mean of 1988	0.135048232	0.013714962	0.17287234	0.019526904
Mean of 1989	0.131832797	0.013575868	0.234042553	0.021864226
Mean of Starter	0.491961415	0.020061716	0.539893617	0.025737573
Mean of Long Reliever	0.168810289	0.015031549	0.164893617	0.019162722
Mean of Closer	0.339228296	0.018998791	0.295212766	0.023554883
Sum of Starter, Long Reliever, Closer	1		1	

Table of Mean Statistics 1990 – 1994

	Mean Statistics 1990-1994			
Variable	AE Mean (n=455)	AE Std Dev	FA Mean (n=399)	FA Std Dev
Mean of Salary	1398.261538	52.45432963	1849.859649	64.0649785
Mean of EXPCurrent	4.648249425	0.060573028	10.08155563	0.172608388
Mean of Throws	0.356043956	0.022472531	0.343358396	0.023801071
Mean of IP - 1 Yr PR	127.0022242	3.261529376	132.6031529	3.744883753
Mean of IP - 2 Yr AVG PR	125.8142725	3.011894261	136.1391253	3.481504418
Mean of IP - 3 Yr AVG PR	123.5147582	2.871928761	139.5722932	3.300259797
Mean of ERA - 1 Yr PR	3.618958242	0.06579643	3.774190476	0.061796892
Mean of ERA - 2 Yr AVG PR	3.580874725	0.057729219	3.658914787	0.040187166
Mean of ERA - 3 Yr AVG PR	3.565186813	0.032272961	3.63641604	0.032275786
Mean of Saves LR Dum 1 Year Prior	0.98021978	0.168842039	0.654135338	0.140533151
Mean of Saves LR Dum 2 Yr AVG Prior	0.904395604	0.139147106	0.878446115	0.157281398
Mean of Saves LR Dum 3 Yr AVG Prior	0.868138462	0.130012204	1.044270677	0.186687324
Mean of Saves CL Dum 1 Year Prior	3.993406593	0.466535032	3.586466165	0.464673547
Mean of Saves CL Dum 2 Yr AVG Prior	3.835164835	0.419516716	3.735588972	0.478182019
Mean of Saves CL Dum 3 Yr AVG Prior	3.451997802	0.379549427	3.707578947	0.457933914
Mean of Division Winner	0.16043956	0.017224784	0.213032581	0.020523898
Mean of SO/BB - 1 Yr PR	2.050021978	0.042714555	2.249243108	0.0870687
Mean of SO/BB - 2 Yr AVG PR	1.985026374	0.031389711	2.13493985	0.058355273
Mean of SO/BB - 3 Yr AVG PR	1.967461538	0.029005306	2.131907268	0.056817893
Mean of League	0.465934066	0.023411635	0.436090226	0.024857157
Mean of LG ERA/ ERA - 1 Yr PR	1.377927501	0.02174698	1.31390788	0.024100895
Mean of LG ERA/ERA - 2 Yr AVG PR	1.333466158	0.015210794	1.292297431	0.016473165
Mean of LG ERA/ERA - 3 Yr AVG PR	1.304830368	0.012674783	1.278944287	0.013662676
Mean of 1991	0.173626374	0.017777396	0.200501253	0.020069008
Mean of 1992	0.202197802	0.01884985	0.187969925	0.019583428
Mean of 1993	0.226373626	0.019640413	0.197994987	0.019974417
Mean of 1994	0.206593407	0.019001076	0.213032581	0.020523898
Mean of Starter	0.457142857	0.023379802	0.503759398	0.025062027
Mean of Long Reliever	0.257142857	0.020512187	0.228070175	0.021032051
Mean of Closer	0.285714286	0.021201863	0.268170426	0.022205926
Sum of Starter, Long Reliever, Closer	1		1	

Table of Mean Statistics 1995 – 2003

	Mean Statistics 1995-2003			
Variable	AE Mean (n=933)	AE Std Dev	FA Mean (n=768)	FA Std Dev
Mean of Salary	2072.644159	66.56695361	3271.223958	106.0859046
Mean of EXPCurrent	4.662990104	0.043574427	9.784013097	0.108420959
Mean of Throws	0.260450161	0.014376001	0.330729167	0.016987893
Mean of IP - 1 Yr PR	107.6024673	2.13582406	114.5946198	2.482170789
Mean of IP - 2 Yr AVG PR	105.888865	1.911742391	116.8812214	2.281232641
Mean of IP - 3 Yr AVG PR	103.5846252	1.772853013	119.6531419	2.20842433
Mean of ERA - 1 Yr PR	4.556681672	0.124181712	4.424597656	0.085198137
Mean of ERA - 2 Yr AVG PR	4.298567403	0.032495373	4.146227865	0.036813479
Mean of ERA - 3 Yr AVG PR	4.265957872	0.028672095	4.066648438	0.029563738
Mean of Saves LR Dum 1 Yr PR	0.59807074	0.095329504	0.625	0.125690725
Mean of Saves LR Dum 2 Yr AVG PR	0.61789925	0.088988874	0.698567708	0.123421204
Mean of Saves LR Dum 3 Yr AVG PR	0.612172562	0.077844605	0.742622396	0.126908548
Mean of Saves CL Dum 1 Yr PR	1.711682744	0.214759745	2.727864583	0.311512792
Mean of Saves CL Dum 2 Yr AVG PR	1.625937835	0.19810707	2.712239583	0.296655027
Mean of Saves CL Dum 3 Yr AVG PR	1.425499464	0.169407689	2.657105469	0.288266695
Mean of Division Winner	0.265809218	0.014470433	0.329427083	0.016970904
Mean of SO/BB - 1 Yr PR	2.058597563	0.030300087	2.235597656	0.037066174
Mean of SO/BB - 2 Yr AVG PR	2.018272867	0.023268603	2.248009115	0.031910446
Mean of SO/BB - 3 Yr AVG PR	1.980581837	0.020632546	2.236253906	0.029384835
Mean of League	0.560557342	0.016257478	0.526041667	0.01802945
Mean of LG ERA/ ERA - 1 Yr PR	1.069154731	0.012864036	1.088021976	0.014276148
Mean of LG ERA/ERA - 2 Yr AVG PR	1.049993875	0.00904028	1.087858059	0.010186657
Mean of LG ERA/ERA - 3 Yr AVG PR	1.047541542	0.008222971	1.096867622	0.009581452
Mean of 1996	0.088960343	0.009325216	0.0859375	0.010120026
Mean of 1997	0.11039657	0.010265215	0.100260417	0.010844898
Mean of 1998	0.11039657	0.010265215	0.11328125	0.011443906
Mean of 1999	0.115755627	0.01047971	0.110677083	0.0113282
Mean of 2000	0.124330118	0.010808127	0.104166667	0.011030122
Mean of 2001	0.125401929	0.010847968	0.127604167	0.01204735
Mean of 2002	0.129689175	0.011004773	0.134114583	0.012304686
Mean of 2003	0.0943194	0.009573706	0.130208333	0.012151484
Mean of Starter	0.434083601	0.016235096	0.459635417	0.017995027
Mean of Long Reliever	0.355841372	0.01568255	0.30078125	0.016559005
Mean of Closer	0.210075027	0.013343574	0.239583333	0.015411909
Sum of Starter, Long Reliever, Closer	1		1	

APPENDIX II

Main Regression Model Output

Restricted Regression for 1984-1989 1 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/25/05 Time: 23:18
Sample: 1 999
Included observations: 999

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.595092	0.115537	39.77168	0.0000
EXPCUR	0.038081	0.004479	8.501461	0.0000
THROWS	0.023763	0.037975	0.625771	0.5316
LONGREL	-0.224764	0.060741	-3.700376	0.0002
CLOSER	-0.105342	0.059652	-1.765949	0.0777
IP1YRPR	0.005423	0.000338	16.03731	0.0000
ERA1YRPR	-0.023240	0.012072	-1.925125	0.0545
SVLRDUM1YRPR	0.026494	0.010440	2.537773	0.0113
SVCLDUM1YRPR	0.030175	0.002975	10.14420	0.0000
DIVWIN	0.221169	0.044156	5.008854	0.0000
SOBB1YRPR	0.102681	0.026604	3.859658	0.0001
LEAGUE	0.105743	0.035826	2.951593	0.0032
YR85	0.116892	0.059503	1.964468	0.0498
YR86	0.163872	0.059859	2.737643	0.0063
YR87	0.268115	0.062881	4.263863	0.0000
YR88	0.384503	0.063230	6.081069	0.0000
YR89	0.427859	0.061292	6.980712	0.0000

R-squared	0.520388	Mean dependent var	6.108277
Adjusted R-squared	0.512573	S.D. dependent var	0.793060
S.E. of regression	0.553682	Akaike info criterion	1.672419
Sum squared resid	301.0460	Schwarz criterion	1.755918
Log likelihood	-818.3735	F-statistic	66.59294
Durbin-Watson stat	2.006897	Prob(F-statistic)	0.000000

Unrestricted Regression for AE 1984-1989 1 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/25/05 Time: 23:20
Sample: 1 623
Included observations: 623

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.201567	0.132200	31.78186	0.0000
EXPCUR	0.138211	0.009960	13.87645	0.0000
THROWS	0.045977	0.038367	1.198346	0.2313
LONGREL	-0.157482	0.061381	-2.565666	0.0105
CLOSER	-0.007945	0.059275	-0.134044	0.8934
IP1YRPR	0.005165	0.000346	14.90700	0.0000
ERA1YRPR	-0.047292	0.015552	-3.040891	0.0025
SVLRDUM1YRPR	0.020744	0.009805	2.115676	0.0348
SVCLDUM1YRPR	0.026888	0.003162	8.504113	0.0000
DIVWIN	0.217580	0.047274	4.602551	0.0000
SOBB1YRPR	0.104876	0.027733	3.781590	0.0002
LEAGUE	0.099030	0.036255	2.731492	0.0065
YR85	0.103384	0.057828	1.787791	0.0743
YR86	0.200944	0.058441	3.438381	0.0006
YR87	0.325964	0.063417	5.140027	0.0000
YR88	0.366551	0.064680	5.667171	0.0000
YR89	0.427529	0.065304	6.546785	0.0000

R-squared	0.658604	Mean dependent var	5.995902
Adjusted R-squared	0.649590	S.D. dependent var	0.745155
S.E. of regression	0.441098	Akaike info criterion	1.227807
Sum squared resid	117.9077	Schwarz criterion	1.348814
Log likelihood	-365.4619	F-statistic	73.06649
Durbin-Watson stat	2.059659	Prob(F-statistic)	0.000000

Unrestricted Regression for FA 1984-1989 1 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/25/05 Time: 23:22
Sample: 1 376
Included observations: 376

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.234234	0.225249	23.23755	0.0000
EXPCUR	-0.007820	0.009450	-0.827491	0.4085
THROWS	-0.052414	0.072892	-0.719059	0.4726
LONGREL	-0.399394	0.117070	-3.411574	0.0007
CLOSER	-0.331110	0.118338	-2.797992	0.0054
IP1YRPR	0.005082	0.000649	7.834814	0.0000
ERA1YRPR	-0.009094	0.018217	-0.499178	0.6180
SVLRDUM1YRPR	0.018269	0.023735	0.769732	0.4420
SVCLDUM1YRPR	0.030504	0.005340	5.712035	0.0000
DIVWIN	0.164278	0.081194	2.023285	0.0438
SOBB1YRPR	0.125611	0.048858	2.570958	0.0105
LEAGUE	0.067765	0.068934	0.983034	0.3263
YR85	0.184049	0.122647	1.500633	0.1343
YR86	0.090850	0.123361	0.736454	0.4619
YR87	0.105183	0.121089	0.868641	0.3856
YR88	0.352207	0.119813	2.939642	0.0035
YR89	0.378321	0.111733	3.385934	0.0008

R-squared	0.437597	Mean dependent var	6.294472
Adjusted R-squared	0.412532	S.D. dependent var	0.834928
S.E. of regression	0.639943	Akaike info criterion	1.989283
Sum squared resid	147.0201	Schwarz criterion	2.166951
Log likelihood	-356.9852	F-statistic	17.45829
Durbin-Watson stat	1.932760	Prob(F-statistic)	0.000000

Restricted Regression for 1984-1989 2 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/25/05 Time: 23:30
Sample: 1 999
Included observations: 999

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.291681	0.169012	31.30953	0.0000
EXPCUR	0.034772	0.004416	7.874110	0.0000
THROWS	0.001558	0.037141	0.041955	0.9665
LONGREL	-0.215348	0.063014	-3.417447	0.0007
CLOSER	-0.106093	0.061263	-1.731757	0.0836
IP2YRPR	0.006102	0.000390	15.63992	0.0000
ERA2YRPR	-0.198768	0.027613	-7.198406	0.0000
SVLRDUM2YRPR	0.031237	0.012253	2.549250	0.0109
SVCLDUM2YRPR	0.029120	0.003521	8.270308	0.0000
DIVWIN	0.207523	0.043533	4.767013	0.0000
SOBB2YRPR	0.065785	0.032633	2.015902	0.0441
LEAGUE	0.086201	0.035391	2.435690	0.0150
YR85	0.122470	0.058394	2.097311	0.0362
YR86	0.177493	0.058683	3.024607	0.0026
YR87	0.228053	0.061674	3.697740	0.0002
YR88	0.359332	0.061768	5.817427	0.0000
YR89	0.442284	0.060302	7.334533	0.0000

R-squared	0.536400	Mean dependent var	6.108277
Adjusted R-squared	0.528847	S.D. dependent var	0.793060
S.E. of regression	0.544361	Akaike info criterion	1.638463
Sum squared resid	290.9951	Schwarz criterion	1.721961
Log likelihood	-801.4122	F-statistic	71.01290
Durbin-Watson stat	2.014329	Prob(F-statistic)	0.000000

Unrestricted Regression for AE 1984-1989 2 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/25/05 Time: 23:26
Sample: 1 623
Included observations: 623

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.873957	0.168906	28.85594	0.0000
EXPCUR	0.120385	0.009791	12.29522	0.0000
THROWS	0.036735	0.036981	0.993344	0.3209
LONGREL	-0.138310	0.062691	-2.206219	0.0277
CLOSER	0.030784	0.060997	0.504681	0.6140
IP2YRPR	0.006293	0.000398	15.82014	0.0000
ERA2YRPR	-0.210286	0.026467	-7.945160	0.0000
SVLRDUM2YRPR	0.026106	0.012005	2.174653	0.0300
SVCLDUM2YRPR	0.024549	0.003630	6.762701	0.0000
DIVWIN	0.177915	0.045764	3.887641	0.0001
SOBB2YRPR	0.048417	0.031965	1.514675	0.1304
LEAGUE	0.074510	0.035131	2.120922	0.0343
YR85	0.107001	0.055803	1.917487	0.0556
YR86	0.208702	0.056298	3.707070	0.0002
YR87	0.291292	0.061213	4.758635	0.0000
YR88	0.348786	0.062516	5.579131	0.0000
YR89	0.461206	0.063151	7.303271	0.0000

R-squared	0.681135	Mean dependent var	5.995902
Adjusted R-squared	0.672716	S.D. dependent var	0.745155
S.E. of regression	0.426294	Akaike info criterion	1.159532
Sum squared resid	110.1262	Schwarz criterion	1.280539
Log likelihood	-344.1944	F-statistic	80.90552
Durbin-Watson stat	2.082119	Prob(F-statistic)	0.000000

Unrestricted Regression for FA 1984-1989 2 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/25/05 Time: 23:24
Sample: 1 376
Included observations: 376

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.811751	0.361702	16.06778	0.0000
EXPCUR	-0.008239	0.009579	-0.860121	0.3903
THROWS	-0.094307	0.073257	-1.287348	0.1988
LONGREL	-0.395190	0.124073	-3.185139	0.0016
CLOSER	-0.386305	0.121453	-3.180698	0.0016
IP2YRPR	0.005003	0.000759	6.595259	0.0000
ERA2YRPR	-0.155947	0.059443	-2.623459	0.0091
SVLRDUM2YRPR	0.015247	0.025249	0.603872	0.5463
SVCLDUM2YRPR	0.030339	0.006635	4.572931	0.0000
DIVWIN	0.209798	0.081176	2.584468	0.0101
SOBB2YRPR	0.149382	0.065700	2.273711	0.0236
LEAGUE	0.057697	0.070346	0.820189	0.4127
YR85	0.198594	0.123807	1.604056	0.1096
YR86	0.107180	0.124821	0.858667	0.3911
YR87	0.058645	0.122399	0.479132	0.6321
YR88	0.313919	0.119665	2.623321	0.0091
YR89	0.361078	0.113626	3.177771	0.0016

R-squared	0.423478	Mean dependent var	6.294472
Adjusted R-squared	0.397783	S.D. dependent var	0.834928
S.E. of regression	0.647926	Akaike info criterion	2.014078
Sum squared resid	150.7111	Schwarz criterion	2.191746
Log likelihood	-361.6467	F-statistic	16.48123
Durbin-Watson stat	1.959740	Prob(F-statistic)	0.000000

Restricted Regression for 1984-1989 3 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/25/05 Time: 23:30
Sample: 1 999
Included observations: 999

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.667214	0.192432	29.45055	0.0000
EXPCUR	0.023544	0.004548	5.176800	0.0000
THROWS	-0.008822	0.037454	-0.235554	0.8138
LONGREL	-0.199523	0.064252	-3.105313	0.0020
CLOSER	-0.070240	0.062118	-1.130758	0.2584
IP3YRPR	0.006637	0.000427	15.53157	0.0000
ERA3YRPR	-0.290746	0.034536	-8.418612	0.0000
SVLRDUM3YRPR	0.022605	0.012260	1.843769	0.0655
SVCLDUM3YRPR	0.025889	0.003886	6.662728	0.0000
DIVWIN	0.215841	0.043809	4.926834	0.0000
SOBB3YRPR	0.065463	0.036761	1.780764	0.0753
LEAGUE	0.072936	0.035781	2.038413	0.0418
YR85	0.146703	0.058946	2.488760	0.0130
YR86	0.168836	0.059253	2.849430	0.0045
YR87	0.209480	0.062443	3.354735	0.0008
YR88	0.338311	0.062640	5.400882	0.0000
YR89	0.404145	0.061310	6.591861	0.0000

R-squared	0.527853	Mean dependent var	6.108277
Adjusted R-squared	0.520161	S.D. dependent var	0.793060
S.E. of regression	0.549356	Akaike info criterion	1.656731
Sum squared resid	296.3599	Schwarz criterion	1.740229
Log likelihood	-810.5371	F-statistic	68.61639
Durbin-Watson stat	2.021482	Prob(F-statistic)	0.000000

Unrestricted Regression for AE 1984-1989 3 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/25/05 Time: 23:27
Sample: 1 623
Included observations: 623

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.250608	0.192300	27.30430	0.0000
EXPCUR	0.094948	0.010277	9.239292	0.0000
THROWS	0.016817	0.037234	0.451656	0.6517
LONGREL	-0.125868	0.063826	-1.972032	0.0491
CLOSER	0.034301	0.062363	0.550030	0.5825
IP3YRPR	0.006696	0.000448	14.94874	0.0000
ERA3YRPR	-0.290094	0.033245	-8.726046	0.0000
SVLRDUM3YRPR	0.018181	0.011831	1.536794	0.1249
SVCLDUM3YRPR	0.024351	0.004145	5.874452	0.0000
DIVWIN	0.193320	0.045980	4.204425	0.0000
SOBB3YRPR	0.076634	0.037800	2.027371	0.0431
LEAGUE	0.063239	0.035549	1.778942	0.0758
YR85	0.120117	0.056165	2.138643	0.0329
YR86	0.183745	0.056810	3.234349	0.0013
YR87	0.252606	0.062090	4.068402	0.0001
YR88	0.314462	0.063475	4.954063	0.0000
YR89	0.400289	0.064026	6.251951	0.0000

R-squared	0.676541	Mean dependent var	5.995902
Adjusted R-squared	0.668001	S.D. dependent var	0.745155
S.E. of regression	0.429353	Akaike info criterion	1.173835
Sum squared resid	111.7127	Schwarz criterion	1.294842
Log likelihood	-348.6497	F-statistic	79.21870
Durbin-Watson stat	2.054754	Prob(F-statistic)	0.000000

Unrestricted Regression for FA 1984-1989 3 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/25/05 Time: 23:25
Sample: 1 376
Included observations: 376

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.325848	0.423275	14.94500	0.0000
EXPCUR	-0.015203	0.010056	-1.511828	0.1315
THROWS	-0.088935	0.075825	-1.172894	0.2416
LONGREL	-0.398577	0.130374	-3.057194	0.0024
CLOSER	-0.353819	0.126062	-2.806711	0.0053
IP3YRPR	0.005124	0.000837	6.125269	0.0000
ERA3YRPR	-0.268861	0.076151	-3.530648	0.0005
SVLRDUM3YRPR	0.006058	0.026627	0.227516	0.8202
SVCLDUM3YRPR	0.022981	0.007303	3.146911	0.0018
DIVWIN	0.221821	0.083571	2.654271	0.0083
SOBB3YRPR	0.118882	0.070379	1.689169	0.0921
LEAGUE	0.044115	0.072537	0.608177	0.5435
YR85	0.244464	0.127786	1.913071	0.0565
YR86	0.140391	0.129041	1.087954	0.2773
YR87	0.086239	0.126445	0.682028	0.4957
YR88	0.333913	0.123702	2.699339	0.0073
YR89	0.368633	0.117598	3.134680	0.0019

R-squared	0.384502	Mean dependent var	6.294472
Adjusted R-squared	0.357071	S.D. dependent var	0.834928
S.E. of regression	0.669469	Akaike info criterion	2.079496
Sum squared resid	160.8999	Schwarz criterion	2.257163
Log likelihood	-373.9452	F-statistic	14.01675
Durbin-Watson stat	1.939213	Prob(F-statistic)	0.000000

Restricted Regression for 1990-1994 1 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/27/05 Time: 22:01
Sample: 1000 1853
Included observations: 854

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.795519	0.151257	38.31575	0.0000
EXPCUR	0.034177	0.006047	5.651927	0.0000
THROWS	0.024269	0.046758	0.519033	0.6039
LONGREL	-0.473579	0.073143	-6.474688	0.0000
CLOSER	-0.265518	0.077913	-3.407865	0.0007
IP1YRPR	0.006005	0.000451	13.32551	0.0000
ERA1YRPR	-0.094516	0.019053	-4.960666	0.0000
SVLRDUM1YRPR	0.051496	0.007605	6.771275	0.0000
SVCLDUM1YRPR	0.032348	0.003167	10.21278	0.0000
DIVWIN	0.061722	0.057252	1.078062	0.2813
SOBB1YRPR	0.057153	0.018691	3.057728	0.0023
LEAGUE	0.073987	0.043963	1.682930	0.0928
YR91	0.420969	0.070478	5.973034	0.0000
YR92	0.521158	0.069515	7.497076	0.0000
YR93	0.585200	0.068107	8.592313	0.0000
YR94	0.476537	0.068329	6.974125	0.0000

R-squared	0.552495	Mean dependent var	7.027957
Adjusted R-squared	0.544485	S.D. dependent var	0.938696
S.E. of regression	0.633543	Akaike info criterion	1.943581
Sum squared resid	336.3540	Schwarz criterion	2.032572
Log likelihood	-813.9089	F-statistic	68.97372
Durbin-Watson stat	2.004313	Prob(F-statistic)	0.000000

Unrestricted Regression for AE 1990-1994 1 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/27/05 Time: 22:02
Sample: 624 1078
Included observations: 455

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.617683	0.182324	25.32682	0.0000
EXPCUR	0.179062	0.019559	9.154960	0.0000
THROWS	-0.007710	0.052073	-0.148062	0.8824
LONGREL	-0.307739	0.083010	-3.707252	0.0002
CLOSER	0.045755	0.086685	0.527836	0.5979
IP1YRPR	0.006835	0.000553	12.35954	0.0000
ERA1YRPR	-0.056827	0.020298	-2.799679	0.0053
SVLRDUM1YRPR	0.050555	0.007708	6.558533	0.0000
SVCLDUM1YRPR	0.027112	0.003380	8.021035	0.0000
DIVWIN	0.131060	0.067704	1.935775	0.0535
SOBB1YRPR	0.108311	0.032113	3.372781	0.0008
LEAGUE	0.095522	0.049106	1.945203	0.0524
YR91	0.400646	0.080008	5.007596	0.0000
YR92	0.432306	0.077034	5.611912	0.0000
YR93	0.590164	0.074955	7.873533	0.0000
YR94	0.503792	0.076802	6.559630	0.0000

R-squared	0.699323	Mean dependent var	6.883711
Adjusted R-squared	0.689049	S.D. dependent var	0.917014
S.E. of regression	0.511354	Akaike info criterion	1.531023
Sum squared resid	114.7910	Schwarz criterion	1.675912
Log likelihood	-332.3077	F-statistic	68.06918
Durbin-Watson stat	1.936668	Prob(F-statistic)	0.000000

Unrestricted Regression for FA 1990-1994 1 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/27/05 Time: 22:04
Sample: 377 775
Included observations: 399

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.940871	0.254734	27.24758	0.0000
EXPCUR	-0.016926	0.010432	-1.622516	0.1055
THROWS	0.009389	0.074633	0.125804	0.9000
LONGREL	-0.615696	0.113694	-5.415376	0.0000
CLOSER	-0.621942	0.124579	-4.992343	0.0000
IP1YRPR	0.004361	0.000673	6.478187	0.0000
ERA1YRPR	-0.141404	0.032400	-4.364337	0.0000
SVLRDUM1YRPR	0.050722	0.013929	3.641327	0.0003
SVCLDUM1YRPR	0.035678	0.005395	6.613347	0.0000
DIVWIN	-0.031228	0.086406	-0.361409	0.7180
SOBB1YRPR	0.044302	0.024181	1.832139	0.0677
LEAGUE	0.037681	0.070873	0.531674	0.5953
YR91	0.411606	0.108809	3.782833	0.0002
YR92	0.638686	0.110764	5.766182	0.0000
YR93	0.564585	0.109554	5.153485	0.0000
YR94	0.453870	0.107443	4.224283	0.0000

R-squared	0.487331	Mean dependent var	7.192449
Adjusted R-squared	0.467252	S.D. dependent var	0.937203
S.E. of regression	0.684060	Akaike info criterion	2.117733
Sum squared resid	179.2204	Schwarz criterion	2.277691
Log likelihood	-406.4876	F-statistic	24.27135
Durbin-Watson stat	2.045850	Prob(F-statistic)	0.000000

Restricted Regression 1990-1994 2 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/27/05 Time: 22:07
Sample: 1000 1853
Included observations: 854

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.631476	0.164067	34.32417	0.0000
EXPCUR	0.022849	0.006005	3.804979	0.0002
THROWS	0.029773	0.046014	0.647043	0.5178
LONGREL	-0.409192	0.075304	-5.433883	0.0000
CLOSER	-0.193949	0.079417	-2.442147	0.0148
IP2YRPR	0.007300	0.000485	15.04514	0.0000
ERA2YRPR	-0.119869	0.023159	-5.175981	0.0000
SVLRDUM2YRPR	0.060479	0.008342	7.250251	0.0000
SVCLDUM2YRPR	0.034591	0.003388	10.20986	0.0000
DIVWIN	0.099601	0.056327	1.768275	0.0774
SOBB2YRPR	0.104371	0.027608	3.780405	0.0002
LEAGUE	0.060012	0.043524	1.378831	0.1683
YR91	0.412778	0.069551	5.934895	0.0000
YR92	0.510208	0.068577	7.439939	0.0000
YR93	0.586543	0.067166	8.732706	0.0000
YR94	0.517979	0.067459	7.678390	0.0000

R-squared	0.564357	Mean dependent var	7.027957
Adjusted R-squared	0.556559	S.D. dependent var	0.938696
S.E. of regression	0.625090	Akaike info criterion	1.916716
Sum squared resid	327.4383	Schwarz criterion	2.005708
Log likelihood	-802.4378	F-statistic	72.37296
Durbin-Watson stat	2.026447	Prob(F-statistic)	0.000000

Unrestricted Regression for AE 1990-1994 2 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/27/05 Time: 22:08
Sample: 624 1078
Included observations: 455

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.421878	0.184349	23.98651	0.0000
EXPCUR	0.163205	0.019029	8.576825	0.0000
THROWS	-0.019305	0.050248	-0.384196	0.7010
LONGREL	-0.273819	0.081604	-3.355459	0.0009
CLOSER	0.055543	0.086540	0.641823	0.5213
IP2YRPR	0.007922	0.000564	14.04181	0.0000
ERA2YRPR	-0.070170	0.021611	-3.247045	0.0013
SVLRDUM2YRPR	0.066039	0.009522	6.935251	0.0000
SVCLDUM2YRPR	0.033541	0.003701	9.061814	0.0000
DIVWIN	0.174908	0.065479	2.671204	0.0078
SOBB2YRPR	0.177044	0.041314	4.285292	0.0000
LEAGUE	0.093960	0.047560	1.975626	0.0488
YR91	0.364604	0.077443	4.708049	0.0000
YR92	0.441674	0.074519	5.926973	0.0000
YR93	0.603410	0.072526	8.319874	0.0000
YR94	0.573130	0.074378	7.705670	0.0000

R-squared	0.718577	Mean dependent var	6.883711
Adjusted R-squared	0.708961	S.D. dependent var	0.917014
S.E. of regression	0.494711	Akaike info criterion	1.464845
Sum squared resid	107.4403	Schwarz criterion	1.609734
Log likelihood	-317.2522	F-statistic	74.72859
Durbin-Watson stat	1.892239	Prob(F-statistic)	0.000000

Unrestricted Regression for FA 1990-1994 2 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/27/05 Time: 22:10
Sample: 377 775
Included observations: 399

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.115870	0.322849	22.04089	0.0000
EXPCUR	-0.024725	0.010525	-2.349071	0.0193
THROWS	0.025215	0.074713	0.337494	0.7359
LONGREL	-0.545285	0.122073	-4.466889	0.0000
CLOSER	-0.510208	0.128364	-3.974698	0.0001
IP2YRPR	0.005338	0.000757	7.051580	0.0000
ERA2YRPR	-0.242567	0.051098	-4.747088	0.0000
SVLRDUM2YRPR	0.046253	0.012948	3.572111	0.0004
SVCLDUM2YRPR	0.030487	0.005476	5.567623	0.0000
DIVWIN	-0.003698	0.085992	-0.043010	0.9657
SOBB2YRPR	0.087501	0.038563	2.269059	0.0238
LEAGUE	-0.002248	0.071476	-0.031455	0.9749
YR91	0.419739	0.108621	3.864267	0.0001
YR92	0.595942	0.110825	5.377313	0.0000
YR93	0.542857	0.109425	4.961004	0.0000
YR94	0.450826	0.107372	4.198718	0.0000

R-squared	0.488785	Mean dependent var	7.192449
Adjusted R-squared	0.468764	S.D. dependent var	0.937203
S.E. of regression	0.683089	Akaike info criterion	2.114892
Sum squared resid	178.7120	Schwarz criterion	2.274850
Log likelihood	-405.9209	F-statistic	24.41304
Durbin-Watson stat	2.141749	Prob(F-statistic)	0.000000

Restricted Regression for 1990-1994 3 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/27/05 Time: 22:12
Sample: 1000 1853
Included observations: 854

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.535950	0.212147	30.80863	0.0000
EXPCUR	0.017074	0.005953	2.867928	0.0042
THROWS	0.049556	0.044995	1.101354	0.2711
LONGREL	-0.363103	0.073946	-4.910363	0.0000
CLOSER	-0.205788	0.079123	-2.600862	0.0095
IP3YRPR	0.007847	0.000507	15.48768	0.0000
ERA3YRPR	-0.343847	0.038853	-8.849960	0.0000
SVLRDUM3YRPR	0.047416	0.007739	6.127013	0.0000
SVCLDUM3YRPR	0.033877	0.003637	9.313520	0.0000
DIVWIN	0.067917	0.055103	1.232553	0.2181
SOBB3YRPR	0.065192	0.028586	2.280526	0.0228
LEAGUE	0.036219	0.042736	0.847514	0.3970
YR91	0.376525	0.068060	5.532272	0.0000
YR92	0.470806	0.067145	7.011765	0.0000
YR93	0.527417	0.065855	8.008787	0.0000
YR94	0.495906	0.065961	7.518199	0.0000

R-squared	0.584321	Mean dependent var	7.027957
Adjusted R-squared	0.576880	S.D. dependent var	0.938696
S.E. of regression	0.610600	Akaike info criterion	1.869807
Sum squared resid	312.4331	Schwarz criterion	1.958799
Log likelihood	-782.4075	F-statistic	78.53191
Durbin-Watson stat	2.033860	Prob(F-statistic)	0.000000

Unrestricted Regression for AE 1990-1994 3 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/27/05 Time: 22:15
Sample: 624 1078
Included observations: 455

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.324517	0.263215	20.22878	0.0000
EXPCUR	0.123599	0.019906	6.209204	0.0000
THROWS	-0.000600	0.050949	-0.011777	0.9906
LONGREL	-0.261074	0.083970	-3.109117	0.0020
CLOSER	0.017779	0.088503	0.200882	0.8409
IP3YRPR	0.008285	0.000607	13.64289	0.0000
ERA3YRPR	-0.253344	0.044436	-5.701303	0.0000
SVLRDUM3YRPR	0.056413	0.010628	5.308121	0.0000
SVCLDUM3YRPR	0.033077	0.004267	7.752221	0.0000
DIVWIN	0.132233	0.066275	1.995211	0.0466
SOBB3YRPR	0.154732	0.046454	3.330836	0.0009
LEAGUE	0.067774	0.048335	1.402182	0.1616
YR91	0.347710	0.078629	4.422172	0.0000
YR92	0.422042	0.075453	5.593432	0.0000
YR93	0.599492	0.073578	8.147699	0.0000
YR94	0.605140	0.075268	8.039810	0.0000

R-squared	0.711812	Mean dependent var	6.883711
Adjusted R-squared	0.701965	S.D. dependent var	0.917014
S.E. of regression	0.500622	Akaike info criterion	1.488600
Sum squared resid	110.0231	Schwarz criterion	1.633490
Log likelihood	-322.6565	F-statistic	72.28726
Durbin-Watson stat	1.873689	Prob(F-statistic)	0.000000

Unrestricted Regression for FA 1990-1994 3 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/27/05 Time: 22:17
Sample: 377 775
Included observations: 399

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.648054	0.355946	21.48654	0.0000
EXPCUR	-0.018894	0.010364	-1.823138	0.0691
THROWS	0.060261	0.074002	0.814307	0.4160
LONGREL	-0.503460	0.120883	-4.164863	0.0000
CLOSER	-0.497742	0.130743	-3.807038	0.0002
IP3YRPR	0.005875	0.000812	7.236464	0.0000
ERA3YRPR	-0.409298	0.064580	-6.337895	0.0000
SVLRDUM3YRPR	0.033220	0.010977	3.026210	0.0026
SVCLDUM3YRPR	0.030465	0.005760	5.289279	0.0000
DIVWIN	-0.001903	0.085109	-0.022355	0.9822
SOBB3YRPR	0.062372	0.038577	1.616811	0.1067
LEAGUE	-0.007112	0.070796	-0.100455	0.9200
YR91	0.387907	0.107317	3.614579	0.0003
YR92	0.554201	0.109718	5.051132	0.0000
YR93	0.451215	0.108716	4.150393	0.0000
YR94	0.387115	0.106181	3.645795	0.0003

R-squared	0.500463	Mean dependent var	7.192449
Adjusted R-squared	0.480898	S.D. dependent var	0.937203
S.E. of regression	0.675242	Akaike info criterion	2.091784
Sum squared resid	174.6297	Schwarz criterion	2.251742
Log likelihood	-401.3109	F-statistic	25.58063
Durbin-Watson stat	2.190124	Prob(F-statistic)	0.000000

Restricted Regression for 1995-2003 1 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/27/05 Time: 22:20
Sample: 1854 3554
Included observations: 1701

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.685193	0.096237	59.07473	0.0000
EXPCUR	0.049576	0.005068	9.781221	0.0000
THROWS	0.068637	0.037911	1.810477	0.0704
LONGREL	-0.430367	0.051496	-8.357269	0.0000
CLOSER	-0.161439	0.058896	-2.741078	0.0062
IP1YRPR	0.007630	0.000358	21.31602	0.0000
ERA1YRPR	-0.021408	0.005424	-3.946942	0.0001
SVLRDUM1YRPR	0.025016	0.005525	4.528157	0.0000
SVCLDUM1YRPR	0.026846	0.002744	9.783471	0.0000
DIVWIN	0.146475	0.036815	3.978673	0.0001
SOBB1YRPR	0.137519	0.019125	7.190542	0.0000
LEAGUE	-0.008621	0.033560	-0.256880	0.7973
YR96	0.047069	0.077115	0.610380	0.5417
YR97	0.083247	0.073729	1.129096	0.2590
YR98	0.156775	0.072900	2.150544	0.0317
YR99	0.333337	0.072981	4.567479	0.0000
YR00	0.416838	0.072689	5.734553	0.0000
YR01	0.599599	0.071286	8.411136	0.0000
YR02	0.757681	0.071192	10.64285	0.0000
YR03	0.662234	0.073894	8.961944	0.0000

R-squared	0.572368	Mean dependent var	7.392473
Adjusted R-squared	0.567535	S.D. dependent var	1.037117
S.E. of regression	0.682030	Akaike info criterion	2.084201
Sum squared resid	781.9416	Schwarz criterion	2.148151
Log likelihood	-1752.613	F-statistic	118.4185
Durbin-Watson stat	1.827760	Prob(F-statistic)	0.000000

Unrestricted Regression for AE 1995-2003 1 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/27/05 Time: 22:24
Sample: 1079 2011
Included observations: 933

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.996160	0.112950	44.23338	0.0000
EXPCUR	0.267786	0.014204	18.85257	0.0000
THROWS	0.009585	0.042897	0.223446	0.8232
LONGREL	-0.384791	0.054850	-7.015356	0.0000
CLOSER	-0.193624	0.063811	-3.034347	0.0025
IP1YRPR	0.006398	0.000389	16.43577	0.0000
ERA1YRPR	-0.015020	0.004956	-3.030854	0.0025
SVLRDUM1YRPR	0.029204	0.006576	4.440989	0.0000
SVCLDUM1YRPR	0.031695	0.003269	9.696864	0.0000
DIVWIN	0.149903	0.041790	3.587088	0.0004
SOBB1YRPR	0.103479	0.021000	4.927533	0.0000
LEAGUE	-0.040666	0.036806	-1.104867	0.2695
YR96	-0.050107	0.082838	-0.604883	0.5454
YR97	-0.043825	0.078637	-0.557311	0.5775
YR98	0.024152	0.078868	0.306234	0.7595
YR99	0.137885	0.078598	1.754312	0.0797
YR00	0.247714	0.076913	3.220692	0.0013
YR01	0.377311	0.076952	4.903166	0.0000
YR02	0.539991	0.076743	7.036376	0.0000
YR03	0.525714	0.082750	6.353023	0.0000

R-squared	0.682861	Mean dependent var	7.198616
Adjusted R-squared	0.676261	S.D. dependent var	0.962631
S.E. of regression	0.547718	Akaike info criterion	1.655092
Sum squared resid	273.8959	Schwarz criterion	1.758810
Log likelihood	-752.1006	F-statistic	103.4664
Durbin-Watson stat	1.834760	Prob(F-statistic)	0.000000

Restricted Regression for FA 1995-2003 1 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/27/05 Time: 22:26
Sample: 776 1543
Included observations: 768

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.006146	0.179531	33.45471	0.0000
EXPCUR	-0.003715	0.009118	-0.407428	0.6838
THROWS	0.130096	0.058383	2.228336	0.0262
LONGREL	-0.467351	0.086012	-5.433530	0.0000
CLOSER	-0.144891	0.095411	-1.518601	0.1293
IP1YRPR	0.007895	0.000586	13.46477	0.0000
ERA1YRPR	-0.034144	0.012514	-2.728414	0.0065
SVLRDUM1YRPR	0.018863	0.008157	2.312338	0.0210
SVCLDUM1YRPR	0.022521	0.004122	5.464144	0.0000
DIVWIN	0.084478	0.057610	1.466374	0.1430
SOBB1YRPR	0.158790	0.031099	5.105905	0.0000
LEAGUE	0.053106	0.053794	0.987209	0.3239
YR96	0.151481	0.124963	1.212203	0.2258
YR97	0.243020	0.120635	2.014511	0.0443
YR98	0.332650	0.117570	2.829393	0.0048
YR99	0.554235	0.118210	4.688580	0.0000
YR00	0.623042	0.120959	5.150849	0.0000
YR01	0.887680	0.115375	7.693867	0.0000
YR02	1.001075	0.115460	8.670301	0.0000
YR03	0.798838	0.114998	6.946544	0.0000

R-squared	0.548635	Mean dependent var	7.627980
Adjusted R-squared	0.537170	S.D. dependent var	1.075528
S.E. of regression	0.731699	Akaike info criterion	2.238802
Sum squared resid	400.4668	Schwarz criterion	2.359734
Log likelihood	-839.6998	F-statistic	47.85236
Durbin-Watson stat	1.967473	Prob(F-statistic)	0.000000

Restricted Regression for 1995-2003 2 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/27/05 Time: 22:28
Sample: 1854 3554
Included observations: 1701

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.771319	0.139188	48.64864	0.0000
EXPCUR	0.038003	0.004924	7.718583	0.0000
THROWS	0.088333	0.036320	2.432109	0.0151
LONGREL	-0.418122	0.051235	-8.160800	0.0000
CLOSER	-0.203878	0.058829	-3.465591	0.0005
IP2YRPR	0.007832	0.000396	19.76383	0.0000
ERA2YRPR	-0.275893	0.018675	-14.77329	0.0000
SVLRDUM2YRPR	0.013836	0.005608	2.467289	0.0137
SVCLDUM2YRPR	0.021903	0.002851	7.682192	0.0000
DIVWIN	0.108605	0.035268	3.079402	0.0021
SOBB2YRPR	0.096625	0.023742	4.069776	0.0000
LEAGUE	-0.031921	0.032098	-0.994475	0.3201
YR96	0.205819	0.073750	2.790769	0.0053
YR97	0.289278	0.070557	4.099903	0.0000
YR98	0.394036	0.069874	5.639267	0.0000
YR99	0.535760	0.069786	7.677174	0.0000
YR00	0.600082	0.069523	8.631450	0.0000
YR01	0.810981	0.068257	11.88135	0.0000
YR02	0.939380	0.068650	13.68363	0.0000
YR03	0.806312	0.071169	11.32954	0.0000

R-squared	0.609836	Mean dependent var	7.392473
Adjusted R-squared	0.605426	S.D. dependent var	1.037117
S.E. of regression	0.651466	Akaike info criterion	1.992505
Sum squared resid	713.4294	Schwarz criterion	2.056455
Log likelihood	-1674.625	F-statistic	138.2868
Durbin-Watson stat	1.869914	Prob(F-statistic)	0.000000

Unrestricted Regression for AE 1995-2003 2 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/27/05 Time: 22:29
Sample: 1079 2011
Included observations: 933

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.778985	0.159187	36.30314	0.0000
EXPCUR	0.241990	0.013313	18.17765	0.0000
THROWS	0.036318	0.039868	0.910974	0.3625
LONGREL	-0.415425	0.051443	-8.075397	0.0000
CLOSER	-0.262089	0.060310	-4.345683	0.0000
IP2YRPR	0.006745	0.000409	16.47184	0.0000
ERA2YRPR	-0.212676	0.020144	-10.55790	0.0000
SVLRDUM2YRPR	0.027255	0.006641	4.103809	0.0000
SVCLDUM2YRPR	0.026346	0.003405	7.736706	0.0000
DIVWIN	0.120569	0.038901	3.099381	0.0020
SOBB2YRPR	0.125346	0.027431	4.569547	0.0000
LEAGUE	-0.074218	0.034243	-2.167390	0.0305
YR96	0.113920	0.077134	1.476910	0.1400
YR97	0.147456	0.073072	2.017945	0.0439
YR98	0.250195	0.073416	3.407888	0.0007
YR99	0.354574	0.073260	4.839930	0.0000
YR00	0.425580	0.071576	5.945845	0.0000
YR01	0.613093	0.071716	8.548853	0.0000
YR02	0.719390	0.072052	9.984377	0.0000
YR03	0.672090	0.077404	8.682849	0.0000

R-squared	0.726863	Mean dependent var	7.198616
Adjusted R-squared	0.721179	S.D. dependent var	0.962631
S.E. of regression	0.508303	Akaike info criterion	1.505724
Sum squared resid	235.8934	Schwarz criterion	1.609441
Log likelihood	-682.4204	F-statistic	127.8761
Durbin-Watson stat	1.922011	Prob(F-statistic)	0.000000

Unrestricted Regression for FA 1995-2003 2 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/27/05 Time: 22:31
Sample: 776 1543
Included observations: 768

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.058493	0.240759	29.31766	0.0000
EXPCUR	-0.009118	0.009049	-1.007626	0.3140
THROWS	0.142539	0.057629	2.473399	0.0136
LONGREL	-0.398948	0.092215	-4.326305	0.0000
CLOSER	-0.139444	0.102137	-1.365264	0.1726
IP2YRPR	0.007935	0.000688	11.53297	0.0000
ERA2YRPR	-0.285221	0.030575	-9.328436	0.0000
SVLRDUM2YRPR	0.002180	0.008342	0.261347	0.7939
SVCLDUM2YRPR	0.018713	0.004269	4.383544	0.0000
DIVWIN	0.039696	0.056635	0.700912	0.4836
SOBB2YRPR	0.107479	0.035955	2.989296	0.0029
LEAGUE	0.035394	0.052833	0.669916	0.5031
YR96	0.293214	0.122747	2.388759	0.0172
YR97	0.428736	0.118728	3.611085	0.0003
YR98	0.554995	0.115832	4.791383	0.0000
YR99	0.703031	0.115996	6.060811	0.0000
YR00	0.779194	0.118591	6.570421	0.0000
YR01	1.030733	0.113421	9.087661	0.0000
YR02	1.149795	0.114411	10.04967	0.0000
YR03	0.912261	0.114002	8.002138	0.0000

R-squared	0.565043	Mean dependent var	7.627980
Adjusted R-squared	0.553995	S.D. dependent var	1.075528
S.E. of regression	0.718277	Akaike info criterion	2.201772
Sum squared resid	385.9090	Schwarz criterion	2.322704
Log likelihood	-825.4806	F-statistic	51.14262
Durbin-Watson stat	1.958922	Prob(F-statistic)	0.000000

Restricted Regression for 1995-2003 3 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/27/05 Time: 22:33
Sample: 1854 3554
Included observations: 1701

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.244182	0.155372	46.62476	0.0000
EXPCUR	0.023422	0.005024	4.661680	0.0000
THROWS	0.122265	0.036294	3.368778	0.0008
LONGREL	-0.434840	0.051277	-8.480249	0.0000
CLOSER	-0.214084	0.059255	-3.612952	0.0003
IP3YRPR	0.008264	0.000424	19.49768	0.0000
ERA3YRPR	-0.390723	0.023093	-16.91972	0.0000
SVLRDUM3YRPR	0.014113	0.005848	2.413544	0.0159
SVCLDUM3YRPR	0.022491	0.003096	7.264800	0.0000
DIVWIN	0.072668	0.035263	2.060729	0.0395
SOBB3YRPR	0.064664	0.026833	2.409888	0.0161
LEAGUE	-0.012414	0.031934	-0.388757	0.6975
YR96	0.189506	0.073431	2.580745	0.0099
YR97	0.415419	0.070662	5.878993	0.0000
YR98	0.553222	0.070213	7.879166	0.0000
YR99	0.682203	0.070112	9.730181	0.0000
YR00	0.745402	0.069787	10.68108	0.0000
YR01	0.949913	0.068773	13.81232	0.0000
YR02	1.065793	0.069095	15.42496	0.0000
YR03	0.962201	0.071623	13.43428	0.0000

R-squared	0.613712	Mean dependent var	7.392473
Adjusted R-squared	0.609346	S.D. dependent var	1.037117
S.E. of regression	0.648222	Akaike info criterion	1.982520
Sum squared resid	706.3418	Schwarz criterion	2.046471
Log likelihood	-1666.133	F-statistic	140.5622
Durbin-Watson stat	1.867399	Prob(F-statistic)	0.000000

Unrestricted Regression for AE 1995-2003 3 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/27/05 Time: 22:35
Sample: 1079 2011
Included observations: 933

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.982402	0.175177	34.15054	0.0000
EXPCUR	0.218281	0.013643	16.00002	0.0000
THROWS	0.085934	0.040401	2.127019	0.0337
LONGREL	-0.435273	0.052459	-8.297465	0.0000
CLOSER	-0.271142	0.061833	-4.385068	0.0000
IP3YRPR	0.007350	0.000459	16.00684	0.0000
ERA3YRPR	-0.272606	0.024210	-11.26001	0.0000
SVLRDUM3YRPR	0.035052	0.007814	4.485525	0.0000
SVCLDUM3YRPR	0.028495	0.004065	7.009255	0.0000
DIVWIN	0.113078	0.039239	2.881799	0.0040
SOBB3YRPR	0.127966	0.031802	4.023801	0.0001
LEAGUE	-0.038584	0.034552	-1.116681	0.2644
YR96	0.084091	0.077697	1.082301	0.2794
YR97	0.241972	0.074101	3.265445	0.0011
YR98	0.366407	0.074767	4.900632	0.0000
YR99	0.456687	0.074809	6.104694	0.0000
YR00	0.522575	0.072802	7.178010	0.0000
YR01	0.718771	0.073175	9.822599	0.0000
YR02	0.826696	0.073649	11.22476	0.0000
YR03	0.801689	0.078725	10.18343	0.0000

R-squared	0.723084	Mean dependent var	7.198616
Adjusted R-squared	0.717321	S.D. dependent var	0.962631
S.E. of regression	0.511807	Akaike info criterion	1.519465
Sum squared resid	239.1572	Schwarz criterion	1.623182
Log likelihood	-688.8306	F-statistic	125.4752
Durbin-Watson stat	1.919948	Prob(F-statistic)	0.000000

Unrestricted Regression for FA 1995-2003 3 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/27/05 Time: 22:37
Sample: 776 1543
Included observations: 768

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.913465	0.273468	28.93748	0.0000
EXPCUR	-0.016987	0.009082	-1.870480	0.0618
THROWS	0.138427	0.057360	2.413306	0.0160
LONGREL	-0.449213	0.091920	-4.887003	0.0000
CLOSER	-0.165804	0.102749	-1.613677	0.1070
IP3YRPR	0.007730	0.000713	10.84745	0.0000
ERA3YRPR	-0.468110	0.040253	-11.62930	0.0000
SVLRDUM3YRPR	-0.000486	0.008086	-0.060098	0.9521
SVCLDUM3YRPR	0.017139	0.004433	3.865997	0.0001
DIVWIN	-0.023768	0.056456	-0.421000	0.6739
SOBB3YRPR	0.045406	0.040486	1.121529	0.2624
LEAGUE	0.009708	0.052648	0.184397	0.8538
YR96	0.304893	0.122048	2.498143	0.0127
YR97	0.586976	0.118844	4.939028	0.0000
YR98	0.750620	0.116034	6.468965	0.0000
YR99	0.882769	0.116003	7.609880	0.0000
YR00	0.991039	0.118879	8.336508	0.0000
YR01	1.208918	0.114109	10.59441	0.0000
YR02	1.301269	0.114829	11.33225	0.0000
YR03	1.110970	0.115192	9.644508	0.0000

R-squared	0.570573	Mean dependent var	7.627980
Adjusted R-squared	0.559665	S.D. dependent var	1.075528
S.E. of regression	0.713696	Akaike info criterion	2.188978
Sum squared resid	381.0029	Schwarz criterion	2.309910
Log likelihood	-820.5675	F-statistic	52.30812
Durbin-Watson stat	1.965601	Prob(F-statistic)	0.000000

APPENDIX III

Variation Model Regression Output

Restricted Regression for 1984-1989 1 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 09:52
Sample: 1 999
Included observations: 999

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.364992	0.095031	45.93220	0.0000
EXPCUR	0.038890	0.004488	8.664814	0.0000
THROWS	0.023533	0.037895	0.621009	0.5347
LONGREL	-0.219828	0.060605	-3.627233	0.0003
CLOSER	-0.104878	0.059332	-1.767638	0.0774
IP1YRPR	0.005455	0.000331	16.50257	0.0000
LGERA1YRPR	0.147230	0.060764	2.422970	0.0156
SVLRDUM1YRPR	0.025858	0.010434	2.478271	0.0134
SVCLDUM1YRPR	0.028651	0.003098	9.249651	0.0000
DIVWIN	0.212131	0.044149	4.804830	0.0000
SOBB1YRPR	0.094505	0.027116	3.485226	0.0005
LEAGUE	0.101185	0.035914	2.817393	0.0049
YR85	0.099969	0.059883	1.669410	0.0954
YR86	0.147066	0.059913	2.454684	0.0143
YR87	0.265572	0.062769	4.230920	0.0000
YR88	0.376454	0.062888	5.986055	0.0000
YR89	0.423401	0.061143	6.924805	0.0000

R-squared	0.521439	Mean dependent var	6.108277
Adjusted R-squared	0.513641	S.D. dependent var	0.793060
S.E. of regression	0.553075	Akaike info criterion	1.670226
Sum squared resid	300.3863	Schwarz criterion	1.753724
Log likelihood	-817.2777	F-statistic	66.87396
Durbin-Watson stat	2.003125	Prob(F-statistic)	0.000000

Unrestricted Regression for AE 1984-1989 1 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:00
Sample: 1 623
Included observations: 623

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.819786	0.098649	38.72111	0.0000
EXPCUR	0.140137	0.009956	14.07504	0.0000
THROWS	0.046011	0.038402	1.198142	0.2313
LONGREL	-0.157965	0.061432	-2.571396	0.0104
CLOSER	-0.001323	0.059066	-0.022403	0.9821
IP1YRPR	0.005319	0.000337	15.80262	0.0000
LGERA1YRPR	0.165169	0.057286	2.883237	0.0041
SVLRDUM1YRPR	0.021943	0.009776	2.244631	0.0252
SVCLDUM1YRPR	0.026114	0.003231	8.081180	0.0000
DIVWIN	0.211441	0.047574	4.444442	0.0000
SOBB1YRPR	0.103362	0.027939	3.699558	0.0002
LEAGUE	0.096942	0.036501	2.655871	0.0081
YR85	0.089210	0.058328	1.529472	0.1267
YR86	0.177972	0.058569	3.038667	0.0025
YR87	0.324016	0.063443	5.107179	0.0000
YR88	0.359071	0.064607	5.557799	0.0000
YR89	0.419573	0.065363	6.419129	0.0000

R-squared	0.658085	Mean dependent var	5.995902
Adjusted R-squared	0.649057	S.D. dependent var	0.745155
S.E. of regression	0.441433	Akaike info criterion	1.229326
Sum squared resid	118.0869	Schwarz criterion	1.350333
Log likelihood	-365.9351	F-statistic	72.89808
Durbin-Watson stat	2.062507	Prob(F-statistic)	0.000000

Unrestricted Regression for FA 1984-1989 1 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:01
Sample: 1 376
Included observations: 376

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.103661	0.203907	25.02940	0.0000
EXPCUR	-0.007539	0.009439	-0.798737	0.4250
THROWS	-0.052810	0.072561	-0.727800	0.4672
LONGREL	-0.392126	0.116415	-3.368344	0.0008
CLOSER	-0.332379	0.117306	-2.833423	0.0049
IP1YRPR	0.005021	0.000646	7.777784	0.0000
LGERA1YRPR	0.124775	0.140830	0.885997	0.3762
SVLRDUM1YRPR	0.016178	0.023887	0.677265	0.4987
SVCLDUM1YRPR	0.028577	0.005879	4.860857	0.0000
DIVWIN	0.163088	0.080375	2.029100	0.0432
SOBB1YRPR	0.114826	0.050980	2.252380	0.0249
LEAGUE	0.066612	0.068624	0.970673	0.3324
YR85	0.173777	0.122712	1.416132	0.1576
YR86	0.082548	0.123193	0.670074	0.5032
YR87	0.101948	0.120842	0.843646	0.3994
YR88	0.346924	0.118663	2.923616	0.0037
YR89	0.379933	0.111442	3.409225	0.0007

R-squared	0.438435	Mean dependent var	6.294472
Adjusted R-squared	0.413407	S.D. dependent var	0.834928
S.E. of regression	0.639466	Akaike info criterion	1.987793
Sum squared resid	146.8012	Schwarz criterion	2.165460
Log likelihood	-356.7050	F-statistic	17.51780
Durbin-Watson stat	1.928697	Prob(F-statistic)	0.000000

Restricted Regression for 1984-1989 2 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:05
Sample: 1 999
Included observations: 999

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.976808	0.112861	35.23643	0.0000
EXPCUR	0.035339	0.004467	7.911310	0.0000
THROWS	0.004084	0.037544	0.108777	0.9134
LONGREL	-0.229331	0.063676	-3.601540	0.0003
CLOSER	-0.090268	0.061882	-1.458709	0.1450
IP2YRPR	0.006484	0.000386	16.78992	0.0000
LGERA2YRPR	0.467981	0.085945	5.445143	0.0000
SVLRDUM2YRPR	0.037825	0.012304	3.074316	0.0022
SVCLDUM2YRPR	0.030151	0.003603	8.368394	0.0000
DIVWIN	0.214684	0.043981	4.881328	0.0000
SOBB2YRPR	0.074907	0.033181	2.257509	0.0242
LEAGUE	0.095565	0.035784	2.670635	0.0077
YR85	0.086980	0.059524	1.461256	0.1443
YR86	0.130808	0.059687	2.191585	0.0286
YR87	0.223845	0.062346	3.590370	0.0003
YR88	0.339839	0.062358	5.449822	0.0000
YR89	0.409390	0.060711	6.743273	0.0000

R-squared	0.526242	Mean dependent var	6.108277
Adjusted R-squared	0.518523	S.D. dependent var	0.793060
S.E. of regression	0.550293	Akaike info criterion	1.660138
Sum squared resid	297.3715	Schwarz criterion	1.743637
Log likelihood	-812.2391	F-statistic	68.17420
Durbin-Watson stat	2.016649	Prob(F-statistic)	0.000000

Unrestricted Regression for AE 1984-1989 2 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:06
Sample: 1 623
Included observations: 623

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.451418	0.113943	30.29070	0.0000
EXPCUR	0.124469	0.009944	12.51699	0.0000
THROWS	0.032294	0.037637	0.858042	0.3912
LONGREL	-0.152385	0.063872	-2.385790	0.0173
CLOSER	0.050910	0.061952	0.821772	0.4115
IP2YRPR	0.006696	0.000397	16.84945	0.0000
LGERA2YRPR	0.512885	0.081466	6.295664	0.0000
SVLRDUM2YRPR	0.032854	0.012144	2.705442	0.0070
SVCLDUM2YRPR	0.025240	0.003741	6.747680	0.0000
DIVWIN	0.183068	0.046652	3.924108	0.0001
SOBB2YRPR	0.056837	0.032636	1.741526	0.0821
LEAGUE	0.086282	0.035732	2.414677	0.0160
YR85	0.073659	0.057376	1.283795	0.1997
YR86	0.158770	0.057699	2.751721	0.0061
YR87	0.284846	0.062306	4.571742	0.0000
YR88	0.326628	0.063525	5.141712	0.0000
YR89	0.429209	0.064189	6.686679	0.0000

R-squared	0.669533	Mean dependent var	5.995902
Adjusted R-squared	0.660808	S.D. dependent var	0.745155
S.E. of regression	0.433980	Akaike info criterion	1.195269
Sum squared resid	114.1330	Schwarz criterion	1.316276
Log likelihood	-355.3264	F-statistic	76.73563
Durbin-Watson stat	2.079229	Prob(F-statistic)	0.000000

Unrestricted Regression for FA 1984-1989 2 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:08
Sample: 1 376
Included observations: 376

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.782025	0.238521	20.04869	0.0000
EXPCUR	-0.008394	0.009622	-0.872328	0.3836
THROWS	-0.084392	0.073420	-1.149446	0.2511
LONGREL	-0.405809	0.124429	-3.261375	0.0012
CLOSER	-0.381427	0.122323	-3.118186	0.0020
IP2YRPR	0.005269	0.000746	7.061804	0.0000
LGERA2YRPR	0.380302	0.192747	1.973056	0.0493
SVLRDUM2YRPR	0.018944	0.025297	0.748883	0.4544
SVCLDUM2YRPR	0.031023	0.006776	4.578100	0.0000
DIVWIN	0.217371	0.081661	2.661878	0.0081
SOBB2YRPR	0.154928	0.066840	2.317898	0.0210
LEAGUE	0.060052	0.070738	0.848926	0.3965
YR85	0.162976	0.124383	1.310280	0.1909
YR86	0.070718	0.125416	0.563865	0.5732
YR87	0.058056	0.122905	0.472360	0.6370
YR88	0.301285	0.120065	2.509355	0.0125
YR89	0.335408	0.113316	2.959946	0.0033

R-squared	0.418729	Mean dependent var	6.294472
Adjusted R-squared	0.392822	S.D. dependent var	0.834928
S.E. of regression	0.650589	Akaike info criterion	2.022283
Sum squared resid	151.9527	Schwarz criterion	2.199950
Log likelihood	-363.1892	F-statistic	16.16323
Durbin-Watson stat	1.958803	Prob(F-statistic)	0.000000

Restricted Regression for 1984-1989 3 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:10
Sample: 1 999
Included observations: 999

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.867083	0.121706	31.77405	0.0000
EXPCUR	0.024100	0.004631	5.204137	0.0000
THROWS	-0.010877	0.038128	-0.285279	0.7755
LONGREL	-0.227714	0.065254	-3.489638	0.0005
CLOSER	-0.056610	0.063217	-0.895494	0.3707
IP3YRPR	0.007014	0.000430	16.29364	0.0000
LGERA3YRPR	0.577237	0.099029	5.828975	0.0000
SVLRDUM3YRPR	0.031676	0.012391	2.556344	0.0107
SVCLDUM3YRPR	0.028361	0.004000	7.089958	0.0000
DIVWIN	0.231170	0.044524	5.192072	0.0000
SOBB3YRPR	0.099196	0.037259	2.662369	0.0079
LEAGUE	0.089285	0.036406	2.452475	0.0144
YR85	0.095104	0.060485	1.572366	0.1162
YR86	0.113691	0.060735	1.871909	0.0615
YR87	0.189797	0.063487	2.989534	0.0029
YR88	0.303707	0.063554	4.778754	0.0000
YR89	0.350923	0.061893	5.669875	0.0000

R-squared	0.510707	Mean dependent var	6.108277
Adjusted R-squared	0.502735	S.D. dependent var	0.793060
S.E. of regression	0.559242	Akaike info criterion	1.692403
Sum squared resid	307.1225	Schwarz criterion	1.775901
Log likelihood	-828.3552	F-statistic	64.06107
Durbin-Watson stat	2.019201	Prob(F-statistic)	0.000000

Unrestricted Regression for AE 1984-1989 3 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:12
Sample: 1 623
Included observations: 623

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.349295	0.121824	27.49299	0.0000
EXPCUR	0.100017	0.010458	9.563743	0.0000
THROWS	0.007476	0.037976	0.196863	0.8440
LONGREL	-0.149741	0.065063	-2.301462	0.0217
CLOSER	0.051319	0.063537	0.807700	0.4196
IP3YRPR	0.007029	0.000453	15.51253	0.0000
LGERA3YRPR	0.669832	0.095473	7.015900	0.0000
SVLRDUM3YRPR	0.025630	0.011976	2.140071	0.0327
SVCLDUM3YRPR	0.025377	0.004275	5.935634	0.0000
DIVWIN	0.204935	0.046877	4.371739	0.0000
SOBB3YRPR	0.108748	0.038013	2.860856	0.0044
LEAGUE	0.079806	0.036141	2.208213	0.0276
YR85	0.066252	0.057766	1.146900	0.2519
YR86	0.122965	0.058377	2.106383	0.0356
YR87	0.231359	0.063241	3.658381	0.0003
YR88	0.277640	0.064478	4.305929	0.0000
YR89	0.347527	0.064822	5.361254	0.0000

R-squared	0.663251	Mean dependent var	5.995902
Adjusted R-squared	0.654360	S.D. dependent var	0.745155
S.E. of regression	0.438085	Akaike info criterion	1.214101
Sum squared resid	116.3026	Schwarz criterion	1.335107
Log likelihood	-361.1923	F-statistic	74.59756
Durbin-Watson stat	2.035185	Prob(F-statistic)	0.000000

Unrestricted Regression for FA 1984-1989 3 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:14
Sample: 1 376
Included observations: 376

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.780995	0.260160	18.37712	0.0000
EXPCUR	-0.013438	0.010178	-1.320394	0.1875
THROWS	-0.081313	0.076756	-1.059368	0.2901
LONGREL	-0.434172	0.131514	-3.301338	0.0011
CLOSER	-0.356371	0.127796	-2.788583	0.0056
IP3YRPR	0.005438	0.000840	6.469528	0.0000
LGERA3YRPR	0.390204	0.215741	1.808670	0.0713
SVLRDUM3YRPR	0.014738	0.026930	0.547289	0.5845
SVCLDUM3YRPR	0.027399	0.007473	3.666224	0.0003
DIVWIN	0.232843	0.084818	2.745223	0.0064
SOBB3YRPR	0.158585	0.072175	2.197218	0.0286
LEAGUE	0.052072	0.073710	0.706440	0.4804
YR85	0.197900	0.129883	1.523678	0.1285
YR86	0.094126	0.130730	0.720003	0.4720
YR87	0.071218	0.127948	0.556618	0.5781
YR88	0.311808	0.125065	2.493177	0.0131
YR89	0.327490	0.118325	2.767718	0.0059

R-squared	0.368882	Mean dependent var	6.294472
Adjusted R-squared	0.340754	S.D. dependent var	0.834928
S.E. of regression	0.677911	Akaike info criterion	2.104558
Sum squared resid	164.9834	Schwarz criterion	2.282226
Log likelihood	-378.6570	F-statistic	13.11447
Durbin-Watson stat	1.944676	Prob(F-statistic)	0.000000

Restricted Regression for 1990-1994 1 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:19
Sample: 1000 1853
Included observations: 854

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.087775	0.118143	43.06460	0.0000
EXPCUR	0.034263	0.006079	5.636506	0.0000
THROWS	0.027613	0.047013	0.587351	0.5571
LONGREL	-0.452453	0.073197	-6.181322	0.0000
CLOSER	-0.228138	0.077409	-2.947185	0.0033
IP1YRPR	0.006467	0.000433	14.93321	0.0000
LGERA1YRPR	0.223370	0.054057	4.132152	0.0000
SVLRDUM1YRPR	0.053663	0.007597	7.063824	0.0000
SVCLDUM1YRPR	0.032089	0.003215	9.979849	0.0000
DIVWIN	0.057677	0.057556	1.002099	0.3166
SOBB1YRPR	0.056372	0.019016	2.964508	0.0031
LEAGUE	0.080268	0.044122	1.819235	0.0692
YR91	0.394901	0.071177	5.548135	0.0000
YR92	0.498848	0.069960	7.130476	0.0000
YR93	0.564776	0.068783	8.210993	0.0000
YR94	0.442412	0.069025	6.409481	0.0000

R-squared	0.548553	Mean dependent var	7.027957
Adjusted R-squared	0.540472	S.D. dependent var	0.938696
S.E. of regression	0.636328	Akaike info criterion	1.952352
Sum squared resid	339.3174	Schwarz criterion	2.041344
Log likelihood	-817.6545	F-statistic	67.88344
Durbin-Watson stat	1.982980	Prob(F-statistic)	0.000000

Unrestricted Regression for AE 1990-1994 1 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:21
Sample: 624 1078
Included observations: 455

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.132159	0.146709	28.16564	0.0000
EXPCUR	0.178031	0.019545	9.108572	0.0000
THROWS	0.007713	0.052295	0.147491	0.8828
LONGREL	-0.285581	0.082302	-3.469935	0.0006
CLOSER	0.070741	0.085471	0.827667	0.4083
IP1YRPR	0.007155	0.000530	13.48715	0.0000
LGERA1YRPR	0.184500	0.062535	2.950369	0.0033
SVLRDUM1YRPR	0.050701	0.007685	6.596983	0.0000
SVCLDUM1YRPR	0.025864	0.003474	7.445231	0.0000
DIVWIN	0.122358	0.067713	1.807002	0.0714
SOBB1YRPR	0.106984	0.032106	3.332230	0.0009
LEAGUE	0.095595	0.049036	1.949481	0.0519
YR91	0.374637	0.080368	4.661524	0.0000
YR92	0.409796	0.076914	5.328002	0.0000
YR93	0.567218	0.075380	7.524784	0.0000
YR94	0.478292	0.076711	6.234960	0.0000

R-squared	0.699905	Mean dependent var	6.883711
Adjusted R-squared	0.689651	S.D. dependent var	0.917014
S.E. of regression	0.510859	Akaike info criterion	1.529085
Sum squared resid	114.5689	Schwarz criterion	1.673975
Log likelihood	-331.8669	F-statistic	68.25793
Durbin-Watson stat	1.946337	Prob(F-statistic)	0.000000

Unrestricted Regression for FA 1990-1994 1 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:23
Sample: 377 775
Included observations: 399

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.972362	0.195055	30.61879	0.0000
EXPCUR	-0.016524	0.010545	-1.567003	0.1179
THROWS	-0.012264	0.075263	-0.162951	0.8706
LONGREL	-0.611471	0.114962	-5.318888	0.0000
CLOSER	-0.580381	0.125076	-4.640216	0.0000
IP1YRPR	0.004913	0.000656	7.487855	0.0000
LGERA1YRPR	0.273531	0.084289	3.245142	0.0013
SVLRDUM1YRPR	0.055816	0.013966	3.996724	0.0001
SVCLDUM1YRPR	0.036661	0.005443	6.735238	0.0000
DIVWIN	-0.028637	0.087358	-0.327812	0.7432
SOBB1YRPR	0.043086	0.025151	1.713086	0.0875
LEAGUE	0.047789	0.071715	0.666377	0.5056
YR91	0.392088	0.110456	3.549710	0.0004
YR92	0.631805	0.112116	5.635302	0.0000
YR93	0.549238	0.111070	4.944975	0.0000
YR94	0.419465	0.109846	3.818652	0.0002

R-squared	0.476236	Mean dependent var	7.192449
Adjusted R-squared	0.455723	S.D. dependent var	0.937203
S.E. of regression	0.691423	Akaike info criterion	2.139143
Sum squared resid	183.0990	Schwarz criterion	2.299101
Log likelihood	-410.7590	F-statistic	23.21635
Durbin-Watson stat	2.022979	Prob(F-statistic)	0.000000

Restricted Regression for 1990-1994 2 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:26
Sample: 1000 1853
Included observations: 854

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.639921	0.134424	34.51698	0.0000
EXPCUR	0.023889	0.005991	3.987514	0.0001
THROWS	0.034715	0.045862	0.756945	0.4493
LONGREL	-0.399718	0.075001	-5.329518	0.0000
CLOSER	-0.199436	0.079115	-2.520848	0.0119
IP2YRPR	0.007543	0.000476	15.84352	0.0000
LGERA2YRPR	0.465200	0.080456	5.782008	0.0000
SVLRDUM2YRPR	0.060689	0.008291	7.319681	0.0000
SVCLDUM2YRPR	0.033352	0.003402	9.802923	0.0000
DIVWIN	0.083928	0.056044	1.497551	0.1346
SOBB2YRPR	0.084299	0.028352	2.973279	0.0030
LEAGUE	0.054451	0.043409	1.254393	0.2100
YR91	0.355363	0.070209	5.061498	0.0000
YR92	0.465567	0.068855	6.761577	0.0000
YR93	0.543479	0.067237	8.082984	0.0000
YR94	0.444760	0.068235	6.518090	0.0000

R-squared	0.567677	Mean dependent var	7.027957
Adjusted R-squared	0.559939	S.D. dependent var	0.938696
S.E. of regression	0.622704	Akaike info criterion	1.909066
Sum squared resid	324.9430	Schwarz criterion	1.998058
Log likelihood	-799.1713	F-statistic	73.35773
Durbin-Watson stat	2.002549	Prob(F-statistic)	0.000000

Unrestricted Regression for AE 1990-1994 2 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:31
Sample: 624 1078
Included observations: 455

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.671364	0.161308	22.75992	0.0000
EXPCUR	0.167014	0.018767	8.899334	0.0000
THROWS	-0.014181	0.049554	-0.286173	0.7749
LONGREL	-0.252160	0.080548	-3.130567	0.0019
CLOSER	0.032598	0.085521	0.381167	0.7033
IP2YRPR	0.007950	0.000551	14.42738	0.0000
LGERA2YRPR	0.434602	0.089476	4.857216	0.0000
SVLRDUM2YRPR	0.061155	0.009485	6.447732	0.0000
SVCLDUM2YRPR	0.030036	0.003769	7.969666	0.0000
DIVWIN	0.157900	0.064277	2.456565	0.0144
SOBB2YRPR	0.158163	0.040903	3.866753	0.0001
LEAGUE	0.080650	0.047030	1.714846	0.0871
YR91	0.309067	0.077300	3.998284	0.0001
YR92	0.402284	0.073744	5.455134	0.0000
YR93	0.565673	0.071603	7.900111	0.0000
YR94	0.514967	0.073812	6.976751	0.0000

R-squared	0.726516	Mean dependent var	6.883711
Adjusted R-squared	0.717171	S.D. dependent var	0.917014
S.E. of regression	0.487683	Akaike info criterion	1.436230
Sum squared resid	104.4095	Schwarz criterion	1.581120
Log likelihood	-310.7424	F-statistic	77.74734
Durbin-Watson stat	1.867564	Prob(F-statistic)	0.000000

Unrestricted Regression for FA 1990-1994 2 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:32
Sample: 377 775
Included observations: 399

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.498442	0.223095	24.64621	0.0000
EXPCUR	-0.024183	0.010604	-2.280477	0.0231
THROWS	0.031768	0.075342	0.421654	0.6735
LONGREL	-0.539190	0.122993	-4.383911	0.0000
CLOSER	-0.487665	0.129032	-3.779405	0.0002
IP2YRPR	0.005873	0.000750	7.832469	0.0000
LGERA2YRPR	0.532265	0.131709	4.041209	0.0001
SVLRDUM2YRPR	0.050149	0.013013	3.853731	0.0001
SVCLDUM2YRPR	0.032343	0.005484	5.897561	0.0000
DIVWIN	-0.007345	0.086652	-0.084761	0.9325
SOBB2YRPR	0.078840	0.040579	1.942882	0.0528
LEAGUE	0.004912	0.071976	0.068246	0.9456
YR91	0.364649	0.110991	3.285395	0.0011
YR92	0.566322	0.112636	5.027893	0.0000
YR93	0.504907	0.111051	4.546643	0.0000
YR94	0.375564	0.111008	3.383225	0.0008

R-squared	0.480843	Mean dependent var	7.192449
Adjusted R-squared	0.460511	S.D. dependent var	0.937203
S.E. of regression	0.688375	Akaike info criterion	2.130307
Sum squared resid	181.4882	Schwarz criterion	2.290265
Log likelihood	-408.9962	F-statistic	23.64900
Durbin-Watson stat	2.131774	Prob(F-statistic)	0.000000

Restricted Regression for 1990-1994 3 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:34
Sample: 1000 1853
Included observations: 854

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.325388	0.148226	29.18100	0.0000
EXPCUR	0.015875	0.006035	2.630393	0.0087
THROWS	0.049499	0.045687	1.083431	0.2789
LONGREL	-0.355397	0.075038	-4.736203	0.0000
CLOSER	-0.187587	0.080224	-2.338296	0.0196
IP3YRPR	0.008263	0.000509	16.22864	0.0000
LGERA3YRPR	0.750471	0.103679	7.238418	0.0000
SVLRDUM3YRPR	0.051084	0.007815	6.536280	0.0000
SVCLDUM3YRPR	0.035020	0.003691	9.487894	0.0000
DIVWIN	0.064481	0.055904	1.153428	0.2491
SOBB3YRPR	0.063389	0.029846	2.123886	0.0340
LEAGUE	0.035717	0.043446	0.822106	0.4113
YR91	0.308158	0.070567	4.366916	0.0000
YR92	0.420773	0.069153	6.084705	0.0000
YR93	0.486325	0.067671	7.186566	0.0000
YR94	0.393065	0.069083	5.689762	0.0000

R-squared	0.572217	Mean dependent var	7.027957
Adjusted R-squared	0.564560	S.D. dependent var	0.938696
S.E. of regression	0.619426	Akaike info criterion	1.898510
Sum squared resid	321.5307	Schwarz criterion	1.987501
Log likelihood	-794.6636	F-statistic	74.72914
Durbin-Watson stat	2.008580	Prob(F-statistic)	0.000000

Unrestricted Regression for AE 1990-1994 3 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:37
Sample: 624 1078
Included observations: 455

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.646052	0.179775	20.28124	0.0000
EXPCUR	0.128091	0.020159	6.354166	0.0000
THROWS	-0.000279	0.051643	-0.005410	0.9957
LONGREL	-0.249860	0.085187	-2.933072	0.0035
CLOSER	0.036985	0.089543	0.413037	0.6798
IP3YRPR	0.008536	0.000611	13.96349	0.0000
LGERA3YRPR	0.546946	0.120744	4.529792	0.0000
SVLRDUM3YRPR	0.058374	0.010812	5.399163	0.0000
SVCLDUM3YRPR	0.032917	0.004394	7.490827	0.0000
DIVWIN	0.128462	0.067147	1.913159	0.0564
SOBB3YRPR	0.174917	0.046861	3.732647	0.0002
LEAGUE	0.069428	0.049093	1.414190	0.1580
YR91	0.297589	0.081827	3.636823	0.0003
YR92	0.375282	0.077782	4.824805	0.0000
YR93	0.571298	0.075447	7.572140	0.0000
YR94	0.531152	0.078407	6.774271	0.0000

R-squared	0.704295	Mean dependent var	6.883711
Adjusted R-squared	0.694191	S.D. dependent var	0.917014
S.E. of regression	0.507109	Akaike info criterion	1.514349
Sum squared resid	112.8929	Schwarz criterion	1.659239
Log likelihood	-328.5144	F-statistic	69.70572
Durbin-Watson stat	1.886867	Prob(F-statistic)	0.000000

Unrestricted Regression for FA 1990-1994 3 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:38
Sample: 377 775
Included observations: 399

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.008076	0.252600	19.82609	0.0000
EXPCUR	-0.019575	0.010484	-1.867100	0.0627
THROWS	0.063042	0.074973	0.840859	0.4010
LONGREL	-0.502675	0.122298	-4.110248	0.0000
CLOSER	-0.491052	0.132283	-3.712142	0.0002
IP3YRPR	0.006319	0.000817	7.737812	0.0000
LGERA3YRPR	0.933825	0.169233	5.517970	0.0000
SVLRDUM3YRPR	0.037418	0.011044	3.388246	0.0008
SVCLDUM3YRPR	0.032974	0.005778	5.707359	0.0000
DIVWIN	-0.005504	0.086097	-0.063929	0.9491
SOBB3YRPR	0.041814	0.041412	1.009713	0.3133
LEAGUE	-0.015418	0.071886	-0.214479	0.8303
YR91	0.302015	0.110495	2.733291	0.0066
YR92	0.508645	0.112260	4.530968	0.0000
YR93	0.388498	0.111727	3.477221	0.0006
YR94	0.256013	0.111938	2.287092	0.0227

R-squared	0.488718	Mean dependent var	7.192449
Adjusted R-squared	0.468693	S.D. dependent var	0.937203
S.E. of regression	0.683134	Akaike info criterion	2.115024
Sum squared resid	178.7356	Schwarz criterion	2.274982
Log likelihood	-405.9472	F-statistic	24.40645
Durbin-Watson stat	2.168279	Prob(F-statistic)	0.000000

Restricted Regression for 1995-2003 1 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:42
Sample: 1854 3554
Included observations: 1701

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.229956	0.092370	56.61973	0.0000
EXPCUR	0.049981	0.004976	10.04535	0.0000
THROWS	0.055588	0.037223	1.493390	0.1355
LONGREL	-0.467998	0.050768	-9.218335	0.0000
CLOSER	-0.215100	0.058177	-3.697336	0.0002
IP1YRPR	0.007432	0.000350	21.21418	0.0000
LGERA1YRPR	0.443533	0.049675	8.928786	0.0000
SVLRDUM1YRPR	0.019070	0.005474	3.484083	0.0005
SVCLDUM1YRPR	0.023858	0.002717	8.781009	0.0000
DIVWIN	0.136083	0.036159	3.763429	0.0002
SOBB1YRPR	0.083465	0.019957	4.182230	0.0000
LEAGUE	-0.020061	0.032974	-0.608379	0.5430
YR96	0.084070	0.075791	1.109225	0.2675
YR97	0.156778	0.072891	2.150846	0.0316
YR98	0.242808	0.072274	3.359539	0.0008
YR99	0.437001	0.072786	6.003876	0.0000
YR00	0.524440	0.072500	7.233683	0.0000
YR01	0.670771	0.070504	9.513922	0.0000
YR02	0.801196	0.070093	11.43051	0.0000
YR03	0.697224	0.072664	9.595189	0.0000

R-squared	0.587947	Mean dependent var	7.392473
Adjusted R-squared	0.583290	S.D. dependent var	1.037117
S.E. of regression	0.669491	Akaike info criterion	2.047090
Sum squared resid	753.4547	Schwarz criterion	2.111040
Log likelihood	-1721.050	F-statistic	126.2407
Durbin-Watson stat	1.828553	Prob(F-statistic)	0.000000

Unrestricted Regression for AE 1995-2003 1 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:44
Sample: 1079 2011
Included observations: 933

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.745507	0.109242	43.44019	0.0000
EXPCUR	0.260011	0.014199	18.31169	0.0000
THROWS	0.000691	0.042531	0.016249	0.9870
LONGREL	-0.409850	0.054803	-7.478617	0.0000
CLOSER	-0.221288	0.063737	-3.471892	0.0005
IP1YRPR	0.006369	0.000385	16.55348	0.0000
LGERA1YRPR	0.266300	0.054779	4.861306	0.0000
SVLRDUM1YRPR	0.025762	0.006579	3.916138	0.0001
SVCLDUM1YRPR	0.029444	0.003282	8.970330	0.0000
DIVWIN	0.142105	0.041516	3.422909	0.0006
SOBB1YRPR	0.073141	0.022223	3.291284	0.0010
LEAGUE	-0.046528	0.036533	-1.273580	0.2031
YR96	-0.043416	0.082193	-0.528217	0.5975
YR97	-0.009688	0.078417	-0.123539	0.9017
YR98	0.062612	0.078710	0.795480	0.4265
YR99	0.185110	0.078929	2.345275	0.0192
YR00	0.300216	0.077120	3.892851	0.0001
YR01	0.411532	0.076769	5.360642	0.0000
YR02	0.559707	0.076295	7.336088	0.0000
YR03	0.527676	0.082109	6.426540	0.0000

R-squared	0.687752	Mean dependent var	7.198616
Adjusted R-squared	0.681254	S.D. dependent var	0.962631
S.E. of regression	0.543478	Akaike info criterion	1.639549
Sum squared resid	269.6715	Schwarz criterion	1.743266
Log likelihood	-744.8495	F-statistic	105.8399
Durbin-Watson stat	1.840929	Prob(F-statistic)	0.000000

Unrestricted Regression for FA 1995-2003 1 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:45
Sample: 776 1543
Included observations: 768

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.390904	0.162444	33.18622	0.0000
EXPCUR	-0.003246	0.008922	-0.363850	0.7161
THROWS	0.114559	0.057187	2.003235	0.0455
LONGREL	-0.496005	0.084280	-5.885235	0.0000
CLOSER	-0.201803	0.093718	-2.153310	0.0316
IP1YRPR	0.007689	0.000568	13.54258	0.0000
LGERA1YRPR	0.515441	0.080529	6.400685	0.0000
SVLRDUM1YRPR	0.012548	0.008057	1.557442	0.1198
SVCLDUM1YRPR	0.019741	0.004059	4.863038	0.0000
DIVWIN	0.079699	0.056207	1.417943	0.1566
SOBB1YRPR	0.103090	0.031750	3.246877	0.0012
LEAGUE	0.039091	0.052648	0.742511	0.4580
YR96	0.235598	0.122989	1.915599	0.0558
YR97	0.347895	0.119241	2.917566	0.0036
YR98	0.459576	0.116936	3.930164	0.0001
YR99	0.702607	0.118255	5.941457	0.0000
YR00	0.770293	0.121072	6.362269	0.0000
YR01	0.985838	0.114131	8.637795	0.0000
YR02	1.061522	0.113458	9.356072	0.0000
YR03	0.877282	0.113324	7.741341	0.0000

R-squared	0.567814	Mean dependent var	7.627980
Adjusted R-squared	0.556836	S.D. dependent var	1.075528
S.E. of regression	0.715985	Akaike info criterion	2.195381
Sum squared resid	383.4504	Schwarz criterion	2.316313
Log likelihood	-823.0262	F-statistic	51.72298
Durbin-Watson stat	1.953830	Prob(F-statistic)	0.000000

Restricted Regression for 1995-2003 2 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:48
Sample: 1854 3554
Included observations: 1701

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.436068	0.110523	40.13689	0.0000
EXPCUR	0.038280	0.004995	7.664281	0.0000
THROWS	0.100867	0.036842	2.737805	0.0063
LONGREL	-0.409929	0.051971	-7.887708	0.0000
CLOSER	-0.174858	0.059532	-2.937192	0.0034
IP2YRPR	0.008337	0.000398	20.93391	0.0000
LGERA2YRPR	0.944602	0.073661	12.82363	0.0000
SVLRDUM2YRPR	0.013281	0.005705	2.327914	0.0200
SVCLDUM2YRPR	0.019260	0.002934	6.564601	0.0000
DIVWIN	0.098417	0.035857	2.744734	0.0061
SOBB2YRPR	0.102197	0.024396	4.189111	0.0000
LEAGUE	-0.033397	0.032574	-1.025282	0.3054
YR96	0.294274	0.075489	3.898258	0.0001
YR97	0.386416	0.072778	5.309546	0.0000
YR98	0.519640	0.072841	7.133902	0.0000
YR99	0.711143	0.073753	9.642227	0.0000
YR00	0.790371	0.073564	10.74405	0.0000
YR01	0.870516	0.070125	12.41370	0.0000
YR02	0.944435	0.069834	13.52409	0.0000
YR03	0.855209	0.072679	11.76693	0.0000

R-squared	0.598461	Mean dependent var	7.392473
Adjusted R-squared	0.593922	S.D. dependent var	1.037117
S.E. of regression	0.660894	Akaike info criterion	2.021243
Sum squared resid	734.2298	Schwarz criterion	2.085193
Log likelihood	-1699.067	F-statistic	131.8628
Durbin-Watson stat	1.814984	Prob(F-statistic)	0.000000

Unrestricted Regression for AE 1995-2003 2 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:49
Sample: 1079 2011
Included observations: 933

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.953993	0.124492	31.76098	0.0000
EXPCUR	0.246607	0.013505	18.26085	0.0000
THROWS	0.047307	0.040565	1.166208	0.2438
LONGREL	-0.404528	0.052252	-7.741790	0.0000
CLOSER	-0.228959	0.061019	-3.752237	0.0002
IP2YRPR	0.007191	0.000413	17.39272	0.0000
LGERA2YRPR	0.701675	0.079151	8.865038	0.0000
SVLRDUM2YRPR	0.027691	0.006760	4.096059	0.0000
SVCLDUM2YRPR	0.023253	0.003541	6.567332	0.0000
DIVWIN	0.123568	0.039573	3.122503	0.0018
SOBB2YRPR	0.141924	0.027847	5.096570	0.0000
LEAGUE	-0.072583	0.034806	-2.085354	0.0373
YR96	0.176762	0.079044	2.236235	0.0256
YR97	0.210448	0.075428	2.790064	0.0054
YR98	0.342592	0.076719	4.465573	0.0000
YR99	0.468126	0.077812	6.016102	0.0000
YR00	0.566596	0.075996	7.455639	0.0000
YR01	0.655214	0.074003	8.853926	0.0000
YR02	0.724298	0.073501	9.854313	0.0000
YR03	0.691308	0.078879	8.764119	0.0000

R-squared	0.717806	Mean dependent var	7.198616
Adjusted R-squared	0.711934	S.D. dependent var	0.962631
S.E. of regression	0.516662	Akaike info criterion	1.538346
Sum squared resid	243.7154	Schwarz criterion	1.642063
Log likelihood	-697.6382	F-statistic	122.2297
Durbin-Watson stat	1.881621	Prob(F-statistic)	0.000000

Unrestricted Regression for FA 1995-2003 2 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:51
Sample: 776 1543
Included observations: 768

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.664056	0.191867	24.30885	0.0000
EXPCUR	-0.010992	0.009137	-1.203073	0.2293
THROWS	0.147526	0.058160	2.536570	0.0114
LONGREL	-0.394600	0.093103	-4.238303	0.0000
CLOSER	-0.128718	0.103129	-1.248126	0.2124
IP2YRPR	0.008307	0.000689	12.05159	0.0000
LGERA2YRPR	1.029203	0.121775	8.451704	0.0000
SVLRDUM2YRPR	0.000574	0.008455	0.067837	0.9459
SVCLDUM2YRPR	0.016714	0.004352	3.840781	0.0001
DIVWIN	0.014704	0.057239	0.256882	0.7973
SOBB2YRPR	0.097200	0.037350	2.602413	0.0094
LEAGUE	0.027150	0.053450	0.507952	0.6116
YR96	0.397144	0.125310	3.169294	0.0016
YR97	0.550584	0.122147	4.507546	0.0000
YR98	0.698221	0.120278	5.805044	0.0000
YR99	0.920622	0.121771	7.560274	0.0000
YR00	0.989238	0.125022	7.912511	0.0000
YR01	1.104289	0.115880	9.529603	0.0000
YR02	1.155146	0.115761	9.978730	0.0000
YR03	0.991508	0.116666	8.498684	0.0000

R-squared	0.556769	Mean dependent var	7.627980
Adjusted R-squared	0.545510	S.D. dependent var	1.075528
S.E. of regression	0.725076	Akaike info criterion	2.220617
Sum squared resid	393.2504	Schwarz criterion	2.341549
Log likelihood	-832.7170	F-statistic	49.45293
Durbin-Watson stat	1.891798	Prob(F-statistic)	0.000000

Restricted Regression for 1995-2003 3 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:55
Sample: 1854 3554
Included observations: 1701

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.149555	0.121314	34.20505	0.0000
EXPCUR	0.025113	0.005162	4.864784	0.0000
THROWS	0.135600	0.037313	3.634151	0.0003
LONGREL	-0.423780	0.052714	-8.039174	0.0000
CLOSER	-0.161018	0.060651	-2.654837	0.0080
IP3YRPR	0.008807	0.000433	20.34649	0.0000
LGERA3YRPR	1.150590	0.085541	13.45068	0.0000
SVLRDUM3YRPR	0.016118	0.006012	2.681043	0.0074
SVCLDUM3YRPR	0.019009	0.003247	5.855158	0.0000
DIVWIN	0.067421	0.036386	1.852937	0.0641
SOBB3YRPR	0.093833	0.027769	3.379030	0.0007
LEAGUE	-0.014579	0.032836	-0.443992	0.6571
YR96	0.289491	0.076538	3.782295	0.0002
YR97	0.518148	0.074556	6.949753	0.0000
YR98	0.679008	0.075130	9.037758	0.0000
YR99	0.869499	0.076620	11.34815	0.0000
YR00	0.960290	0.076809	12.50226	0.0000
YR01	0.995094	0.072177	13.78681	0.0000
YR02	1.051545	0.071358	14.73621	0.0000
YR03	1.001391	0.074686	13.40799	0.0000

R-squared	0.591855	Mean dependent var	7.392473
Adjusted R-squared	0.587241	S.D. dependent var	1.037117
S.E. of regression	0.666309	Akaike info criterion	2.037562
Sum squared resid	746.3099	Schwarz criterion	2.101512
Log likelihood	-1712.946	F-statistic	128.2963
Durbin-Watson stat	1.806029	Prob(F-statistic)	0.000000

Unrestricted Regression for AE 1995-2003 3 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:56
Sample: 1079 2011
Included observations: 933

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.634901	0.136711	26.58828	0.0000
EXPCUR	0.221818	0.013804	16.06883	0.0000
THROWS	0.091617	0.040960	2.236760	0.0255
LONGREL	-0.430000	0.053148	-8.090625	0.0000
CLOSER	-0.228851	0.062224	-3.677880	0.0002
IP3YRPR	0.007807	0.000463	16.85547	0.0000
LGERA3YRPR	0.939951	0.094074	9.991620	0.0000
SVLRDUM3YRPR	0.036712	0.007911	4.640734	0.0000
SVCLDUM3YRPR	0.022018	0.004280	5.144685	0.0000
DIVWIN	0.110166	0.039864	2.763566	0.0058
SOBB3YRPR	0.151585	0.031871	4.756272	0.0000
LEAGUE	-0.041368	0.035005	-1.181773	0.2376
YR96	0.168867	0.079907	2.113298	0.0348
YR97	0.338985	0.077228	4.389380	0.0000
YR98	0.492998	0.079401	6.208977	0.0000
YR99	0.610640	0.081056	7.533597	0.0000
YR00	0.717490	0.079502	9.024849	0.0000
YR01	0.780297	0.076097	10.25394	0.0000
YR02	0.837122	0.075128	11.14268	0.0000
YR03	0.847700	0.080673	10.50784	0.0000

R-squared	0.715714	Mean dependent var	7.198616
Adjusted R-squared	0.709798	S.D. dependent var	0.962631
S.E. of regression	0.518573	Akaike info criterion	1.545731
Sum squared resid	245.5221	Schwarz criterion	1.649448
Log likelihood	-701.0836	F-statistic	120.9767
Durbin-Watson stat	1.884744	Prob(F-statistic)	0.000000

Unrestricted Regression for FA 1995-2003 3 Year Stats

Dependent Variable: LNSAL
Method: Least Squares
Date: 04/28/05 Time: 10:57
Sample: 776 1543
Included observations: 768

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.477156	0.210404	21.27890	0.0000
EXPCUR	-0.017059	0.009433	-1.808406	0.0709
THROWS	0.161654	0.059518	2.716067	0.0068
LONGREL	-0.432400	0.095470	-4.529173	0.0000
CLOSER	-0.121285	0.106598	-1.137774	0.2556
IP3YRPR	0.008244	0.000737	11.18900	0.0000
LGERA3YRPR	1.179368	0.140027	8.422425	0.0000
SVLRDUM3YRPR	0.001341	0.008406	0.159532	0.8733
SVCLDUM3YRPR	0.016326	0.004658	3.504907	0.0005
DIVWIN	-0.037104	0.058846	-0.630525	0.5285
SOBB3YRPR	0.084792	0.042800	1.981123	0.0479
LEAGUE	0.022346	0.054708	0.408469	0.6830
YR96	0.404469	0.128542	3.146586	0.0017
YR97	0.664646	0.126455	5.255998	0.0000
YR98	0.849439	0.124772	6.807937	0.0000
YR99	1.085687	0.127582	8.509688	0.0000
YR00	1.174846	0.131656	8.923591	0.0000
YR01	1.227975	0.120671	10.17625	0.0000
YR02	1.252707	0.119531	10.48019	0.0000
YR03	1.113209	0.121609	9.154025	0.0000

R-squared	0.536854	Mean dependent var	7.627980
Adjusted R-squared	0.525089	S.D. dependent var	1.075528
S.E. of regression	0.741187	Akaike info criterion	2.264568
Sum squared resid	410.9194	Schwarz criterion	2.385500
Log likelihood	-849.5940	F-statistic	45.63372
Durbin-Watson stat	1.876040	Prob(F-statistic)	0.000000

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