The Contract Year Phenomenon: Investigating the Effect of Contract Uncertainty on NBA Player Performance

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Abstract

This paper investigates whether NBA player performance is affected by their uncertain contract status. Although our regression results suggest a statistically insignificant change in four advanced metrics for regular season performance during a player's contract year compared to his pre-contract year, we find that these measures of player performance dip significantly in the regular season following the contract year. On the other hand, player performance during the NBA postseason is unaffected by contract status. Our results provide evidence of shirking by NBA players during the regular season after signing a new contract, whereas the goal of winning a championship provides a strong incentive to always exert high effort during the playoffs.

JEL classifications: J22, J30
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1 Introduction

Economists have long been interested in the relationship between worker productivity and labor contracts. Holmstrom (1989) provides a seminal paper on optimal contracting under moral hazard. In order to incentivize high effort, an ideal wage contract should include both a fixed salary and a performance-based bonus. Labor contracts in professional sports exemplify how this wage structure is intended to minimize shirking, in which players exert high effort in order to earn a lucrative long-term labor contract but then exhibit low effort afterwards. Although Maxcy et al. (2002) finds mixed results of shirking in Major League Baseball (MLB), their results suggest that pitchers who recently signed long-term contracts are more likely to end up on the disabled list. Interestingly, Frick (2011) shows that player performance increases significantly at the end of a contract for players in the German Bundesliga soccer league, whereas Allen (2012) documents that shirking is less likely to occur if players in the National Football League (NFL) have previously served as team captains. More recently, Fumarco et al. (2024) finds that player performance in the National Hockey League (NHL) does not vary over time.

Several papers investigate evidence of shirking in the National Basketball Association (NBA). Using data from 1988 to 2002, Stiroh (2007) examines 1) how performance in the contract year affected future contracts and 2) how different points in the contract cycle affect individual performance. First, contract year improvements in performance led to more financially lucrative contracts. Moreover, the results revealed that all measures of individual performance improved during the contract year, while a player's composite rating, the preferred measure of overall performance, declined significantly in the post-contract year. Berri and Krautmann (2006) explored whether NBA player performance declines in the post-contract year due to shirking, but found mixed results and concluded that the answer varies based on the chosen dependent variable. Shirking was present with the NBA's measure for player productivity, but the effect is statistically insignificant when using a more traditional measure of marginal product. Finally, White and Sheldon (2014) conducts eight repeated measures MANOVAs concerning players who had a contract year between the 2003-2004 to 2009-2010 NBA seasons. While they analyzed mostly basic statistics, they found

that Player Efficiency Rating (PER) was highest in the contract year. Interestingly, PER in the post-contract year was lower than both the pre-contract baseline year and contract year.

The contribution of this paper is threefold. First, our player data is more recent than the existing literature. With the prominence of the three-point shot and an increased emphasis on analytics, the NBA has changed dramatically over the last 15 years. Next, we incorporate newer advanced metrics (e.g. PER, Win Share per 48 Minutes (WS/48), Box Plus/Minus (BPM), and Value Over Replacement Player (VORP)) into our regression analysis. In other words, we build on previous research that incorporated antiquated statistics, such as composite rating (Stiroh, 2007) and player productivity metrics (Berri and Krautmann, 2006). Finally, our analysis is the first paper to the best of our knowledge that distinguishes a contract year effect in the postseason in addition to regular season.

Compared to the baseline time period of the season preceding the contract year, an NBA player's regular season performance during his contract year showed no improvement, on average. However, our regression results provide evidence of shirking during the regular season of the post-contract year. Notably, a player's contract status had no effect on their postseason performance as players always have a strong incentive to exert high effort in their pursuit of a championship title.

2 Data

Our data spans three years: the 2021-2022 season (baseline year), the 2022-2023 season (contract year), and the 2023-2024 season (post-contract year). Basketball Reference was used for the individual player statistics, age, and NBA awards.[1] We are specifically interested in PER and other advanced metrics as they account for team context and are more comprehensive than traditional statistics. For example, PER, BPM, and VORP are all pace-adjusted, which prevents players on high-pace teams from having inflated statistics.[2] While no single metric is perfect, the combina-

[1] `https://www.basketball-reference.com/`

[2] NBAstuffer (`https://www.nbastuffer.com/analytics-101/`) provides an in-depth explanation of advanced player evaluation metrics.

tion of these four metrics gives us clearer insights into player performance. NBA.com's Free Agent Tracker provided the information on contract year status.[3] These two data sources were merged to create a dataset involving both regular season and postseason data at the player-season level.

Following White and Sheldon (2014), observations were removed if the player failed to play at least 500 regular season minutes in a season. The minutes requirement is in accordance with ESPN's Hollinger NBA Player Statistics Leaderboard.[4] The resulting dataset consists of 1,102 player-season observations for 505 unique players and is summarized in Table 1. While players in a contract year and those not in a contract year were included in the analysis, only 542 observations have both regular season and postseason statistics.

Table 1: Summary Statistics

Variable	Definition	Mean (Std. Dev.)
$PER\_regular_{it}$	Player Efficiency Rating for player i during regular season t	14.4614 (4.4378)
$PER\_playoffs_{it}$	Player Efficiency Rating for player i during postseason t	12.7796 (8.6621)
$BPM\_regular_{it}$	Box Plus-Minus for player i during regular season t	-0.3544 (2.8058)
$BPM\_playoffs_{it}$	Box Plus-Minus for player i during postseason t	-0.1737 (7.0830)
$VORP\_regular_{it}$	Value Over Replacement Player for player i during regular season t	0.8421 (1.407)
$VORP\_playoffs_{it}$	Value Over Replacement Player for player i during postseason t	0.7659 (0.4235)
$WS48\_regular_{it}$	Win Share per 48 Minutes for player i during regular season t	0.0977 (0.0555)
$WS48\_playoffs_{it}$	Win Share per 48 Minutes for player i during postseason t	0.1534 (0.3604)
$ContractYear_{it}$	Dummy variable indicating whether player i is in a contract year during season t	0.1113 (0.3169)
Age_{it}	Age of player i during season t	26.1339 (4.2784)
MVP_{it}	Dummy variable indicating whether player i was in the top 5 for MVP votes during season t	0.0136 (0.1158)
$AllNBA_{it}$	Dummy variable indicating whether player i was on an All-NBA team during season t	0.0407 (0.1977)
$AllStar_{it}$	Dummy variable indicating whether player i was on the All-Star team during season t	0.0724 (0.2593)
Players	Number of players in the sample	505
N	Number of observations	1,102

[3] `https://www.nba.com/players/free-agent-tracker/2023`

[4] John Hollinger created the Player Efficiency Rating (PER) statistic, one of our dependent variables.

3 Empirical Analysis

We estimate a fixed effects regression specification to test whether shirking exists in the NBA:

$$\begin{aligned} y_{it} &= \alpha + \beta_1 ContractYear_{it} + \beta_2 ContractYear_{i,t-1} \\ &+ \beta_3 Age_{it} + \beta_4 Awards_{it} + \beta_5 Team_{it} + \gamma_i + \delta_t + \varepsilon_{it}, \end{aligned} \tag{1}$$

where the dependent variable consists of four advanced metrics for player performance for player i in season t: 1) PER in the regular season ($PER\_regular_{it}$) or postseason ($PER\_playoffs_{it}$); 2) Box Plus-Minus in the regular season ($BPM\_regular_{it}$) or postseason ($BPM\_playoffs_{it}$); 3) Value Over Replacement Player in the regular season ($VORP\_regular_{it}$) or postseason ($VORP\_playoffs_{it}$); and 4) Win Share per 48 Minutes in the regular season ($WS48\_regular_{it}$) or postseason ($WS48\_playoffs_{it}$). The main variables of interest are dummy variables that indicate whether player i is currently in his contract year ($ContractYear_{it}$) or was in a contract year in the previous season ($ContractYear_{i,t-1}$). Additionally, we include player i's age (Age_{it}) and three dummy variables indicating different NBA awards: 1) top 5 for MVP votes (MVP_{it}); 2) selection onto either All-NBA first team, All-NBA second team, or All-NBA third team ($AllNBA_{it}$); and 3) selection on the All-Star team ($AllStar_{it}$).[5] We also control for team effects ($Team_{it}$) by including 31 dummy variables: one for each of the 30 NBA teams and one called $TM2$ that identifies when a player played for two teams in a particular season. Finally, we include a player fixed effect (γ_i) and a season fixed effect (δ_t), as well as cluster standard errors by player to account for heteroskedasticity and serial correlation.

Table 2 presents the regression results for Equation (1) using regular season data. The estimated coefficients for $ContractYear_t$ are statistically insignificant for each of our four advanced metrics, suggesting that NBA players exert similar effort during their contract year relative to their pre-contract year (the baseline time period). Interestingly, the estimated coefficient for $ContractYear_{t-1}$ are all negative and statistically significant across all four advanced metrics. For example, Column (1) suggests that PER fell by 0.9195 in the post-contract year relative to the baseline time period,

[5] Allen (2015) and Caudill et al. (2025) include awards as control variables in their regression models.

on average. This result is also economically significant since Table 1 reports that the mean value for $PER\_regular$ is 14.4614 so PER decreased by 6.36% in the post-contract year compared to the pre-contract year. Similarly, BPM, VORP, and WS48 lowered by 162.56%, 26.98%, and 10.03%, respectively, in the post-contract year relative to the baseline time period. The results suggest that free agents in 2022-2023 free agent class exhibited shirking during the 2023-2024 regular season.

Table 2: Regression Results (Regular Season Sample)

	PER	BPM	$VORP$	$WS48$
	(1)	(2)	(3)	(4)
$ContractYear_t$	-0.3716	-0.0869	-0.0322	-0.0020
	(0.2734)	(0.2067)	(0.0930)	(0.0045)
$ContractYear_{t-1}$	-0.9195***	-0.5761**	-0.2272*	-0.0098*
	(0.3299)	(0.2522)	(0.1177)	(0.0054)
Age	0.0613	0.1705	0.0885	0.0035
	(0.1634)	(0.1269)	(0.0612)	(0.0026)
MVP	-0.1088	0.2410	0.6408**	-0.0003
	(1.1613)	(0.6805)	(0.2573)	(0.0173)
$AllNBA$	1.6495***	0.9437**	1.1459***	0.0263***
	(0.5687)	(0.4106)	(0.2092)	(0.0082)
$AllStar$	1.6141***	1.0553***	0.6917***	0.0213***
	(0.3378)	(0.2767)	(0.1457)	(0.0057)
N	1,102	1,102	1,102	1,102

Note: The table reports regression results for Equation (1) using the regular season sample. Team dummy variables, player fixed effects, and season fixed effects suppressed. Standard errors are clustered by player and reported in parentheses. *, **, and ** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 3 reports the regression results for Equation (1) using data from the playoffs. As with Table 2, the estimated coefficients for $ContractYear_t$ are not statistically significant for each of our four advanced metrics. However, these results remain statistically insignificant for $ContractYear_{t-1}$, which contrasts with the key result in Table 2. Instead, the results in Table 3 suggest that players exert similar effort during the playoffs in their pre-contract year as in their contract year and post-contract year.[6] Since the ultimate team goal for a player is to become NBA champions, there is a strong inherent incentive for players to perform at the best of their abilities during the playoffs.

[6]It is possible that contract status may be endogenous. Following Fumarco et al. (2024), we re-estimate Equation (1) without the contract year dummies and obtain qualitatively similar regression results for Tables 2 and 3. In other words, the sign and significance for β_3 and β_4 are unchanged, mitigating the concern over endogeneity.

Table 3: Regression Results (Playoffs Sample)

	PER	BPM	$VORP$	$WS48$
	(1)	(2)	(3)	(4)
$ContractYear_t$	-2.5780	-3.0729	0.0631	-0.0127
	(2.7644)	(2.4146)	(0.0739)	(0.0393)
$ContractYear_{t-1}$	-2.2146	-3.3661	0.0384	-0.0331
	(3.4392)	(2.9790)	(0.0848)	(0.0465)
Age	-1.2114	-0.8374	-0.0069	-0.0195
	(1.0318)	(0.8380)	(0.0482)	(0.0158)
MVP	-0.9780	-1.9395	-0.0798	-0.0482
	(2.9649)	(1.9612)	(0.1509)	(0.0423)
$AllNBA$	-3.1450**	-2.5519**	-0.2322	-0.0386*
	(1.5208)	(1.0628)	(0.1640)	(0.0233)
$AllStar$	-0.0533	-0.4764	-0.0224	-0.0074
	(1.8247)	(1.3934)	(0.0860)	(0.0251)
N	542	542	542	542

Note: The table reports regression results for Equation (1) using the playoff sample. Team dummy variables, player fixed effects, and season fixed effects suppressed. Standard errors are clustered by player and reported in parentheses. *, **, and ** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

4 Conclusion

For NBA front offices, understanding how financial incentives affect the strategic behavior of players is critical for contract valuations. Our findings indicate that regular season performance does not improve during the contract year when compared to the pre-contract year baseline time period. Interestingly, evidence of reduced effort emerged in the regular season following the contract year, suggesting possible shirking in the post-contract year. Importantly, contract status appeared to have no influence on player performance in the postseason.

There are a few remaining questions surrounding the contract cycle of NBA players. The size and length of the contract are two factors that could affect the strategic behavior of the players. Furthermore, the type of free agency (restricted vs. unrestricted, player option vs. team option, etc.) is another variable that could influence player performance in both the contract year and post-contract year. We leave this for future research.

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