

New Evidence in the Study of Shirking in Major League Baseball

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ABSTRACT

This paper uses Major League Baseball data to examine the relationship between years remaining on player contracts and player performance. There is a potential for moral hazard to arise in this principal-agent relationship as the player may choose a less than optimal level of effort from the perspective of team management when the player has many guaranteed years remaining. A player fixed-effects estimation strategy is employed, which finds a negative, significant relationship between years remaining and performance. The primary contribution of this work is to show that this relationship is due to shirking. Alternative explanations for this relationship, that teams sign improving players to multi-year contracts or players face an adjustment process when joining a new team, are addressed. Additional evidence which is consistent with shirking behavior shows that shirking occurs on offense, not defense, and for position players, not pitchers. (Keywords: Multi-year Contracts, Performance, Agency Theory)

INTRODUCTION

The proper alignment of incentives in principal-agent relationships is a long-studied issue in the field of economics (Ross, 1973; Holmström, 1979). One relationship that has received attention is the relationship between employer (the principal) and employee (the agent). In this relationship, the employer is concerned with the potential for moral hazard to arise. Moral hazard may arise if the employee has job security, and subsequently exerts diminished effort, or shirks, and performs at a low level. Professional sports are an ideal environment to study this potential for shirking because players commonly have contracts with guaranteed salary, contract data is publicly available, and while effort is not directly observable, performance is. Sports scholars have given considerable attention to agency relationships, with recent works looking at those including the player-agent relationship (Krautmann, von Allmen, & Walters, 2018) and the team-player relationship (Paulsen, 2018; Krautmann, 2018). This paper will use variation in contract length in Major League Baseball (MLB) to study the relationship between player performance and years remaining on the player's contract.

While multi-year contracts have the potential to induce sub-optimal effort, there are multiple reasons why sport managers may want to sign players to multi-year contracts. An obvious reason is that multi-year contracts may be necessary to attract the best talent, and fans like watching talented players. Multi-year contracts can also be beneficial because fans get attached to certain players and have a preference for roster continuity (Kahane & Shmanske, 1997). Further, the signing of a player to a multi-year contract worth potentially hundreds of millions can be thought of as an investment in a major asset, and multi-year contracts may impact asset specificity. Specifically, long-term contracts have been found to be positively related to relationship specific investments (Joskow, 1987; Dubois & Vukina, 2016; Kacker,

2016). This finding is supported in the context of Major League Baseball as well. Lin and Yang (2016) find that catchers, who play an important role in working with a team's pitching staff, are more likely to be signed to multi-year contracts. Beyond catchers, multi-year contracts may influence the home-stadium specific human capital investments players make in their hitting or pitching styles. They may also influence the investments teams make in managerial and training staff. Because management in sports organizations may reap these and other potential benefits from investing in multi-year player contracts, fully understanding the costs associated these contracts can help managers to make optimal contracting decisions.

As shirking in Major League Baseball has received some attention in the literature, it is important to call attention to this paper's contributions. First, while some past literature has found evidence consistent with shirking, the evidence is mixed. Further, past literature that has identified relationships between contract years remaining and decreased performance has argued that this is due to shirking, without consideration of other potential explanations for this relationship.¹ This paper will address alternative explanations and will present evidence that is consistent with the argument that the relationship is driven by player shirking. Second, this paper will use a player fixed-effects estimation strategy to identify the impact of years remaining on a contract and player performance. A fundamental challenge in identifying this relationship is that those players who receive multi-year contracts are of higher ability and have more scope to shirk than those who do not. As ability is positively related to both contract length and performance, failing to control for this positive selection into multi-year contracts will cause the estimated coefficient in a regression of performance on years remaining to be upward biased. A player fixed-effects regression controls for innate ability by estimating a player-specific coefficient,

¹ The alternative explanations tested here have been proposed by the author, other readers of this work, and conference/seminar participants, motivated by this and prior research on the topic.

controlling for time-invariant player characteristics. When estimating this coefficient, other time-varying player characteristics that affect player performance are held constant.

Shirking occurs when an employee exerts effort in an employer-employee relationship that is sub-optimal in the eyes of the employer. For such behavior to occur, the relationship must have certain characteristics. Effort improves production, but the relationship between effort and production is noisy. While production is observable, effort is not and is costly to monitor, and cannot be contracted upon. The employee must face a cost to exerting effort. If such characteristics exist, the employee may find it optimal to shirk (Holmström, 1979). MLB presents settings that are ideal for trying to identify shirking for multiple reasons. Players in MLB are typically signed to contracts that vary in length from one year to ten or more years. Due to the strength of the MLB Players Association, these contracts are essentially guaranteed.² Fixed-length multi-year contracts allow for the identification of shirking as player incentives vary throughout the duration of the contract. Assuming future employers place more weight on recent performance when hiring, when an employee is in a multi-year contract and anticipates signing a new contract at the end of the current contract, the employee has an incentive to shirk and exert low effort at the start of the contract but increase levels of effort as the contract approaches its end (Cantor, 1988).

The primary research question that this study looks to answer is “Does signing Major League Baseball players to contracts that are multiple years in length cause players to shirk in the early years of such contracts?” This paper looks to first identify a causal relationship between the number of years remaining on a player’s contract and player performance. Using a player fixed-

² The Player’s Association has made many attempts to void contracts without paying unsuccessful. This includes instances of players being charged with driving while intoxicated, assault, smuggling drugs with intent to distribute, and solicitation of a prostitute. A rare case where a player was successfully terminated occurred when a player grabbed his team’s general manager by the neck and repeatedly slammed him to the ground (Macramalla, 2013).

effects estimation strategy, evidence of a negative relationship between contract years remaining and performance is found. Past studies that find evidence of a negative relationship between contract length and player performance claim that this is due to shirking in the early years of a contract.³ However, there are alternative explanations for why player performance may improve throughout the duration of a contract other than shirking, two of which are addressed in this study. First, signing a new, multi-year contract could mean the player is undergoing other changes if this new contract is signed with a new team. Second, teams may be more likely to sign players that they expect to improve over time to multi-year contracts. To further convince the reader that the results are driven by shirking, heterogeneity in player performance between non-pitchers and pitchers, and between offensive and defensive performance for non-pitchers, will be considered. A player shirks in MLB by violating the terms of his contract. Knowing how a player can shirk helps in predicting for which types of player and within which parts of the game shirking is more likely to occur.⁴ The presented results are consistent with the hypothesis that the negative relationship between years remaining and performance is driven by player shirking.

LITERATURE

A long literature in the field of economics has given attention to incentives for employee effort in the relationship between employer and employee.⁵ Sports have long been an ideal setting to test labor economics theories empirically. Some of the earliest works using sports data

³ Lehn (1982), Scoggins (1993), Krautmann and Solow (2009), and Hakes and Turner (2008) all find evidence of an inverse relationship between contract length and player performance. Krautmann and Donley (2009) and Berri and Krautmann (2006) both use two different dependent variables and find evidence of a negative relationship with one of the two measures but not the other.

⁴ The Uniform Player's Contract presented in the Collective Bargaining Agreements between the thirty teams and the Players Association outlines expectations for players. Specifically, the player is expected to use his "exceptional and unique skill and ability as a baseball player" in performance for his team during spring training, the regular season, and the playoffs. Also, players are expected to remain in "first-class physical condition" and follow training rules specified by the team (MLB, 2006; MLB, 2011; MLB, 2016).

⁵ See Pendergast (1999) for a detailed review of theoretical and applied works in this area.

in this way include a theoretical work by Rottenberg (1956) and an empirically focused work by Scully (1974), which analyze the MLB as a setting in which firms have monopsony power in the labor market due to the Reserve Clause. Since the introduction of free agency in Major League Baseball in the mid-1970s and in other American professional sports shortly thereafter, sports have provided an ideal setting to test for shirking behavior. Free agency led to the signing of multi-year guaranteed contracts in the MLB. From a theoretical perspective, costly exertion of effort should lead to diminished performance early in a multi-year contract, but improved performance toward the end as the player hopes to sign a new contract following the expiration of the current contract (Cantor 1988).

Lehn (1982) was the first to use MLB player data to test the shirking hypothesis empirically. Lehn (1982) posited that guaranteed multi-year contracts may affect the likelihood of player injury as players with job security may shirk on physical conditioning. Using an Ordinary-Least Squares (OLS) regression of years remaining on days spent on the injured list, Lehn (1982) found evidence of a direct relationship between years remaining and player injury, supporting the shirking hypothesis. Following this work, using Slugging Average (SA) to measure player productivity, Krautmann (1990) tested the shirking hypothesis by analyzing the stochastic nature of player productivity. Krautmann (1990) highlighted that even the best players experience great variability in their performance across their careers, and posited that if performance is stochastic, one would generally expect that player performance across seasons will fall within confidence intervals surrounding mean career performance, with few outliers. Shirking was then identified as performance outside of the confidence interval. Evidence supporting this hypothesis was found, with few players signing long-term contracts performing abnormally strongly in the year prior to signing a new contract or abnormally poorly in the year

following signing a new contract, and a similar fraction of players performing above and below average in the year preceding and following a new contract. Scoggins (1993) commented that Total Bases may be a better way to measure player performance and used regression analysis to find evidence of an inverse relationship between long-term contracts and performance, but Krautmann (1993) rebutted this comment finding similar evidence to Krautmann (1990) using Total Bases to measure performance instead of Slugging Average.

Following the success of the Oakland A's in the early 2000s and the release of the book *Moneyball*, On-Base Plus Slugging Average (OPS) became a popular measure of player hitting productivity. Hakes and Turner (2008) tested the shirking hypothesis using OLS regressions and a first-differenced OPS as the performance dependent variable. Using this approach, they found evidence of an inverse relationship between contract years remaining and performance. Krautmann and Solow (2009) similarly used OPS to measure performance and found evidence of an inverse relationship between contract length and performance, controlling for the likelihood of player retirement. Krautmann and Donley (2009) tested for the shirking hypothesis using two different approaches. In each approach, a shirking variable was created, which was defined as expected performance minus realized performance. In one approach, expected performance was measured as the average of the three prior seasons of OPS, and realized performance was actual OPS. The second approach used salary as expected performance, and a measure of marginal revenue product (MRP) as realized performance. Evidence of an inverse relationship between long-term contracts and performance was found using the MRP measure, but not the OPS measure.

A related literature in Major League Baseball looks at a closely related issue, whether players engage in opportunistic behavior in the final season of contracts. Using a player fixed-

effects identification strategy, O'Neill (2013) found evidence of players engaging in opportunistic behavior in the final season of multi-year contracts by performing at an abnormally high level. While baseball has some advantages over other sports as a testing grounds for the shirking hypothesis, namely that performance is relatively individual, and data availability is greater, shirking has been assessed in other sports settings. Like Krautmann and Donley (2009), Berri and Krautmann (2006) used both a standard production and a marginal revenue product approach to testing for shirking in the National Basketball Association (NBA). They found evidence of an inverse relationship between contract length and performance using the standard production approach, but not using the MRP approach.

Empirically testing the shirking hypothesis has also occurred in other labor market settings where employees have job security. One common similar setting is in education with the tenure system. Carmichael (1988) and McPherson and Schapiro (1999) presented theoretical discussions of the role of tenure in the university setting. For professors, studies have found empirical evidence of a fall in publishing with age, and a drop-off following tenure (Holley, 1977; Levin & Stephan, 1991; Faria & McAdam, 2015). For schoolteachers, rises in absenteeism following tenure have been found (Hansen, 2009; Jacob, 2013; Jones, 2015). The shirking hypothesis has also been tested empirically following law changes affecting worker job security. Evidence of increases in absenteeism have been found, following law changes making it harder to fire workers (Scoppa, 2010; Ichino & Riphahn, 2005).

The primary drawback of prior work testing the shirking hypothesis using MLB data is that when evidence of an inverse relationship between contract length and performance is found, the authors have declared this is sufficient evidence that shirking has occurred.⁶ While this is a

⁶ To give one example, in their abstract, Krautmann and Donley (2009) state 'Shirking is inferred if the player's actual performance falls below expected performance in the year following a newly signed contract' when

necessary condition, one could formulate alternative explanations for this relationship. This study will look to improve upon past work addressing alternative explanations for this relationship and presenting additional evidence consistent with shirking behavior. Additionally, a more complete measure of player contribution to team production will be used to measure performance and a stronger identification strategy will be pursued.

DATA AND EMPIRICAL STRATEGY

This study looks to identify the relationship between years remaining on a player's contract and player performance. The key independent variable is the number of years remaining on the player's contract. Player contract data comes from the Cot's Baseball Contracts website. This website has team payroll data dating back to 2000, and player contract data starting with the 2009 MLB season (Euston, n. d.). Consequently, the data employed in this study for the primary analysis consists of yearly player data from the 2010 to 2017 seasons.

For the purpose of the main analysis, the sample in this study will be restricted to non-pitchers, as is standard in the literature, with three or more years of MLB service.⁷ The final sample includes 1,829 contract-year observations, 1,068 of which come from players in the first year of a new contract. The sample consists of observations for 535 unique players, with the average player appearing in the sample for 3.4 seasons. While not the focus of the primary analysis, pitchers will be used for analysis presented in Table 8.

referencing studies in sports economics looking at the shirking in problem. In their own study, they find evidence of below expectation performance using their MRP measure, and in their conclusion they state 'we do find evidence of shirking when using MRP.' A viable alternative explanation for their findings here is that per Table A1, the three biggest shirkers are Carlos Beltran, Magglio Ordonez, and Adrian Beltre, all of whom joined a new team and could've struggled for this reason.

⁷ The sample is restricted to only those with at least three years of experience because of rules regarding player contracting outlined in the Collective Bargaining Agreement (CBA). For players acquired by a team through the player draft, the team has rights over the player outlined in the CBA. The player must accept the team's offer if the player has fewer than three years of MLB experience. As a result, players in the first three years are typically given one-year contracts that pay approximately the league minimum. In one later table (Table 4) the sample is restricted to only those free-agency eligible (MLB, 2016).

Table 1 shows contract lengths of new contracts in the sample. Just over twenty-five percent of contracts in the sample exceed one year in length. Of contracts greater than one year in length, contracts of two years are most common, with the frequency of contracts decreasing as contract length increases.

The measure of performance will be Wins Above Replacement (WINS⁸). Data for WINS comes from the Baseball-Reference website (Baseball-Reference.com). Wins Above Replacement is a newer advanced metric developed by baseball statisticians to measure player performance. The goal of WINS is to have an all-inclusive measure of player contribution to his team. The value of WINS is interpreted as the number of wins a player adds to his team relative to a replacement level AAA (minor league) or MLB bench player. While multiple sites calculate WINS, the two most commonly used measures come from Fangraphs.com and Baseball-Reference.com. WINS data for this study come from Baseball-Reference.com.⁹ Position players contribute wins through batting, base-running, and fielding. To calculate WINS¹⁰, one adds batting runs added, base-running runs added, and fielding runs added, and then divides by runs per win. In this calculation, adjustments are made by position and league.

Additional independent variables which serve as control variables will be included in regressions as well. These variables include age, an indicator for six or more years of MLB experience (service), league, and position. Data for these variables comes from the Baseball-

⁸ The standard acronym for Wins Above Replacement is WAR. The use of WINS here is due to author preference.

⁹ For 2017, the correlation coefficient between the two measures is approximately 0.7. Among top batters in 2017, six of the top ten in WINS are common across the sites. For a detailed description of differences between these two measures and other common measures, see www.baseball-reference.com/about/war_explained_comparison.html.

¹⁰ On-Base Plus Slugging Percentage (OPS) has been commonly used in the literature. The primary difference between the two measures of performance is that WINS is a function of batting, fielding, baserunning, and games played, while OPS is only a function of batting. Using OPS to calculate the results presented later on gives similar results to those presented using WINS.

Databank website. This website has comprehensive player and team data dating back to 1871 (Baseball-Databank.org).

Descriptive statistics are presented in Table 2. Means and standard errors are presented first for the whole contract-year sample, then for one-year contracts, then for multi-year contracts with one year remaining, then for contracts with two or more years remaining. The mean value of WINS is 1.48. Despite being significantly younger on average, players on one-year contracts have WINS that are significantly lower than that of players in the final year of a multi-year contract. Positive selection into multi-year contracts is likely driving this difference. This highlights the need to control for this selection. Mean performance for those under multi-year contract is higher with two or more years remaining than in the final year. This runs counter to the shirking hypothesis. However, the players are significantly older in the final year of multi-year contracts, which highlights the need to control for age.

When trying to identify the relationship between years remaining on a player contract and player performance, it is important to address positive selection into multi-year contracts. Teams are most likely to give multi-year contracts to the best players. As player ability is likely to be positively related to both contract length and performance, omitting player ability in regressions of performance on contract years remaining will lead to coefficient estimates that are upward biased. As discussed previously, a player fixed-effects estimation strategy will be used to address this bias. To test for the impact of contract years remaining on player performance, regressions will be run of the form

$$PERFORMANCE_{it} = \beta_0 + \beta_1 YEARSLEFT_{it} + \beta_2 ONEYEAR_{it} + \beta_X X_{it} + \alpha_i + \lambda_t + \varepsilon_{it},$$

where *PERFORMANCE* will be measured using WINS, *YEARSLEFT* is years remaining on the contract, *ONEYEAR* is a dummy variable indicating a one-year contract, *X* is a vector of control

variables which include age and age-squared¹¹, an indicator for six or more years of experience, league and position dummies¹², α_i is the individual fixed effect, and λ_t is a time fixed effect. The coefficient of interest here is β_1 . If players shirk, this coefficient is expected to be negative.

It is also possible that the relationship between years remaining on a contract and performance is non-linear. Krautmann and Donley (2009) suggest that players may want to avoid gaining a reputation as a shirker because this could hurt their chances of receiving multi-year contracts in the future. If this is the case, players may shirk, but only up to some maximum level. Since it is likely that professional athletes enjoy playing the sport that is their job, players could also place a limit on shirking behavior if they fear that too much shirking could lead to reduced playing time. If shirking by players is bounded by some upper limit, rather than seeing performance monotonically decrease with contract length, it is possible that it plateaus. To address the possibility that the relationship between years remaining (YEARSLEFT) and performance (PERFORMANCE) is non-linear, regressions will also be run where years remaining is split into separate dummy variables indicating two years remaining, three years remaining, and four or more years remaining. The estimating equation in this case is

$$PERFORMANCE_{it} = \beta_0 + \beta_1 TWOYEARSLEFT_{it} + \beta_2 THREEYEARSLEFT_{it} + \beta_3 FOURPLUSYEARSLEFT_{it} + \beta_4 ONEYEAR_{it} + \beta_X X_{it} + \alpha_i + \lambda_t + \varepsilon_{it},$$

where *TWOYEARSLEFT*, *THREEYEARSLEFT*, and *FOURPLUSYEARSLEFT* are dummy variables indicating two, three and four or more years remaining on a contract.

RESULTS

Fixed Effects Regression Results

¹¹ Including age quadratically in labor regressions is common. Literature in sports, including Hakes and Turner (2011) using MLB player data, highlight that athlete performance also follows a quadratic relationship.

¹² The position dummies are binary indicators for fielding position, and include the eight non-pitcher fielding positions, as well as designated hitter, general infielder, and general outfielder.

To identify the impact of contract years remaining on player performance, regressions are run with WINS as the measure of performance. Table 3 shows the results of these regressions. Column one shows results without the inclusion of player fixed-effects. Years left is regressed linearly in the second column, and with separate dummy variables for two years left, three years left, and four or more years left in the third column.

As predicted by theory, the results show a negative relationship between years remaining on the contract and player performance using WINS as the outcome variable. In the first specification, without fixed effects, the coefficient on Years Left is positive, suggesting that having more years remaining on a contract improves performance. This highlights the positive selection into multi-year contracts. This positive selection is also supported by the negative and significant coefficient on the variable indicating having a one-year contract. Adding in fixed effects in the second column causes the coefficient on years left to turn negative. The magnitude of the coefficient indicates that each additional year remaining leads to a fall in player performance of about 0.08 WINS. This is a sizeable impact relative to the mean. Also, note the positive and significant coefficient on one year contract. This coefficient suggests that when a player is in a one year contract, the incentive to prove one's value is even stronger than when a player is in the final year of a multi-year contract.

The third specification tests for the possibility that the relationship between contract years remaining and performance may be non-linear.¹³ As indicated by coefficients on the years remaining variables, the impact of years remaining on performance does not appear to increase

¹³ Three additional non-linear specifications were considered: quadratic, an indicator for 2 years or more remaining, and an indicator for 4 years or more remaining. The fit of the regression was worse than linear for the quadratic and 4 years or more remaining specifications, but better for the separate dummies and 2 years or more remaining specifications. While the fit was slightly better with the 2 years or more indicator than separate dummies, author preference and theory led to the selection of the separate dummies specification.

linearly. Rather, it appears that performance is at its highest in the final year of the contract and at a comparable lower level in all other years. Wald tests for the significance of differences between the pairwise combinations of these three coefficients confirms that they are not statistically significantly different. Relative to the final year of the contract, with two or more years remaining players add about 0.3 fewer wins relative to a replacement level player.¹⁴

Additional Sample Restriction

To ensure the robustness of the presented results showing the relationship between years remaining and performance, regressions are run with an additional sample restriction. The sample is restricted to include only those players with at least six years of service in MLB. While the previous analysis included those with at least three years of service, this further restriction causes the sample to include only those who are free agent eligible, rather than those free agent or arbitration eligible. While this greatly reduces the sample for analysis, this is the sample restriction most common in the literature.

Results of regressions using a sample of free-agency eligible players only are presented in Table 4. Like Table 3, the first column shows results without the inclusion of fixed-effects. Here again the coefficients on years left and the one-year contract indicator suggest positive selection into multi-year contracts. In the fixed effects specifications, columns two and three, the coefficients indicate a negative and significant relationship between years remaining on a contract and performance.

EVIDENCE OF SHIRKING

¹⁴ As a robustness check to test for the possibility of an immediate drop in performance following the signing a multi-year contract, the Table 3 regressions were also run including an indicator for year one of a multi-year contract. In the fixed-effects specifications this coefficient was insignificant, so the results are not reported.

A drawback of past work studying the relationship between contract length and player performance in MLB is a lack of convincing evidence that the observed relationship is driven by shirking, rather than some alternative explanation. There are other potential reasons to believe that an observed negative relationship between years remaining on contracts and player performance is possible. Two possible alternative explanations will be addressed here. First, the possibility that the observed relationship is due to players adjusting to signing multi-year contracts with a new team will be addressed. Second, the possibility that teams sign players they expect to improve to multi-year contracts will be addressed.

Evidence that is consistent with what would be expected of shirking players will be also presented. First, WINS for the non-pitcher sample will be split into offensive WINS and defensive WINS. Under the assumption that players do not want to get caught shirking, players may be more likely to shirk on offensive than on defense. Second, results will be presented for pitchers. As the pitcher's game is controlled more closely by the team, and pitchers report to the team for spring training earlier than hitters, pitchers should be less likely to shirk.

Addressing Alternative Explanations

One possible explanation for this observed relationship is that signing a new contract may lead to changes for the player. Signing a new contract could involve signing with a new team. Adjusting to a new situation could cause performance to suffer at the start of a new contract. During a player's tenure with his team, he is likely to acquire some firm-specific human capital. This firm-specific human capital could be related to experience playing in the home stadium, playing with a group of teammates and coaches, or more (Leeds, von Allmen, and Matheson, 2018). Pollard (2002) finds that teams experience a fall in home-field advantage when moving to

a new stadium. As such it is reasonable to believe that a player may see an effect when moving to a new home stadium.

To address the possibility that changing teams is driving the relationship between years remaining and performance, two approaches are taken. Regressions are run controlling for whether a player has joined a new team and interacting this new team dummy with the years remaining variables. A second approach is to control for the player's tenure with his team. Table 5 shows results for these regressions. The first two specifications include the controls relating to joining a new team, while the last two specifications control for tenure. In the first specification, the impact of years left remains negative and significant, while the coefficient on the interaction term is not significant. In the second specification, the two and three years left coefficients increase in magnitude and are significant. The coefficients on the new team-two years left interaction term is positive and significant, while the other interaction terms are not significant. The third and fourth specifications control for player tenure with his team. Relative to the results presented in Table 3, the coefficients on the years remaining variables have increased when controlling for tenure. As the coefficients of interest remain negative and significant in each of these specifications, there is no evidence to support that this alternative explanation is driving the relationship between years remaining and performance. Of interest also is that the coefficient on tenure is negative. It is possible that more time spent with the same team facing the same opponents may hurt a hitter, as those opposing pitchers learn the hitter's weaknesses, leading to a fall in performance with tenure.

Another possible explanation for the observed inverse relationship between contract years remaining and performance is that teams sign players to multi-year contracts if they expect the players to improve over time. If a team correctly believes the player it is signing to a multi-year

contract is on an upward trajectory, the relationship between years remaining on a contract and performance will be negative, just as would be the case if the player shirks. To address the possibility that the observed relationship between years remaining and performance is due to the team signing players it expects to improve, regressions will be run controlling for player salary.¹⁵ In a competitive labor market, players will be paid salaries commensurate with their marginal revenue product. If the team signs a player it expects to improve to a multi-year contract, this should be reflected in the yearly salaries during the contract. For this analysis, the sample will be restricted to only players with six years of service. This is because the salaries of free agent eligible players will be most reflective of the team's valuation of the player. For arbitration eligible players, the team has greater monopsony power and the salary may not be representative of the team's valuation.

Table 6 presents the results of regressions testing the possibility that team expectations of player improvement are driving the relationship between years remaining and performance. When including years left linearly, the coefficient of interest remains negative and significant. This, too, supports the notion that the relationship between contract years remaining and performance is not being driven by those players teams expect to improve during their contracts. The second specification again shows an increasing relationship between years left and WINS, like that of the restricted sample presented in Table 4.

Shirking Evidence

Based on the expectations for players outlined in the Uniform Player Contract outlined in recent iterations of the Collective Bargaining Agreement, there are two ways in which a player

¹⁵ Salary is measured in millions of dollars, adjusted for inflation using the Consumer Price Index (base year = 2010). Salary is yearly salary, which varies throughout the duration of player contracts. This data also comes from the Cot's Baseball Contracts website (Euston, n. d.).

can shirk. Either players shirk by not remaining in good physical shape, or players fail to exert optimal effort during games (MLB, 2006; MLB, 2011; MLB, 2016). Two sources of heterogeneity will be used to shed light on shirking behavior. First, heterogeneity in offensive and defensive performance will be explored for non-pitchers. Assuming the player does not want to get caught and labeled as a “shirker”, the player may try to shirk in ways that are the least observable. As such, a player may not want to shirk on defense. When playing in the field, it is easy to observe a player that does not give maximum effort when chasing down a fly ball or making throws to first base. There is also little noise in the relationship between effort and performance on defense, as players succeed on defense more than ninety percent of the time. Directly observing low effort on offense may be more difficult. Shirking on offense could take the form of swinging more frequently at bad pitches or not swinging at good pitches. It takes effort to be patient and wait for quality pitches, and it also takes effort to swing at quality pitches when they do come. Having longer at-bats also requires the player to spend more time actively engaged in the game. Players could also shirk on offense by not taking enough batting practice or watching enough video prior to the game. Even the best players go through “slumps” at the plate. Shirking on offense may be difficult to distinguish from the typical “slump”. Generally, there is more noise in the relationship between effort and performance for offense than for defense. The best players succeed on offense less than half of the time, and many succeed far less frequently than that. As a result, those who shirk may be more likely to do so on offense than on defense.

The second source of heterogeneity that will be explored is performance by non-pitchers and pitchers. As we have seen already, evidence suggests that non-pitchers shirk. Pitchers are likely to find it more difficult to shirk. Within games, pitchers are expected to throw the pitches that the catcher asks for. Pitchers are also taken out of the game by the manager whenever the

manager feels the pitcher is done for the day. Pitchers almost never pitch complete games. While non-pitchers can be replaced, this happens infrequently. Pitchers are also expected to report to the team for spring training about a week sooner than are non-pitchers. This means the pitcher has less time during the off-season to shirk on preparation.

WINS is a function of offense, defense, and games played. WINS can be decomposed into offensive WINS and defensive WINS. Offensive WINS are the components of WINS that come from hitting, base-running, and not hitting into double-plays. Defensive WINS come from performance in the field while the opposing team is hitting. To test for differences in offensive and defensive performance, regressions comparable to those presented in Table 3 will be run using offensive WINS and defensive WINS as outcome variables.

Regression results testing for differences in the impact of years remaining on offensive and defensive performance using the full non-pitcher sample are presented in Table 7. The first and second columns show results for offensive WINS, while the third and fourth columns show results for defensive WINS. Years remaining has a negative and significant impact on offensive WINS, in magnitudes comparable to the results for overall WINS. While poor offensive performance could be attributable to slumping, it is very unlikely that slumping would align so well with years remaining on the contract. As such, shirking is the more viable explanation. The impact of years remaining on defensive WINS is statistically insignificant. These findings are consistent with players exerting low effort in games in a way that is harder to directly observe.

In understanding shirking behavior, another source of heterogeneity that will be considered are differences between non-pitchers and pitchers. Since the pitcher's game is under greater control by the catcher and manager, and the pitcher reports to the team sooner for spring training, it is possible pitchers may be less likely to shirk. As non-pitcher results have already

been presented, results for pitchers will now be presented. The sample of pitchers for the 2010-2017 period with the same sample restrictions as those for non-pitchers includes 1,679 contract-year observations for 522 unique players, and 1,114 unique contracts. In the pitcher sample multi-year contracts occur at a rate of about 21 percent, with the longest contracts being seven years in length.

Table 8 shows regression results for pitchers comparable to the results presented for non-pitchers in Table 3. Just like in Table 3, the first specification shows a positive and significant impact of years left on WINS, highlighting positive selection in multi-year contracts for pitchers as well. In the second specification, the coefficient on years left is insignificant. In the third specification, each of the years-left coefficients is not significant. These results support the hypothesis that pitchers are less likely to be able to shirk than are non-pitchers. These results and the results of the offense and defense regressions would suggest that the observed negative relationship between years remaining and performance is due to shirking.

CONCLUSION

Teams frequently sign players to multi-year contracts yet results in the literature on performance throughout the duration of such contracts are mixed. In just the offseason prior to the 2019 season alone, the top three largest contracts awarded totaled over a billion dollars in nominal value. Fans and the media are often skeptical of large contracts being awarded over long time durations, yet to land the best players, teams often must give up substantial sums of money over these long periods of time. Management may also favor multi-year contracts because of the potential for relationship specific investments. This study adds to the literature on shirking in Major League Baseball by presenting causal evidence of an inverse relationship between the number of years remaining on a player contract and player performance. Using player fixed-

effects regression specifications, this study finds that having multiple years remaining on a multi-year contract causes the player to perform at a lower level early in the contract relative to performance during the final year of a contract.

This finding would suggest that general managers and team ownership should take caution when considering signing players to large, multi-year contracts. When negotiating multi-year contracts, it is important for general managers to weight the benefits against both the financial costs of these contracts and the costs associated with diminished incentives for exerting effort. While this finding is of interest to MLB teams and managers, this finding has consequences for managers in other sports and for employers generally. Baseball players and other athletes are playing a game, one that the majority of those players have a strong passion for, so one could only imagine how guaranteed employment impacts performance in settings where the employee feels less joy and passion toward his or her occupation. If multi-year contracts of fixed duration lead MLB players to exert low levels of effort, guaranteed contracts of unlimited duration, such as those given to school teachers and college professors under the tenure system, would likely lead to low levels of effort as well. As employers seek to get the most out of their employees, balancing the costs and benefits of using guaranteed contracts is an issue they should be aware of.

Despite some past studies in the literature on shirking in MLB having presented evidence of a negative relationship between years remaining on a contract and performance, past studies have failed to persuade readers convincingly that this relationship is due to shirking as opposed to alternative explanations. The primary contribution of this study is to present such evidence. First, evidence is presented to address the possibility that this negative relationship is driven by player adjustment to a new team. Evidence is also presented to address the possibility that the

relationship is driven by teams signing players they expect to improve to multi-year contracts. Second, evidence is presented that is consistent with what would be expected of shirking behavior. Players are found to shirk in their offensive performance, but not in defensive performance. Such behavior would be consistent with players shirking during the season only in ways that are less observable to the team to avoid gaining a reputation as a shirker. Pitchers, who have less freedom in being able to shirk, are not found to exhibit a negative relationship between years remaining on a contract and performance, while non-pitchers are.

There are approaches team management can take to try to minimize player shirking. One potential approach would be to increase the use of incentive pay. While some current contracts do reward players with bonuses for performance related achievements, they are not common outside of the top echelon of players, and the bonuses are typically small relative to a player's base salary. Work looking at the impact of incentive pay on performance in MLB could be an avenue for future research. Another approach to minimize shirking is to increase player monitoring, although this comes at a financial cost to management. Monitoring has been found to be effective in limiting shirking by other workers within professional sports including agents (Mason & Slack, 2001; Mason & Slack, 2003) and umpires (Bradbury, 2019). The findings of this work, that shirking primarily occurs in offensive performance by position players with multiple years remaining on their contracts, could help managers to minimize the associated monitoring costs by focusing monitoring resources on this aspect of the game.

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