HOME SAFE: NO-TRADE CLAUSES AND COMPENSATING WAGE DIFFERENTIALS IN MAJOR LEAGUE BASEBALL

Roberto Pedace*
Department of Economics
Scripps College
Claremont, CA 91711
rpedace@scrippscollege.edu

Curtis Hall
Eller College of Management
University of Arizona
Tucson, AZ 85721
curtish@email.arizona.edu

JEL Classification: J31, J44, M55

Keywords: compensating wage differentials; non-monetary benefits; no-trade clause; performance and compensation

* Corresponding author, Tel: 909-607-3368.
The authors would like to thank participants at the 84th Annual Conference of the Western Economic Association International for their insightful comments.

HOME SAFE: NO-TRADE CLAUSES AND COMPENSATING WAGE DIFFERENTIALS IN MAJOR LEAGUE BASEBALL

Abstract

In this paper, we examine the compensating wage effects of no-trade clauses in Major League Baseball player contracts. Under current rules, no-trade clauses insure players against risks associated with involuntary movements to undesirable teams. Since there is an abundance of individual performance, team characteristics, and contract information for this labor market, it provides an excellent opportunity for testing compensating wage differentials. Using an accepted player salary equation and data from the 2003-2008 seasons, we find evidence that there is a significant trade-off between monetary compensation and the risk reduction provided by the inclusion of a no-trade clause in a player's contract.

1 Introduction

More than 200 years ago, Adam Smith (1776) described the idea of compensating wage differentials (CWDs) when he explained net differences in the labor market by stating that "the agreeableness or disagreeableness of the employment themselves… make up for a small pecuniary gain in some employments." The principle of CWDs is that, holding all worker characteristics constant, the existence of workplace amenities will result in lower wages. Some have argued that the theory of CWDs is flawed. These criticisms have typically focused on data issues related to the construction of an appropriate risk variable and econometric specification in the presence of endogeneity and omitted variables that conflate the risk premium with industry and other productivity differentials.[1] Additional problems in testing the theory of CWDs can arise if data is obtained from workers who may not be highly mobile and/or are not informed about job characteristics. Nevertheless, these problems are not sufficient to imply that the theory of CWDs is irrelevant, but rather that careful consideration must be given to the empirical methods and institutional setting in which the theory is tested.

In this paper, we examine the compensating wage effects of no-trade clauses (NTCs) in Major League Baseball (MLB) player contracts. Under the reserve clause, which was a component of MLB player contracts before 1975, the rights to a player upon a contract's expiration were to be retained by the team to which he had been previously signed. All contracts were for one year and NTCs were non-

[1] See Purse (2004) for a more complete exposition of these arguments.

existent. The reserve clause was struck down in 1975 and this opened the door to widespread free agency and the ability for a player to negotiate with any team when his contract expires. The prevalence of free agency increased competition in the MLB labor market and led to contract innovations that incorporated various options and clauses; two of the most popular include long-term contracts (LTCs) and NTCs.

A LTC guarantees players a negotiated amount of compensation for a stated amount of time. Although players with LTCs can be traded, they have insurance against income loss. The team who signs the player is responsible for continuing the salary payments for the term of the contract. In many cases, when players are traded prior to the end of the contract term, the team releasing the player can strike a deal which passes the salary commitment to the acquiring team. So, a LTC does not guarantee the player a unique employer, it simply ensures their income stream for the specified term.

NTCs, on the other hand, insure players against disamenity risks associated with involuntary movements to undesirable teams, while maintaining the income security associated with the contract term. A NTC gives players the option of limiting their trade to a select group of teams or rejecting any trade altogether. Players can subsequently waive their right to exercise this option or may be asked to do so, but usually with a substantial monetary offer from the team to the player.

The MLB labor market provides an ideal setting for testing CWDs for several reasons. First, all contract terms including compensation, length, and no-trade provisions are available. Second, an abundance of performance data exists for MLB

players, so there are no concerns about accurately capturing individual productivity.[2] Third, the market is characterized by a high degree of competition, where there are no salary caps and the nature of mobility is characterized by national and even international player migration. Finally, players are highly informed about potential employer traits since team statistics, managerial organization, and even co-workers are known.[3] Under these circumstances, we expect that MLB players will pay a premium (in the form of lower compensation) when they choose to reduce their risks by negotiating for a NTC.

2 Related Literature

The empirical framework for analyzing CWDs was originally outlined by Rosen (1974) and initially applied by Smith (1974) and Thaler and Rosen (1975), who studied the wage effects of dangerous jobs and occupations. These studies supported the assertion that wage differentials compensate workers for high risks. As reviewed by Viscusi (1993), subsequent results from numerous studies examining the role of death or serious injury risk have also been consistent with the theory of CWDs. However, evidence of CWDs associated with other disamenities such as physical demands, mental stress, routine work, and employment security

[2] Agents can also play some role in the transfer of non-performance information to teams and endorsement possibilities to players.

[3] A limited number of teams hiring individuals with these specialized skills and relatively few players with the skills required for participation could result in bilateral bargaining that undermines the compensating payments of competitive scenarios (Viscusi 1980; Fairris 1989). However, the multi-employer bargaining and abundance of information renew the possible relevance of CWDs.

has been less conclusive (Hamermesh and Wolfe 1990; French and Dunlap 1998; Borjas 2005).

The specific labor market structure of MLB was first examined by Scully (1974) when he used player performance measures, such as slugging percentage for batters and earned run average for pitchers, to estimate each player's contribution to his team's winning percentage. By doing so, Scully was able to build a model that would predict a player's free market salary based on his marginal revenue product (MRP). He then compared MRP estimates with actual player salaries and concluded that players were exposed to a large degree of monopsonistic exploitation due to the reserve clause.

Kahn (1993) uses post reserve clause data to estimate salary and contract length models. He finds that both free agency and arbitration eligibility are positively related to salaries, while only free agency increases the average contract length. Maxcy (1998) finds that the best players receive both higher salaries and longer contracts. The study argues that LTCs benefit players by reducing risk of lost income, but these are not paid for with lower salaries because teams also benefit by reducing market and productivity uncertainty. Krautmann and Oppenheimer (2002), on the other hand, find that the risk premium is in fact paid by the players through lower returns on performance when contract length increases.

3 The Model

Empirical work on salary models in professional baseball has continued to confirm the highly deterministic nature between pay and performance that was originally uncovered by Scully. Since the abolishment of the reserve clause, player salaries have become even more dependent on player performance, especially among free agents (Krautmann 1999).[4] In addition to individual player abilities, Fort and Quirk's (1996) model suggests that rent-sharing, or a team's ability-to-pay, can affect contract values. Krautmann and Oppenheimer's (2002) empirical results support this hypothesis. They also find that there is a CWD associated with contract length, as the returns to the primary performance characteristic (slugging percentage) are lower with longer contracts.

Consequently, we follow these developments in contract determination models by adding a variable that captures whether the new contract includes a NTC and use ordinary least squares (OLS) to estimate

$$\ln v_{ijt} = \alpha + \mathbf{x}_{ijt}\,\boldsymbol{\beta} + \gamma \ln r_{jt} + \theta\, l_{ijt} + \varphi\left(x_1 \times l\right)_{ijt} + \delta\, c_{ijt} + \varepsilon_{ijt} \qquad (1)$$

for free agent batters, where the i, j, and t subscripts denote player, team, and year, respectively; v is the real (inflation adjusted) guaranteed annualized compensation, $\mathbf{x}$ is a vector of performance characteristics (slugging percentage and number of "at-

[4] In fact, Krautmann argues that only free agents should be used in salary model estimations. The intense bidding process that determines free-agent salaries should produce better estimates of returns to performance. As discussed later, we follow this suggestion in our sample selection.

bats") and a set of position dummies (catcher and infield).[5] As in Krautmann and Oppenheimer, all performance characteristics represent the player's 3-year average prior to signing the contract. In addition, r is the team's real total revenue in the year prior to the contract signing, l is the contract length, $x_1 \times l$ is the interaction of slugging percentage with contract length, and c is a dummy variable indicating if the player's contract included a NTC.

Players with more Major League experience have developed a track record of performance. In addition, over time, they are likely to have gained valuable knowledge about the contract negotiation process. If this allows players to negotiate higher salaries and simultaneously obtain NTCs, then our estimates of δ will be biased upward. We control for this by including player experience (the number of years playing in the Major Leagues) in the model. Finally, another source of bias may result from contemporaneous correlation between the increasing popularity of NTCs and rising salaries. We address this by including a year trend variable. The complete specification becomes

$$\ln v_{ijt} = \alpha + \mathbf{x}_{ijt}\,\boldsymbol{\beta} + \gamma \ln r_{jt} + \theta\, l_{ijt} + \varphi\left(x_1 \times l\right)_{ijt} + \delta\, c_{ijt} + \phi\, e_{ijt} + \psi\, e_{ijt}^2 + \kappa\, y_t + \varepsilon_{ijt} \qquad (2)$$

where e is the number of years playing in the Major Leagues and y is a yearly trend variable as used by Krautmann.

[5] The position dummies are identical to those used by Kahn (1993). Specific infield position dummies (e.g., catcher, shortstop, etc.) following Krautmann were also utilized, but these results were largely uninformative and their inclusion did not change any of our other estimated coefficients.

Despite these modifications to the specification of the contract value equation, it is still possible that estimates of the impact of NTCs will be biased. The existence of a NTC is the result of choices made during contract negotiation. Any unobservable productivity factors that would allow players to negotiate for higher salaries are also likely to increase their chances of obtaining a NTC. This simultaneity would result in an upward (positive) bias in our estimates of the effect of a NTC on contract value.

In order to address this, we fit a treatment-effects model of the form

$$\ln v_{ijt} = \alpha + \mathbf{x}_{ijt}\,\boldsymbol{\beta} + \gamma \ln r_{jt} + \theta\, l_{ijt} + \varphi\left(x_1 \times l\right)_{ijt} + \delta\, c_{ijt} + \phi\, e_{ijt} + \psi\, e_{ijt}^2 + \kappa\, y_t + \varepsilon_{ijt} \qquad (3)$$

where *c*, the binary variable for the NTC, is endogenously determined and assumed to stem from an unobservable latent variable

$$c_{ijt}^{*} = \Phi\left(\widetilde{\alpha} + \mathbf{x}_{ijt}\,\widetilde{\boldsymbol{\beta}} + \widetilde{\gamma} \ln r_{jt} + \widetilde{\theta}\, l_{ijt} + \widetilde{\varphi}\left(x_1 * l\right)_{ijt} + \widetilde{\phi}\, e_{ijt} + \widetilde{\psi}\, e_{ijt}^2 + \widetilde{\kappa}\, y_t + \mathbf{z}_{ijt}\,\widetilde{\eta} + u_{ijt}\right) \qquad (4)$$

where Φ is the standard normal cumulative distribution function and **z** is a vector of exogenous instruments; an indicator for the player's team winning the World Series and an indicator for foreign-born player.[6] Table 1 contains a complete list and definition of the analysis variables.

[6] As a substitute for the World Series indicator, we are able to use a dummy variable for the player's team winning the league (pennant) or for the player's team winning their division. However, neither of these alternative instruments significantly alters any of our results.

[Insert Table 1]

An indicator for a World Series championship and foreign-born status are both logical choices for instruments, but their signs are indeterminate. For example, players might be attracted to playing for a successful team, and thus more likely to seek a NTC with teams who won the World Series. On the other hand, highly successful teams may have more bargaining power in the contract negotiation process and less likely to offer this form of employment protection. Similarly, foreign-born players may be less averse to trades because they are already accustomed to moving long distances, or their migration may have been so taxing that they are inclined to avoid subsequent moves. After estimating equations (3) and (4), a Lagrange multiplier (LM) chi-squared test is performed to test the validity of the instruments and the assumption that they are not significantly correlated with salaries.

The relationship between equations (3) and (4) is through the assumption that ε and u have a bivariate normal distribution and covariance matrix

$$Cov(\varepsilon, u) = \begin{bmatrix} \sigma^2 & \rho \\ \rho & 1 \end{bmatrix} \quad (5)$$

Equations (3) and (4) can be estimated using maximum likelihood (ML) techniques.[7] In addition, a likelihood ratio (LR) chi-squared can be utilized to test the hypothesis that the two error terms are uncorrelated (i.e., $\rho = 0$). If this hypothesis cannot be rejected, then OLS will provide unbiased and efficient estimates. On the other hand, if the hypothesis of uncorrelated errors is rejected by the LR test, then ML will yield better estimates of δ.

4 Data

Our sample consists of MLB free agents (players eligible to sign with any team under the MLB players' agreement) who signed contracts between 2003 and 2008 and whose salary, contract length, NTC, and performance information is complete. Although the first NTC was signed in 1999, we limit our sample to the aforementioned 6 years because official data on free-agent signings and NTCs were not made publicly available until the first year in our sample. Since a player's compensation is a function of their expected future performance for the length of the contract, we follow previous work in assuming that the average of the previous three years provides teams with their best estimate of this productivity. Consequently, we utilize performance data beginning in the 2000 season for those who signed contracts in 2003. [8]

[7] See Maddala (1983) and Greene (2008) for details on the likelihood function for treatment-effects models.

[8] Since the appropriate productivity measures for pitchers vary depending on their role (i.e., starter, long reliever, middle reliever, and stopper), a unique specification should be estimated for each type (Krautmann 1999; Krautmann and Oppenheimer 2002). In our case, the classification of pitchers into each group requires assumptions about some components of the player data and each group

Team revenue information is obtained from *Forbes*, player performance is acquired from *Lahman's Archive* and *USA Today*, and contract-specific data is gathered from the *Hot Stove Report* on the MLB.com web-site. The contract values represent inflation adjusted player compensation that is guaranteed at the time of contract negotiations. Thus, performance-based bonuses and team-player options are excluded from our data. The most common example of this type of option is when a team agrees to pay a specific salary for an agreed-upon contract length. At the end of that period, the team may have the option of retaining that player for another year at a pre-determined annual salary. This additional year and salary is not included in our compensation and contract length calculations because it is not guaranteed, depends on future rather than past performance, and will be influenced by any subsequent changes in managerial personnel or organizational structure.

Table 2 contains the descriptive statistics for the 382 batter-observations in the analysis sample. On average, these players have 12 years of experience in MLB.[9] Some players sign LTCs (up to 10 years), but most players sign 1- or 2-year contracts. The average real annual compensation in these contracts is approximately $3.3 million. Finally, about 12 percent of the batters (47 players) in our sample have NTCs in their contracts.

---

would subsequently contain a relatively small sample, so pitchers are excluded from the empirical analysis.

[9] The minimum MLB experience in the sample is 4 years because of the free agency eligibility rules. When a player is drafted, a team has the rights to that player for 3 years and each year (for a maximum of 3) has the option to retain that player for an additional 3 years. If the team wishes to keep the player, they can have the player's rights for up to 6 years. If the team does not want to retain the player after 3 years, they can release the player and he is then eligible for free agency.

[Insert Table 2]

5 Results

Figure 1 contains three graphs illustrating the changes that have occurred in contract values and contract lengths during the sample period. While contract values have been fairly stable, there is a pronounced decrease in 2006 followed by a large increase in compensation during the last two years of the sample period. This coincides with changes in the popularity of LTCs. However, using the contract length to convert total compensation into an annualized salary, illustrates that increases in contract values were not completely dependent on the presence of these longer contracts. We expect that a significant fraction of this variation in contract values can be explained by variation in the free agent talent pool, which can vary from year to year.

[Insert Figure 1]

In Figure 2, we illustrate the number of observed free agent contract signings along with those that included a no-trade option. With some slight variation, we observe approximately 66 contract signings per year. The peak of free agent signings occurs in 2006 with 76 contracts and the low occurs in 2008 with 59 contracts. Initially, it appears NTCs follow the trend of overall contract signings; that is, fewer NTCs are observed in years with fewer contracts. However, in later

years there is a discernable increase in the popularity of NTCs, as more are observed even in years when free agent signings decrease. A possible explanation of this is that as the free agent market becomes more competitive and player salaries increase, teams seek both monetary and non-monetary methods to compensate their players. This is most clearly depicted by the increased presence of the no-trade option from 5 percent of new contracts in 2004 to nearly 25 percent in 2008.

[Insert Figure 2]

The issue then is whether the market salaries have adjusted for this non-monetary form of compensation. This is first examined with OLS estimates of equations (1) and (2). These results are reported in Table 3, columns (1) and (2), respectively. In both specifications, the NTC coefficient is positive, statistically significant, and does not provide any evidence of a CWD. On the contrary, these estimates imply that players were additionally compensated by signing contracts with a no-trade option.

[Insert Table 3]

The other OLS estimates are consistent with previous work on labor markets generally and baseball specifically. First, the two individual performance measures, slugging percentage and "at-bats" both have positive effects on earnings and explain

a large fraction of the variation in contract values. Second, team revenue is positively correlated with contract values, but this becomes insignificant after controlling for the yearly trend in salaries. Third, the estimated impacts of the performance attributes are robust to changes in specification. Fourth, the return to performance is significantly smaller with longer contracts, which implies that there is a CWD associated with increased income security as shown by Krautmann and Oppenheimer. Finally, playing experience, holding other factors constant, does not have a significant impact on contract values.

A potential problem with the NTC coefficients in our OLS estimates is that they are likely to be affected by the ability of players to simultaneously negotiate for both higher salaries and no-trade options. Our treatment effects model addresses this issue. In Table 4, we report the first and second-stage ML results from our treatment effects model. As with the OLS model, we estimate two different specifications. The Wald chi-squared statistics indicate the first and second stages of the ML estimation are significant in each specification.

LM tests are also performed using a method outlined by Wooldridge (1991, 1997). The LM chi-squared values are calculated by $n \times R_{\hat{\varepsilon}}^2$, where n is the number of observations and $R_{\hat{\varepsilon}}^2$ is the R-squared value from performing a variance-weighted regression of the errors from the annual salary equation on the instruments in the NTC equation. In both cases, we fail to reject the null hypothesis of no misspecification and validate the instruments in the NTC equation. Furthermore, the LR tests reject the hypothesis that the two error terms are uncorrelated, so the

use of ML to estimate equations (3) and (4) will yield better estimates than OLS. More specifically, the NTC coefficients are biased upward with OLS, where they are positive and significant.

[Insert Table 4]

With ML estimation, the NTC coefficients are negative, statistically significant, sizeable, and fairly robust to changes in specification. The ML estimates suggest that there are actually two sources of CWDs associated with salary and employment security. There is continued support for lower returns to performance with longer contracts, but now there is an additional amount of forgone compensation resulting from the location stability of a no-trade option. Our initial point estimate suggests that there is a 44 percent decrease in compensation associated with a NTC, holding other factors constant.

Similar to our OLS estimates, slugging percentage and number of "at-bats" are positive, significant, and consistent with prior studies. Our position controls are also consistent with prior literature in that we find that infielders (excluding catchers) are paid approximately 15 percent less than outfielders. We also find that, on average, annual salary increased by 9.26 percent per year while holding other factors constant.

Once we control for this salary trend, the CWD associated with NTCs is reduced to 36 percent. Nevertheless, this still represents a substantial earnings

reduction. Evaluated at the mean, we estimate that a player earning $3.3 million per year would relinquish approximately $1.2 million in exchange for the stability of a NTC. This may appear to be an exceptionally large coefficient, but some anecdotal evidence discussed in the following section suggests that MLB players place a significant amount of monetary value on this contract option.

6 Discussion

In this paper, we examined whether the presence of a NTC results in a CWD for MLB players. Using ML estimation and an accepted MLB salary equation, we find evidence that there is a significant trade-off between monetary compensation and the risk reduction provided by a NTC. For MLB players, detailed performance and contract information allow us to identify two dimensions in which CWDs appear. Specifically, both LTCs and NTCs are a source of CWDs. Players relinquish some return to their performance in exchange for longer contracts and a quantitatively significant amount of compensation (approximately 36 percent of their guaranteed annual salary) for insurance against the possibility of being traded.

Since it is not possible to directly observe the contract negotiation process or any bargaining dealing with the no-trade option, the actual price of this contractual arrangement is unknown. As a result, it is difficult to assess the accuracy of our estimated CWD at the time of contract signing. Nevertheless, it is possible for NTCs to have an observed price associated with them at some point following

contract signing. This occurs when teams attempt a buyout of the NTC or offer to purchase a waive option. A waive option allows the team to explore trading opportunities, but the team must ultimately obtain approval from the player before the deal can be completed. Although there are only two cases in which monetary values have been directly linked to a NTC in this manner, they are enlightening nonetheless.

Roger Clemens, in 2005, was offered a waive option to his NTC in exchange for $3 million; approximately 17 percent of his $18 million one-year contract. However, the option could have been used anytime prior to the trade deadline (half way through the season), so the offer was worth up to 33 percent of the contract value. His unwillingness to accept the offer suggests that the actual value of the NTC is larger and perhaps closer to our estimated price of 36 percent.

In 2006, Bobby Abreu accepted $3.5 million (about 18 percent of his remaining contract value) for a buyout of his NTC. There are two reasons why this amount is considerably less than our model predicts. First, the player accepted a potential trade to only 1 team (the New York Yankees). So, not only did the agreement continue to exclude any risk of a trade to a low-performing team that could negatively affect the player's endorsement income and future salary, it actually resulted in a trade to a highly desirable team. Second, this agreement was reached when there was slightly more than 1 year remaining on a 5-year contract. A simple linear adjustment to the time of contract signing, when the remaining salary commitment is much larger, would likely place the value of the NTC near our

estimated value. In addition, any diminishing marginal benefit associated with a NTC as the contract approaches expiration would also explain the lower observed option price relative to our estimated value.

A major implication of this evidence is that teams can utilize non-monetary benefits such as a NTC to retain high-performing players. Team management can also use the risk reduction derived from a NTC as leverage in the negotiation process. In November 2006, professional sports agent, Scott Boras said, "star players often seek no-trade clauses because they don't want to deal with the trauma of uprooting their families every two or three years (Crasnick 2006)." Perhaps the estimated cost of a NTC, 36 to 44 percent of the contract value, is large because players assign a considerable amount of value to the risk reduction. The income effect may also play a significant role here. Since the player contracts are worth millions of dollars (even after relinquishing a large sum for a NTC), the marginal utility of income may be close to zero while other forms of non-wage compensation become relatively much more valuable.

Moreover, the high price of NTCs may be due to the fact that they can result in a complete transfer of "future performance risk" from the player to the team. Not only does mobility become the individual player's choice, but the team now bears all the risk of a player's performance deterioration and subsequent fan disapproval. These results outline a compensating wage effect that has not yet been explored in other studies of MLB salaries and should motivate additional studies as these contractual arrangements become increasingly more common.

References

Borjas, George J. 2005. *Labor Economics*, 3rd edition. New York: McGraw-Hill Irwin.

Crasnick, Jerry. 2006. Phillies Hamstrung by Burrell's No-Trade Clause. *ESPN.com*, November 8, http://sports.espn.go.com/mlb/columns/story?columnist=crasnick_jerry&id=2653713, gleaned on June 18, 2008.

Fairris, David. 1989. Compensating Wage Differentials in the Union and Nonunion Sectors. *Industrial Relations*, 28(3), 356-72.

Fort, Rodney and James Quirk. 1996. Overstated Exploitation: Monopsony versus Revenue Sharing in Sports Leagues. In J. Fizel, E. Gustafson, and L. Hadley (eds.), *Baseball Economics: Current Issues*. Connecticut: Greenwood, 159-75.

French, Michael T. and Laura J. Dunlap. 1998. Compensating Wage Differentials for Job Stress. *Applied Economics*, 30(8), 1067-75.

Greene, William H. 2008. *Econometric Analysis*, 6th edition. New Jersey: Prentice-Hall, Inc.

Hamermesh, Daniel S. and John R. Wolfe. 1990. Compensating Wage Differentials and the Duration of Wage Loss. *Journal of Labor Economics*, 8(S1), S175-97.

Kahn, Lawrence M. 1993. Free Agency, Long-Term Contracts and Compensation in Major League Baseball: Estimates from Panel Data. *Review of Economics and Statistics*, 75(1), 157-64.

Krautmann, Anthony C. 1999. What's Wrong with Scully-Estimates of a Player's Marginal Revenue Product. *Economic Inquiry*, 37(2), 369-81.

Krautmann, Anthony C. and Margaret Oppenheimer. 2002. Contract Length and the Return to Performance in Major League Baseball. *Journal of Sports Economics*, 3(6), 6-17.

Maddala, G. S. 1983. *Limited Dependent and Qualitative Variables in Econometrics*. New York: Cambridge University Press.

Maxcy, Joel. 2004. Motivating Long-Term Employment Contracts: Risk Management in Major League Baseball. *Managerial and Decision Economics*, 25(2), 109-20.

Purse, Kevin. 2004. Work-Related Fatality Risks and Neoclassical Compensating Wage Differentials. *Cambridge Journal of Economics*, 28(4), 597-617.

Rosen, Sherwin. 1974. Hedonic Prices and Implicit Markets. *Journal of Political Economy*, 82(1), 34-55.

Scully, Gerald W. 1974. Pay and Performance in Major League Baseball. *American Economic Review*, 64(6), 915-30.

Smith, Adam. 1776. *An Inquiry into the Nature and Causes of the Wealth of Nations*, 1976 E. Cannan and G. J. Stigler edition. Chicago: University of Chicago Press.

Smith, Robert. 1974. The Feasibility of an "Injury Tax" Approach to Occupational Safety. *Law and Contemporary Problems*, 38(4), 730-44.

Thaler, Richard and Sherwin Rosen. 1975. The Value of Saving a Life: Evidence from the Labor Market. In N. E. Terleckyj (ed.), *Household Production and Consumption*. New York: National Bureau of Economic Research, 265-97.

Viscusi, W. Kip. 1980. Unions, Labor Market Structure, and the Welfare Implications of the Quality of Work. *Journal of Labor Research*, 1(1), 175-92.

Viscusi, W. Kip. 1993. The Value of Risks to Life and Health. *Journal of Economic Literature*, 31(4), 1912-46.

Wooldridge, Jeffrey M. 1991. Specification Testing and Quasi-Maximum-Likelihood Estimation. *Journal of Econometrics*, 48(1-2), 29-55.

_____. 1997. On the Limits of GLM for Specification Testing: A Comment on Gurmu and Trivedi. *Econometric Theory*, 10(2), 409-18.

Table 1: Variable List and Definitions

Name	Definition
Dependent Variable	
lnanncomp	natural log of real (2003 dollars) annualized compensation
Explanatory Variable	
slg	slugging percentage, previous 3-year average
ab	at-bats, previous 3-year average
catcher	1 if player's position is catcher, 0 otherwise (infield or outfield)
infield	1 if player's position is in the infield, 0 otherwise (catcher or outfield)
lnteamrev	natural log of real (2003 dollars) team revenue in previous year
conlength	contract length (in years)
ntc	1 if player signed contract with a no-trade clause, 0 otherwise
exper	experience; number of years in Major League Baseball
expersq	experience squared
trend	time trend
wswin	1 if player's team won the World Series in previous year, 0 otherwise
foreign	1 if player is foreign-born, 0 otherwise

Table 2: Sample Descriptive Statistics

Variable	Mean	Std. Dev.	Min.	Max.
lnanncomp	14.4416	1.0315	12.5240	16.9468
slg	.4192	.0718	.1583	.6747
ab	326.2212	148.3703	5	684
catcher	.1963	.3977	0	1
infield	.4581	.4989	0	1
lnteamrev	18.7445	.2466	17.9826	19.4226
conlength	1.8010	1.4113	1	10
ntc	.1230	.3289	0	1
exper	11.6885	3.6815	4	25
expersq	150.1387	95.2450	16	625
trend	3.4503	1.6794	1	6
wswin	.0497	.2177	0	1
foreign	.2932	.4558	0	1

Notes: $N = 382$.

Table 3: Ordinary Least Squares Regression Estimates

Explanatory Variable	(1)	(2)
slg	5.0088***	4.9412***
	(.7747)	(.7537)
ab	.0026***	.0026***
	(.0003)	(.0003)
catcher	-.0083	-.0174
	(.0792)	(.0763)
infield	-.1071	-.1153*
	(.0670)	(.0664)
lnteamrev	.2932***	.1173
	(.1028)	(.1145)
conlength	.8582***	.8402***
	(.1566)	(.1465)
slg × conlength	-1.2023***	-1.1350***
	(.2837)	(.2665)
ntc	.3112***	.2480***
	(.0956)	(.0957)
exper	-----	.0000
		(.0386)
expersq	-----	.0003
		(.0016)
trend	-----	.0748***
		(.0191)
R^2	.7241	.7372

Notes: $N = 382$. Robust standard errors in parenthesis; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 4: Maximum Likelihood Regression Estimates

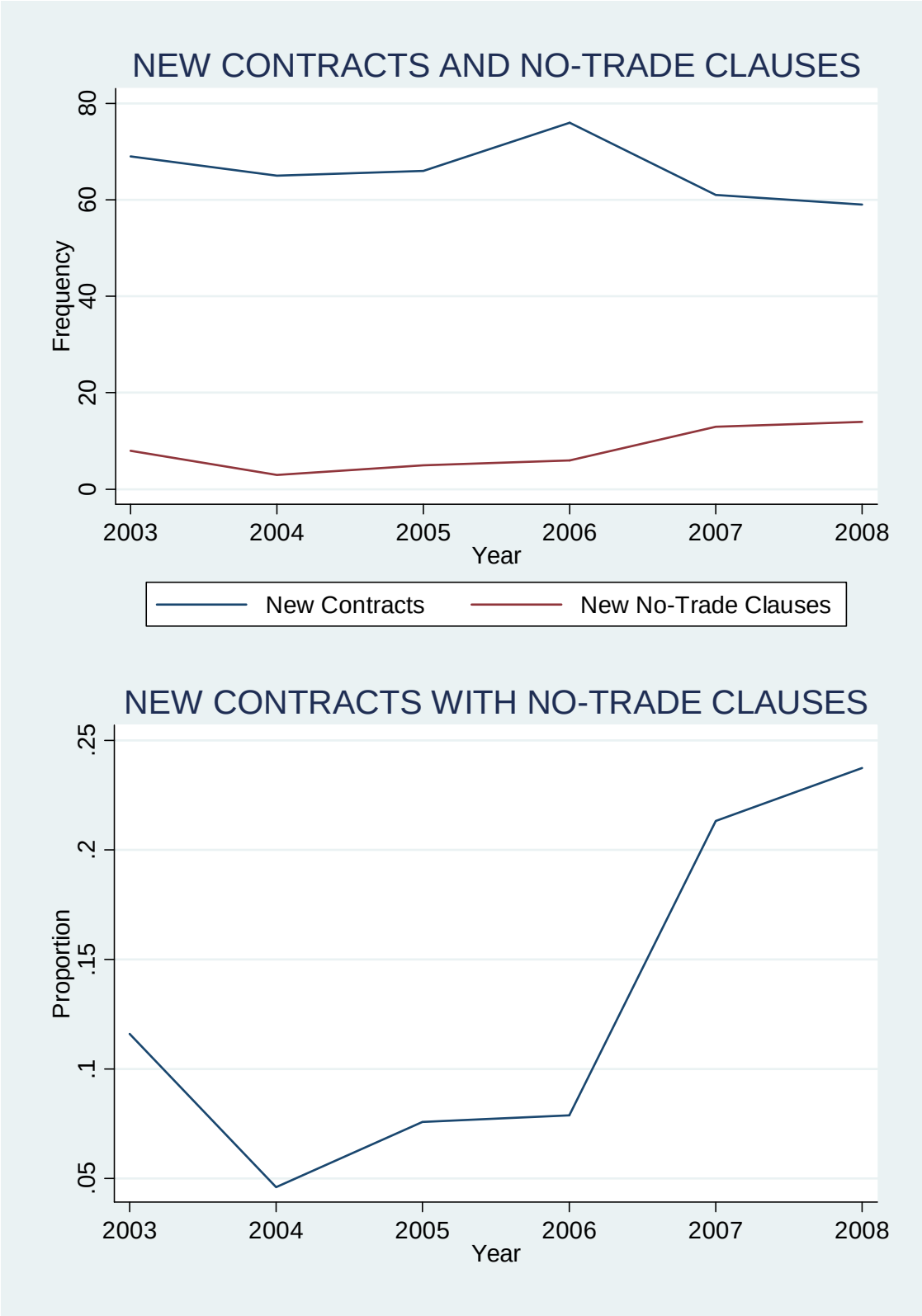
	Dependent Variable:			
	lnanncomp	ntc	lnanncomp	ntc
Explanatory Variable	(1a)	(1b)	(2a)	(2b)
slg	5.3037***	8.0328***	5.1856***	9.9171***
	(.8366)	(2.7640)	(.8389)	(3.4310)
ab	.0030***	.0029***	.0029***	.0028***
	(.0003)	(.0010)	(.0003)	(.0011)
catcher	.0530	.5793*	.0303	.5586*
	(.0837)	(.2974)	(.0784)	(.3048)
infield	-.1472**	-.1025	-.1500**	-.1107
	(.0704)	(.2490)	(.0683)	(.2538)
lnteamrev	.3307***	.1599	.1083	-.5753
	(.1098)	(.3918)	(.1176)	(.4755)
conlength	.8124***	1.2929***	.7701***	1.2557***
	(.1366)	(.4640)	(.1381)	(.4838)
slg × conlength	-.9918***	-1.8839**	-.9025***	-1.8041*
	(.2673)	(.9144)	(.2760)	(.9766)
ntc	-.4406***	-----	-.3614*	-----
	(.1457)		(.2258)	
exper	-----	-----	.0371	-.1052
			(.0386)	(.1474)
expersq	-----	-----	-.0011	.0024
			(.0015)	(.0062)
trend	-----	-----	.0926***	.2967***
			(.0205)	(.0801)
wswin	-----	.4011	-----	.6180**
		(.3090)		(.3129)
foreign	-----	-.3186	-----	-.4225*
		(.2397)		(.2321)
Wald χ^2 overall	1213.41***	71.31***	1241.57***	53.91***
χ^2 instruments		3.65		7.71**
LM χ^2 specification	.65		.96	
$\hat{\rho}$	.7615		.6854	
LR χ^2 (test $\rho = 0$)	7.21***		5.03**	

Notes: $N = 382$. Robust standard errors in parenthesis; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Figure 1


AVG REAL CONTRACT VALUES
2003 Dollars (in millions)
5
10
15
2003
2004
2005
2006
2007
2008
Year
LONG-TERM CONTRACTS
Average Length (in years)
1.4
1.6
1.8
2
2.2
2003
2004
2005
2006
2007
2008
Year
AVG REAL YEARLY SALARIES
2003 Dollars (in millions)
2.5
3.0
3.5
4.0
4.5
2003
2004
2005
2006
2007
2008
Year

Figure 2


NEW CONTRACTS AND NO-TRADE CLAUSES
Frequency
0
20
40
60
80
2003
2004
2005
2006
2007
2008
Year
New Contracts
New No-Trade Clauses
NEW CONTRACTS WITH NO-TRADE CLAUSES
Proportion
.05
.1
.15
.2
.25
2003
2004
2005
2006
2007
2008
Year