University Avenue Undergraduate Journal of Economics

Volume 2 | Issue 1 Article 2

1998

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UNDERGRADUATE JOURNAL OF ECONOMICS

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The University Avenue Undergraduate Journal of Economics v. II, n. 1 (1998)

Introduction

During the mid-1970s, when the legality of baseball's reserve clause was called into question, [1] maverick Oakland A's owner Charles O. Finley proposed to his fellow owners that they should sign all players to one-year contracts, and allow them to become free agents, whose services will (typically) go to the highest bidder, after each season. His proposal was decried as ludicrous by his peers, and rejected out of hand. (Fresno Bee, 8/14/94)

Twenty years later, after three rounds of collusion hearings and billions of dollars in long-term contracts issued to players, it is time to reexamine Finley's proposal, at least theoretically. For today, an axiom in Major League Baseball is that players perform well in their "walk year," that is, the season prior to becoming a free agent, because they expect that exceptional performance immediately preceding free agency will be rewarded with a potentially lucrative contract. Larry Lucchino, president of the San Diego Padres, said that he certainly believes that players' performance is affected by their being in their walk year, and that this sentiment is widespread among front-office personnel throughout the league. He added, however, that whether players perform better or worse than they normally would varies from case to case. "It depends on the mentality of the individual players. Some are more financially motivated than others. It's human nature (for performance to be effected by playing for a contract)." While Lucchino said that he thinks some players shine in this situation, "For others, (the pressure) might be debilitating." Still, whether they "overperform" or underperform, it is clear that there is incentive for players to do well in their walk year.

This same incentive is not present for players either already tied up in long-term contracts or those without enough major league service time to qualify for free-agent status. [2] Were Finley's plan adopted, this incentive would be present for all players in all seasons, instead of just the few hoping for lucrative contracts at the end of the year. While the competitive balance (and aggregate statistics) may not be effected, if work effort is indeed endogenous, overall effort (and "hustle") would likely be increased, and a finer product would be put on the field, potentially increasing attendance and thus revenues. Thus, this paper seeks to test whether the assertion that players perform better and expend more effort in their "walk year" is empirically observable. To do so, section II presents a model of the relationships between performance, effort and walk-year incentive, and reviews previous work done on similar topics. Section III discusses the relationship between performance and marginal revenue product. Section IV presents data and methodology, and section V states conclusions.

II. The model and previous work

At the present time annual free-agency for all is far from a reality [3]. In its place lie allegations against players of only trying their hardest in their walk year, implying shirking in other seasons. These allegations, if true, frame an example of the principal-agent problem. The principal (team owners and upper-management) cannot discern a player's true effort *E*. This is the case because observable measures of performance, while

based on effort, are also the product of other variables. For example, a disappointing year cannot definitively be blamed on lack of effort, as pitchers may be pitching around a batter due to weak lineup support. Krautmann (1990) modeled a player's productivity, or marginal physical product MPP, as a function of several factors, including *E*, a measure of talent level *T*, and a random variable *X*, so that

(1)

He hypothesized that there may be some opportunity cost to players to give the maximum *E* (e.g., aversion to additional training, giving up or reducing drinking, etc.) Therefore, while it is always in the owner's best interests to have the player maximize *E*, it may only in the player's best interest to maximize *E* when he knows he will be best rewarded for his additional effort. At no time is this more the case than when a player is in his "walk year." Thus, effort *E* is modeled

(2)

where *W* is a dummy variable equal to 1 when a player is in his walk year, and *Z* is all other factors influencing his effort, such as the aforementioned aversion to additional training, wages, etc.

While this paper uses Krautmann's model of the stochastic nature of performance, it will test it differently than Krautmann did. Krautmann tested the performance of the 110 position players who signed contracts of greater than five years' duration between 1976 and 1983, comparing their slugging percentage in the year prior to the contract signing with lifetime performance up to that point. He found that only 5 players (4.5%) had "super-par" or significantly above average years relative to career performance in the year before signing the long-term contract, which he concluded were merely outliers in a stochastic distribution of performance. Krautmann additionally tested whether players registered "sub-par" performances relative to their career averages in the first year of the long-term contracts. He only found 2 players (1.8%) with such seasons, again concluding that they were outliers. Thus, Krautmann asserted that allegations of shirking were merely a product of front-office personnel misunderstanding the concept of regression to the mean.

In addition to the above findings on which he based his conclusions, Krautmann found that 71 players (64%) performed above their career averages in the year immediately following the contract signing, while 39 players (36%) played below their means. While this starkly contradicts any theory of shirking due to long-term job security, Krautmann also found that 68 players (62%) performed above their career averages in the pre-signing year, while 42 (38%) played below their means, suggesting that extra effort may be present in the pre-signing year.

There is additional evidence which somewhat contradict Krautmann's findings. Work done by then-Player Relations Committee head Lee MacPhail in the mid-1980s found that players with contracts of three years or more spent nearly 50 percent more time on the disabled list than did those with one-year contracts. MacPhail also concluded that a player's batting average dropped by an average of nearly 20 points after he signed a guaranteed multi-year deal. [4] (TSN, 8/19/91) The Sporting News similarly found evidence of free agents' production diminishing immediately following the walk year in its study of free agency in the 1990s (See Figure 1).

Figure 1 - Free agents in the 1990s

	PITCHERS		
	Improved next year	Same next year	Worse next year
Those who re-signed	28%	6%	66%
Those who switched teams	36%	16%	48%
Total	33%	13%	54%
	NON-PITCHERS		
	Improved next year	Same next year	Worse next year
Those who re-signed	26%.	21%	53%
Those who switched teams	31%	13%	56%
Total	**29%**	**16%**	**55%**
	ALL FREE AGENTS		
	Improved next year	Same next year	Worse next year
Those who re-signed	26%	15%	59%
Those who switched teams	33%	15%	52%
Total	31%	15%	54%

source- The Sporting News, November 23, 1992

While this paper is concerned with a similar subject matter to Krautmann's, they differ in several respects. First and foremost, Krautmann focused on whether there is evidence of shirking in the first year of long-term contracts; here the hypothesis is not that players underperform after signing long-term contracts, but that they expend additional effort immediately preceding free agency in anticipation of such a lucrative contract. Multi-year contracts can be extensions of present agreements, and can be signed in mid-season. Free-agent contracts come after a player has played an entire season with the knowledge that the size of his next contract will at least partially depend on his performance in that

season. Thus, it is more likely that a player will expend additional effort in the season prior to free agency when compared with the season (or part of season) before signing a long-term contract.

Secondly, this study uses a larger and more up-to-date sample than Krautmann's, examining all free agents beginning with the end of the 1989 season through the free-agent class following the 1992 season. Given TSN's findings, albeit crude, it is not unreasonable to suspect that Krautmann's findings may be dated. Additionally, the larger sample should make for a more powerful test.

The start date is so chosen because players could not expect to receive lucrative free-agent contracts in the offseasons following the 1985, 1986 and 1987 seasons, when owners colluded to keep free-agent salaries down. (Bruggink and Rose, 1990) (WSJ, 5/20/91) Furthermore, it is also reasonable to assume that given the owners' choice not to reward performance in that period, it was not until after the 1988 offseason, when the free-agent market was again unrestricted, that players about to become free agents would expend additional effort in anticipation of lucrative deals. The end date is so chosen because the strike-shortened 1994 season poses statistical comparison problems.

The statistics used by this study also are different from those used by Krautmann. Krautmann used slugging average (see Appendix A) as his sole measure of player performance. While a better measuring tool of offensive production than most (e.g., batting average, homeruns, Runs Batted In), as well as one which has gained acceptance in economic circles, [5] slugging average has its limitations as a measure of overall player performance. [6] Instead, here Total Player Rating, a comprehensive statistic complexly devised (see Appendix A) but simple to understand ESPNET SportsZone described it as "how many wins above a league average performer a player achieves in a season, taking into account a players hitting, fielding and basestealing statistics" - is used to measure performance. In addition, two measures not necessarily measuring performance but hypothesized to measure effort - games played and stolen bases attempted are considered. [7]

Furthermore, one of Krautmann's fundamental assumptions, that a player's production is identically distributed across time, is a doubtful assertion, at best. This assumption is significant because a player may perform at a high level the year after he signs a long-term contract merely due to the fact that he is still improving as a player. Similarly, if a player's performance is unchanged, it may be because his potential increased but his effort fell. Krautmann's justification for his assumption that most players spend between three and five years in the minor leagues before making a major league roster is dubious. If a player was in the minors the year before his rookie season, this means that, with few exceptions, he was worse than every single player on the major league roster that year. It would take a dramatic improvement in one year for a player to go from worse than all players on a team to worse than half of them. Furthermore, in Krautmann's model this improvement suddenly comes to a halt once a player begins to play at the major league level, an even more ludicrous assumption that Eddie Epstein, the Padres' director of baseball operations, calls "Just not true." As evidence, consider that Rookie of the Year

selections have been made every year since 1947 in both leagues since 1949 but only one player (Fred Lynn in 1975) has ever won both that honor and been selected Most Valuable Player in the same year, although several ROY winners have gone on to earn MVP awards. This despite the fact that a significant, if small, percentage of players in the majors at a given time are rookies.

The Relationship Between Performance and Marginal Revenue Product

Above it has been implicitly assumed that a player's future salary is directly determined by on-field performance. This, while to the layperson seems obvious, is hardly so for the economist. Rather than base salary directly on a player's marginal physical product MPP, the economist model sets the efficient market salary equal to a player's marginal revenue product MRP, that is, the additional revenue that player is responsible for generating. Thus, a number of studies have concerned themselves with different ways to measure MRP, beginning with Scully (1974). However, while different estimates for MRP exist (Scully; Sommers and Quinton, 1982), how exactly MRP is determined is not particularly relevant to this paper. According to Lucchino, the Padres, as well as the vast majority of teams, base salaries on expected performance and what the player will add to the team's place in the standings (MPP) rather than MRP. In other words, Major League Baseball teams balance performance, not revenue, with cost. Furthermore, to the extent that profitability is considered, there exists a relationship that if a team wins, it will draw fans, sell merchandise, etc., thus increasing revenue. Bruggink and Rose found that each winning percentage point raises revenue $53,070.50, with a t statistic of 5.84, meaning the correlation is significant at the 99% level. So even from a business standpoint, maximizing production is related to increasing profit.

Still, even if teams were interested only in maximizing revenue, as opposed to production, with respect to cost, the only variable within the player's control which effects revenue is effort.

Data and Methodology

To test whether players "overperformed" in their walk year, performances of the 188 non-pitcher free agents who signed with a major league team following the 1989-1992 seasons were compared. [8] TPR data for each free agent in his walk year, as well as for each season surrounding the walk year, was compiled. The 188 includes all free-agent seasons for a player in the period,

Figure 2.0 - Summary of variables and raw data

Variable	Obs	Mean	Std. Dev.	Min	Max
NAME	0	-	-	-	-
YEAR	0	-	-	-	-

GAMES	509	106.0648	38.28156	3	162
SB	509	7.269155	11.51327	0	93
CS	509	3.306483	3.406856	0	21
TPR	509	-0.0923379	1.616073	-4.5	9.2
WALKYR	509	0.3693517	0.4831041	0	1
LSEASON	509	0.0825147	0.275418	0	1
TPRP	321	-0.076324	1.597381	-4.5	8.8
TPRA	188	-0.1196809	1.651441	-3.5	9.2
SBA	509	10.57564	14.23013	0	106

Figure 2.1 - Walk year regressed on performance

Source	**SS**	**df**	**MS**	**Number of obs** = 509
Model	0.2229	1	0.2229	F(1, 507) = 0.09
Residual	1326.5172	507	2.6164	Prob > F = 0.7705
Total	1326.7401	508	2.6117	R-squared = 0.0002
-	-	-	-	Adj R-sqr= -0.0018
-	-	-	-	Root MSE = -1.6175

TPR	**Coef.**	**Std.Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
WALKYR	-0.0434	0.1486	-0.292	0.771	-0.3352	0.2485
_cons	-0.0763	0.0903	-0.845	0.398	-0.02537	0.101

e.g., if a player is a free agent in 1990 and 1992, both of those seasons are counted in the 188. However, in the event that a player was a free agent in consecutive seasons, each season's statistics were only counted once, and considered a walk year rather than a surrounding season. The walk year variable WALKYR was regressed on the performance variable TPR to find how much being in the walk year influenced performance. The results (see Figure 2.1) showed that walk year and performance level are not even weakly correlated. Being in the walk year had an infinitesimally small negative impact on TPR (-.04), which not only explained a negligible amount of deviations in TPR ($R^2 = .0002$), but was also insignificant at even the 50% level (t = -.292).

Whether knowing a player's statistics in the seasons surrounding the walk year would be an unbiased estimation of walk year performance was also tested. This was done by

averaging a player's performance in the seasons surrounding the walk year (or years), and regressing this mean AVGTPRP on the actual average performance in the walk year (or years) AVGTPRA (see Figure 3.0). If a player was a free agent in two non-consecutive seasons, his performances were counted separately. The result was that the two are highly correlated, (coefficient on AVGTPRA = .73, significant at the 95% level; see Figures 3.1 and 3.2), but that

Figure 3.0 - Summary of a player's average performance in his walk year and the surrounding seasons

Variable	Obs	Mean	Std.	Min	Max
NAME	0	-	-	-	-
AVGTPRP	165	-0.0893939	1.352975	-2.75	7.6
AVGTPRA	165	-0.0841414	1.661499	-3.5	9.2

Figure 3.1 - Avg. TPR in surrounding seasons regressed on avg. TPR in walk year

Source	SS	df	MS	Number of obs = 165
Model	162.54736	1	162.5474	F(1, 163 = 91.30
Residual	290.18753	163	1.7803	Prob >F = 0.0000
Total	452.73489	164	2.7606	R-squared = 0.3590
-	-	-	-	Adj R-sqr = 0.3551
-	-	-	-	Root MSE= 1.3343

AVGTPRA	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
AVGTPRP	0.7358	0.0770	9.5550	0.0000	0.5838	0.8879
_cons	-0.0184	0.1041	-0.1760	0.8600	-0.2239	0.1872

players' performances, while when aggregated in large numbers are very similar between walk year and surrounding seasons, on an individual basis can vary greatly between the two types of seasons examined in this paper ($R^2 = .3590$). This likely means that performance is stochastic, and distributed randomly over time, as Krautmann asserted.

However, there is another possible explanation, in addition to the stochastic nature of performance. Noting Lucchino's comment about walk-year incentive pressure affecting

different players in different ways, whether the variance of performance in the walk year is significantly different from variance in the surrounding years was examined by using a standard deviation test (see Figure 4.0). The t value yielded by the test was -1.04, meaning that there is a 70.1% chance that the two standard deviations are different. This is not significant at the 95%

Figure 3.2 - T test comparing avg. TPR in walk years with avg. TPR in the surrounding seasons

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Paired t test Number of obs =165

Variable	Mean	Std. Err	t	P>|t|	[95% Conf.	Interval]
AVGTPRA	-0.0841	0.1293	-0.6505	0.5163	-0.3395	0.1713
AVGTPRP	-0.0894	0.1053	-0.8487	0.3973	-0.2974	0.1186
diff	0.0053	0.1072	0.0490	0.9610	-0.2065	0.2170

Degrees of freedom: 164

Ho: mean diff = 0
Ha: diff < 0 Ha: diff ~= 0 Ha: diff > 0
t = 0.049 t = 0.049 t = 0.049
P < t = 0.5195 P > |t| = 0.9610 P > t = 0.4805

Figure 4.0 - Standard deviations test of avg. TPR in walk years with avg. TPR in surrounding seasons

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Paired t test Number of obs =165

Variable	Mean	Std. Err	t	P>|t|	[95% Conf.	Interval]
AVGTPRA	-0.0841	0.1293	-0.6505	0.5163	-0.3395	0.1713
AVGTPRP	-0.0894	0.1053	-0.8487	0.3973	-0.2974	0.1186
combined	-0.0878	0.0834	-1.0403	0.2990	-0.2508	0.0773

Ho: sd(AVGTPRA) = sd(AVGTPRP)
F Observed = F = F(164,164) = 1.508
F Lower tail = F_L = F(164,164) = 0.663
F Upper tail = F_U = F(164,164) = 1.508
Ha: s1 < s2 Ha: s1 ~= s2 Ha: s1 > s2
P < F = 0.9956 P < F_L + P > F_U = 0.0089 P > F = 0.0044

level. [9]

Whether a player's effort, as measured by games and stolen bases attempted, was significantly affected by a player being in his walk year was also tested. Again, any difference was insignificant (see Figures 5.0 and 5.1). Thus, there seems to be no evidence that players increase their effort in their walk year, as measured by both performance and hypothesized effort variables.

Conclusions

While there may have been some problems with Krautmann's study, his conclusions are

Figure 5.0 - Walk year regressed on games played

Source	SS	df	MS	Number of obs = 509
Model	778.5079	1	778.5079	F(1, 507) = 0.09
Residual	743684.353	507	146.8330	Prob > F = 0.4666
Total	744462.861	508	1465.4781	R-squared = 0.0010
-	-	-	-	Adj R-sqr = -0.0009
-	-	-	-	Root MSE= 38.299

Games	Coef.	Std.Err.	t	P>|t|	[95% Conf.	Interval]
WALKYR	2.5625	3.51734	0.729	0.467	-4.3480	9.4729
_cons	105.1184	2.1377	49.175	0.000	100.9186	109.3181

Figure 5.1 - Walk year regressed on stolen bases attempted

Source	SS	df	MS	Number of obs = 509
Model	37.6138	1	37.6138	F(1, 507) = 0.19
Residual	102830.724	507	202.8219	Prob > F = 0.6669
Total	102868.338	508	202.4967	R-squared = 0.0004

-	-	-	-	Adj R-sqr = -0.0016
-	-	-	-	Root MSE= 14.242

Games	Coef.	Std.Err.	t	P>|t|	[95% Conf.	Interval]
WALKYR	0.5632	1.3079	0.431	0.667	-2.0063	3.1389
_cons	10.3676	0.7949	13.043	0.000	8.8059	11.9293

also borne out by this paper. It appears that a player's average performance in his walk year is not significantly different from his average performance in similar seasons. Similarly, using games and stolen bases attempted as measures of effort, it is clear that players do not expend additional effort in their walk years. One difference found between walk-year and surrounding-seasons performance is the larger standard deviation of walk-year performance, though this difference is not significant at the 95% level. A possible explanation for this small difference is that while on average players perform the same in both cases, an individual player may have a significantly better or worse than average performance in the walk year due to the additional pressure of looming free agency.

While the results of this study are clear on paper, there remains one potential problem which may call these findings into question. It is possible that teams make a concerted effort to sign above-average and star players to multi-year contract extensions, meaning that such prime performers are rarely eligible for free agency. If this is true, then a data set composed solely of free agents as this paper uses is not a representative pool. This bias can be mitigated in future studies several ways. First, one can test players the year before and the year after they sign long-term contracts, as Krautmann did. This, however, poses two problems discussed in section II, namely that many long-term contracts are signed mid-season, making testing difficult, and that any time a player signs a contract extension, he may already be "shirking" due to a current multi-year contract; thus, evidence of a drop-off in performance may not be observed. Another way of getting around the "selecting out" of stars in the free-agent pool is to somehow control for salary. For example, one can divide free agents into quintiles based on salary prior to becoming free agents (or salary after signing the new contract), and test the performances before and after free agency separately for each quintile. Similarly, players can be divided into quintiles based on some measure of performance. Here the recommendation would be either career TPR, TPR over the previous *n* seasons, or TPR in the year prior to free agency.

For the rest of the players filling out major league rosters, who seem to be well represented in the sample, the disincentive to perform provided by not being a free agent in the coming offseason may be offset by the possibility of being granted their unconditional release. Furthermore, incentive clauses sometimes in place in newly-signed

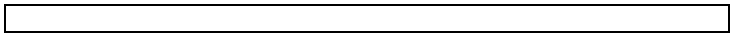
contracts, such as rewarding players' based on games played, slugging percentage, etc., may reduce the principal-agent problem.

While there may be some problems with the sample, it appears that in the labor market for veteran baseball players, even when direct financial incentive to maximize effort may be weak, indirect financial incentives, or other non-financial incentives, may compensate. For example, for good players, financial reward in the next negotiated contract may be considered even before the walk year; for bad players, the possibility of not making the team the next year may motivate those not in their walk year. Endorsement opportunities, recognition by ones peers and by the public and media are other examples of reasons why players may perform well even when not in their walk year.

The conclusions of this paper in the specific labor market for major league veterans may have applications in other labor markets where effort is difficult to measure. For example, one may hypothesize that in the labor market for college professors with tenure there may be little direct financial incentive to expend maximum effort. However, it would be interesting to test whether other considerations, such as the respect of peers, outside income from being an "expert" in the field, and revenues from published material and textbooks, factor in to ensure that close to maximum effort is put forth.

Appendix A: Computation of baseball statistics

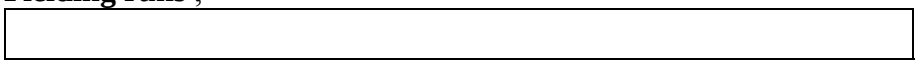
Batting runs ,



where 1B is singles, 2B is doubles, 3B is triples, HR is home runs, BB is walks, HB is hit by pitches, AB is at bats, and H is hits.

Batting wins Batting runs divided by runs per win.

Fielding runs ,

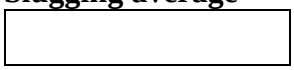


where PO is putouts, A is assists, E is errors, DP is double plays, and K is strikeouts. This formula is for second basemen, third basemen and shortstops; it is slightly modified for other positions. The idea is to measure the number of "runs saved" by a player beyond what the league-average performer would have done.

Fielding wins Fielding runs divided by runs per win.

Runs per win The average number of runs (usually about 10) in a given season which produced an additional win beyond average. That average is defined as a team record of .500 (which a league won-lost average must be).

Slugging average



A better measure of performance than batting average, as it weights extra-base hits, but not as good a measure as batting runs or TPR, as slugging average omits important variables and misweights the ones it uses.

Stolen base runs .30(*SB*) - .60(*CS*),

where SB is stolen bases and CS is caught stealing.

Stolen base wins Stolen base runs divided by runs per win.

Stolen bases attempted SB + CS.

Total Player Rating Batting wins (adjusted for league average and home "park factor") + fielding wins + stolen base wins - positional adjustment. Designed to measure all-around performance for non-pitchers, i.e., position players.

Appendix B: Breakdown of individual performances in walk year and surrounding seasons

Total Player Rating	Surrounding season	Walk year	Total
-4.5	1	0	1
-3.5	0	2	2
-3.4	0	1	1
-3.3	2	0	2
-3.2	2	0	2
-3	0	1	1
-2.8	2	0	2
-2.7	1	2	3
-2.6	1	0	1
-2.5	2	1	3
-2.4	2	1	3
-2.3	1	3	4
-2.2	3	1	4

-2.1	2	3	5
-2	5	1	6
-1.9	5	4	9
-1.8	3	1	4
-1.7	4	4	8
-1.6	9	6	15
-1.5	3	3	6
-1.4	8	7	15
-1.3	3	3	6
-1.2	12	0	12
-1.1	10	5	15
-1	10	5	15
-.9	6	6	12
-.8	8	5	13
-.7	8	9	17
-.6	5	4	9
-.5	9	10	19
-.4	12	5	17
-.3	14	5	19
-.2	17	6	23
-.1	13	6	19
0	12	7	19
.1	9	5	14
.2	13	3	16
.3	9	4	13
.4	8	7	15
.5	5	5	10
.6	9	1	10
.7	9	2	11
.8	2	4	6
.9	5	3	8

1	4	2	6
1.1	4	3	7
1.2	4	6	10
1.3	5	2	7
1.4	2	3	5
1.5	2	2	4
1.6	3	1	4
1.7	2	1	3
1.8	3	1	4
1.9	1	0	1
2	2	1	3
2.1	3	1	4
2.2	3	0	3
2.3	1	1	2
2.4	2	0	2
2.6	1	0	1
2.9	1	0	1
3	0	1	1
3.1	1	2	3
3.2	1	2	3
3.3	0	2	2
3.4	0	2	2
3.5	2	0	2
3.6	3	0	3
4.1	2	1	3
4.6	0	1	1
4.7	1	0	1
5.3	0	1	1
5.9	1	0	1
6.4	1	0	1
8.2	1	0	1

8.8	1	0	1
9.2	0	1	1
Total	**321**	**188**	**509**

Endnotes

1 The reserve clause, which prohibited player movement from team to team except through trade or sale, was overturned by an arbitrator in 1975. (Bruggink and Rose, 1990) .

2 Currently, this latter criterion applies to those with fewer than six major league seasons.

3 This is not meant to imply that universal perennial free agency is either a viable option politically or even an improvement on the current free-agent system. Eliminating long-term contracts would be inefficient from both team and individual perspectives. In addition, it is important for a team to have monopsony control over its players at the beginning of their careers to recoup for research and development costs of scouting players at the amateur level and training them in the minor leagues, much like drug companies need the short-term monopolies granted by patents. Finally, the expanded player movement might alienate fans.

4 Unfortunately, I was unable to obtain a copy of MacPhail's study. When I asked John Ricco, my contact at the PRC, to send me a copy, he was unable to view it himself, and was told that it was "an internal document." The study allegedly helped start the 'Collusion Era' in Major League Baseball (WSJ, 5/20/91).

5 Krautmann cites three papers, including Scully, as studies which have used slugging average as a proxy for performance.

6 Among other things, slugging average discounts baserunning, defense and ability to draw walks. In addition, as a simple percentage, it weighs average performance, not aggregate performance, meaning that a player who bats 4 times and one who bats 400 times in a season can be said to perform at the same level.

7 Krautmann refers to a study by Lehn which found that, "On average every additional year remaining on a multiyear contract was associated with a 25 percent increase in number of days spent on the disabled list." (Krautmann, 963).

8 Lists of players filing for free agency were obtained from issues of The New York Times and The Sporting News.

9 However, a larger percentage of walk year TPRs fell outside of the overall 95% confidence interval of {-3.26, 3.07} (15 out of 188; 8.0%) than surrounding year TPRs (17 out of 321; 5.3%) (see Appendix B).

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