The End of Contract Recency Bias Despite the 2011 CBA

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1 Abstract

In the NBA, the common perception is that the best way to secure a huge contract is to come as close as possible to perfecting your craft. But is this true? Do NBA front offices respond as we believe we do? Furthermore, should they? And has the Collective Bargaining Agreement, renegotiated in 2011, spurred any discernible changes in front office behavior? This paper is a replication and response to Casey Fox's 2105 thesis, "NBA Contracts and Recency Bias: An Investigation into Irrationality in Performance Pay Markets". This paper confirms Fox's findings that players past two years of performance predicts future performance, yet NBA execs suffer from recency bias as contract value is only determined by contract year performance. Our update finds that NBA execs have gotten wiser and do not suffer from recency bias despite the liberating 2011 CBA .

2 Introduction

This paper is a replication and response to Casey Fox's 2105 thesis, "NBA Contracts and Recency Bias: An Investigation into Irrationality in Performance Pay Markets", which investigates similar questions to our paper. Fox found that performance in a player's contract year, which is the season they play immediately before their next contract, and the year prior are apt predictors of future performance. Fox also found owners to be more receptive to giving larger contracts to players who performed well in contract year only, not taking prior seasons into account. We will examine his findings and try to use similar methods to extend them into the new NBA we observe after the new CBA's introduction.

H1: Between 2006-2012, win share per 48 minutes for contract year and the year prior will be significant in determining future win share, as claimed in Fox (2015).

H2: Between 2006-2012, win share per 48 minutes for contract year will be significant in determining contract duration, average value, and total value. Win share per 48 minutes for either of the two years prior will not be significant. This would confirm Fox's findings.

3 The 2011 CBA

In this section, we will detail some of the notable changes between the NBA's Collective Bargaining Agreement in 2005 and the revised CBA put into effect in 2011. The 2011 CBA was put into effect on December 9th, 2011, after a 161-day from the end of the 2005 CBA. One of the changes was a decrease in the percentage of Basketball Related Income (BRI) that the players collectively receive, down from 57% in 2005 to 51.15% in 2011. However, we posit that this essentially cancels out with the increase in total NBA revenue every year in every year except the lockout-shortened season (See figure 1).

(Insert figure 1 here.)

The NBA employs a soft salary cap system. The salary cap is, intuitively, the limit that a team can spend on its roster. Under a hard cap, the salary cap may not be exceeded under any circumstances; however, under the NBA's soft cap, teams may exceed the salary cap if they agree to pay what is called the luxury tax, the penalty for going over the cap. After being in the luxury tax for more and more seasons, the team will have to pay a "repeater tax," which is just the luxury tax at a higher rate. In the 2011 CBA, the repeater tax applied in 2014-2015 and onward. We typically see successful teams in the luxury tax, such as championship contenders such as Cleveland Cavaliers and the Golden State Warriors. The soft cap is in place so that teams are more likely to keep players that they would not be able to afford under a hard cap (for example, LeBron James, J.R. Smith, or Memphis' Mike Conley). However, the penalties for going over the soft cap would eventually, in theory, discourage teams from handing out large contracts after a few years of being in the luxury or repeater tax.

In addition to the soft cap, there is a hard salary floor, up from 85% to 90% in 2011. Teams must spend at least 90% of the soft cap's limit, which was set at $94.14 million for the 2016-2017 season (which rose astronomically from $70 million last season, and is estimated to grow another $10-20 million dollars in the coming offseason). This could lend toward recency bias as we discuss later in the paper, because teams are becoming more and more able to spend money and may reward players highly for one or two good seasons.

Clearly, there is an increase in money in the NBA. Some contracts' values are by choice and some are to get to the hard floor; take Mike Conley's 2015 5-year, $153 million contract (the largest in NBA history) to stay in Memphis compared to Dirk Nowitzki's 2015 "let's get-the-Mavericks-to-the-salary-floor" $50 million contract over two years. However, there are also concessions made to teams to be able to spend their money in a smarter way or to make up for bad contracts. One such method is the amnesty clause, which is a way of completely erasing a player's salary from the books. This, clearly, can lead to teams spending their money more freely and taking more risks. A notable example of the amnesty clause includes Brandon Roy, a 3-time All-Star shooting guard for the Portland Trail Blazers who retired due to injury. Roy's contract was estimated to be roughly 30% of the salary cap each season, allowing the Trail Blazers to free wasted cap space from a contract spoiled by injury.

A similar course of action is the stretch provision, which is put into effect by cutting the player and “stretching” his salary and cap hold over the coming years. The player’s salary will be stretched over twice the remaining amount of years left on his contract plus one. A notable example of the stretch provision occurred earlier this year when future Hall-of-Famer Tim Duncan announced his retirement from the San Antonio Spurs. Duncan had approximately $6 million remaining on the last year of his contract, so the Spurs will pay that out to him over the next three years, making his burden on the Spurs’ salary cap a paltry $2 million each season. Both the amnesty clause and the stretch provision allow organizations a chance to recover financially from contracts which turned out not to be as great as they thought and should encourage more risk-taking and allow organizations to give in to recency bias.

Another contract style that increases risky spending, in a way, is the mid-level exception. The MLE comes in three different varieties depending on the current cap structure of a given team. Non-luxury tax teams are allowed to offer up to 4 years starting at $5 million with annual raises, whereas tax-paying teams are limited to 3 years starting at $3 million with annual raises. These types of exceptions are limited only to teams who do not have remaining cap space to spend. There is a third type of exception for teams with salary cap left to spend called the room exception; only teams without salary room are able to use the mid-level exception. The room exception is up to 2 years at $2.5 million with a 3% raise in the second year. These contracts in general are over a shorter duration for less money and allow the organization more flexibility and less risk, freeing the team up to, say, take up more cap space on big-name free agents like the Golden State Warriors did with four-time scoring champion Kevin Durant and fill out the rest of their roster with MLE contracts like Zaza Pachulia's (1-year, $2.9 million).

Now, we come to the more outright enabler of recency bias in NBA contract negotiation: free agency. Depending on a player's previous contract makeup, they will enter either unrestricted free agency, in which they can sign with any team at all, or restricted free agency, in which their current team has the ability to match any contract offer sheet to retain a given player. For example, in 2014, Utah Jazz forward Gordon Hayward agreed to a 4-year, $63 million offer sheet with the Charlotte Hornets, giving the Utah Jazz three days to match that offer or lose Hayward. The young Hayward was coming off his fourth year in the league and posting career-high figures in points, rebounds, assists, and steals, so no price was too high for the Jazz to keep their young franchise player locked up for a few more years. In restricted free agency, the players have no choice in their future if their teams wish to retain them, but in unrestricted free agency, players may go wherever their hearts desire.

This was seen when LeBron James left Cleveland for the Miami Heat in the 2010 free agency, only to return to Cleveland in 2014 again as an unrestricted free agent. Many times, players make a particular effort to perform better than ever before in the season before they enter free agency so as to take advantage of organizations' recency bias. While many times, players get about a fair contract value for their level of play, sometimes they play at an unsustainably high level, making their team's overspending and willingness to accept risk backfire on them. For example, center Bismack Biyombo spent his first four years in the league as a solid, average backup for the Charlotte Bobcats/Hornets. Upon being traded to the Toronto Raptors, he played exceptionally well in the playoffs as starter Jonah Valanciunas' replacement, posting efficient scoring and high rebounding numbers. Fresh off a great statistical showing in the playoffs, Biyombo inked a 4-year, $72 million contract to back up Nikola Vucevic for the Orlando Magic, where he has drifted back into his Charlotte days? mediocre figures and left the Magic front office with egg on its collective face.

Another aspect of free agency is the abilities of different teams to offer different amounts of money to the same player. While the most obvious reason is that some teams just have less cap space available, there is a mechanism that allows the player's most recent team to offer him more money, and that is a player's Bird rights. The soft cap, paired with a team having a player's Bird rights (obtained after a player has played three consecutive seasons with the same team), is what allows franchises to keep their more talented or more popular players by offering more money than their competitors.

With all of this taken into account, qualitatively, we posit that the 2011 CBA gives NBA teams more room for error and that we should see more risks taken in NBA contracts in both contract length and contract value. Is a player's past performance necessarily a predictor of contract value and duration, and furthermore, is past performance a predictor of future performance. This is what we aim to answer in the following sections.

H3: Between 2012-2015, win share per 48 minutes for contract year and the year prior will be significant in determining future win share, as claimed in Fox (2015).

H4: Between 2012-2015, win share per 48 minutes for contract year will be significant in determining contract duration, average value, and total value. Win share per 48 minutes for either of the two years prior will not be significant.

4 Data

The contract data for this paper came from spotrac.com, a sports-contract tracking website. From spotrac, we were able to extract all of the contract data from the 2006-2007 season to the 2014-2015 season. This data set only includes players who were signed to contracts at least as long as a year. 10-day contracts and mid-season contracts were not included as there are few basketball metrics to compare them to players with full contracts. We included contracts from the 2006-2007 to the 2011-2012 season in order to replicate Fox's findings and added the data from the 2012-2013 to the 2014-15 seasons. The measurements of contract value used in this paper are total contract value, duration of the contract, and average yearly contract value.

Data for player performance statistics was taken from basketball-reference.com. The data was taken between the span of the 2005-2006 season to the 2015-2016 season. The statistics utilized from this dataset are win share per 48 minutes, age, and minutes played. We also received data with regards to All-Star, All-NBA, and All-Defense selections from the 2005-2006 season to the 2015-2016 season from nba.com/history. All-Star means that a players was selected to play in the mid-season All-Star game. All-NBA and All-Defense are awards given out to 15 players by the media.

5 Methods

We will perform multiple linear regressions on future win share per 48 minutes, natural log of contract value, natural log of average contract value, and natural log of contract duration. Future win share is defined by the sum of the win share per 48 of a player two years after his contract. We chose two years for future win share as that is around the median duration of contracts for the entire dataset of contract. Similar to Fox, we decided to take the natural log of contract value, average contract value, and contract duration due to the heavy positive skew of the data due to mega contracts and superstars (see figures 2, 3, and 4).

(Insert figures 2, 3, and 4 here.)

In our first model, we will regress our 2006-2011 contract data using the aforementioned dependent variables on win share per 48 for a player's contract year and the two years prior, minutes played for a player's contract year and the two years prior, age and age squared, and whether or not the player plays the center position. Win share is a metric that takes into consideration the marginal offense for a player over the marginal offense of his team. Win share per 48 minutes is in our opinion the best statistic to capture a player's performance. We chose win share per 48 minutes instead of win share as win share is not controlled for minutes played. Thus, we would argue that win share is post-treatment of minutes played, while win share per 48 minutes is not. Minutes played is included as players with more minutes played are viewed as more consistent, influencing value. We decided to use a quadratic relationship with age as it is common wisdom in the NBA that a player peaks in age and then declines in effectiveness. Also, centers in the NBA typically get longer and larger contracts due to their scarcity (ex: There only so many 7 footers in the NBA). Center is a dummy variable that takes the value of 1 if the player at any time during his contract year or the two years prior was labeled as a center.

In our second model, we will also regress our 2006-2011 contract data using the same model as the first with adding awards such as All-Star, All-NBA, and All-Defense. All of these awards are dummy variables that take the value of 1 if during the player's contract year or during the two years prior the player won one of these awards. The third model uses the same model as the second but instead uses the 2012-2014 season contract data as the dependent variables. Finally, we will use a generalized linear model in order to model the 2012-2014 season data using our aforementioned explanatory variables. Due to the assumptions made with using natural log to solve the positive skew seen in the variables of contract data, we feel that it is best to see how the relationships change when using a generalized linear model.

6 Results

Table 1 shows the Fox Model applied to the future performance [1] during 2006-2012. The model resulted in statistically significant estimates for performance during contract year and the year prior to contract year. Both had positive estimates, implying that both statistics of win share had a positive impact on future performance. Contract year performance had a larger estimate, which is consistent with expectations that the most recent result would be more indicative of future success.

(Insert table 1 here.)

[1] The word "performance" will be used to indicate win shares per 48 minutes in order to increase the readability of the paper.

Table 2 shows the Fox Model applied to natural log of contract duration, natural log of average contract value, and natural log of total contract value. Performance during contract year was statistically significant at the α = .01 level for predicting contract duration, average value, and total value. However, performance two years prior to contract year was significant at the α = .1 level. Performance during contract year had a significantly larger estimate than the performance two years prior, implying that it was the more influential in determining contract value. Minutes played during contract year was statistically significant at the α = .0001 level for natural log of duration, average contract value, and total contract value. Furthermore, minutes played the season prior to the contract year was also statistically significant at the α = .01 level. Again, this supports the assumption that players that played more minutes recently are seen as more valuable and more consistent. Being a center was also statistically significant at the α = .05 level for average contract value and total contract value, supporting that centers do get paid more for being more scarce. We would argue that the model suggests recency bias as performance during contract year was statistically significant and had the largest estimate amongst the performance variables.

(Insert table 2 here.)

Upon adding awards to the Fox Model, the results are largely the same. Table 3 shows that again performance for contract year and the year prior are significant in determining future performance; however, all-star and all-defense were also significant in determining future win share. With positive estimates, this model suggests that all-star and all-defensive players were more likely to produce higher win shares in the future.

(Insert table 3 here.)

The Fox Model with awards has very similar results as the Fox Model without awards. Table 4 shows that performance and minutes played in contract year are statistically significant at the $\alpha = .01$ level in determining contract duration. This is congruent with Fox's findings and our findings in model 1. With regards to average contract value, performance during contract year and two years prior along with center, age, and minutes played during contract year and the year prior to contract year are statistically significant. Furthermore, performance during the year prior to contract year (which is indicative of future win share) has a negative estimate and an insignificant p-value of .5942. This suggests that executives are most likely not taking into consideration performance the year prior to contract year. It is thus illogical for them to not take into consideration performance the year prior to contract year, but take into consideration performance two years prior to the contract year. This assumption is also supported by win share for 48 minutes for two years prior to contract year not being significant in predicting total contract value.

(Insert table 4 here.)

Shifting the dataset to the post-2011 CBA in model 3 as seen in table 5, performance for contract year and the year prior are again significant at the $\alpha = .0001$ level in predicting future performance. Center and minutes played during two years prior to contract year were both significant at the $\alpha = .1$ level. Again, these results suggest that performance during contract year and the year prior are predictive of future performance.

(Insert table 5 here.)

Although there appeared to be recency bias in the earlier data, post-2011 appears to have significantly less recency bias in contracts as seen in table 6. Performance for contract year and the year prior are statistically significant at the $\alpha = .05$ level for duration, average contract value, and total contract value. This result seems to suggest that NBA executives have a more accurate picture of what determines future player value. Again, minutes played during contract year was statistically significant at the $\alpha = .01$ level for duration, average contract value, and total contract value, while minutes played the year prior to contract year and center were significant at the same level for average contract value and total contract value. This finding is consistent with our results in model 2. Finally, all-star was statistically significant at the $\alpha = .1$ level for average contract value and total contract value, as the CBA allowed for rewards for achieving all-star status.

(Insert table 6 here.)

In table 7, applying a general additive model to the variables used in the Fox Model with awards resulted in similar results as our previous regressions of future win shares. Again, performance for contract year and the year prior were statistically significant at the $\alpha = .01$ level. Age was also significant at the $\alpha = .01$ level. With a negative estimate, it is logical that as a player gets older his win share decreases.

(Insert table 7 here.)

The general additive model in table 8 had surprising results. Performance for the year prior to contract year was significant at the $\alpha = .05$ level for duration, average value, and total value; however, performance during contract year was only significant for contract duration. Although performance during contract year was not signifiant, it did have fairly low p-values at .1348 and .1938. Age and minutes played during contract year were statistically significant at the $\alpha = .0001$ level for duration, average value, and total value. Center, minutes played during the year prior to contract year, all-star, and all-NBA were also significant in predicting average contract value and total value. Given that all these other variables are significant in predicting contract structure, one could deduce from this model that NBA executives are less prone to recency bias and are taking a more holistic approach to assessing contract value. One explanation could be that the NBA has recently adopted statistical analytics, which would cause a more holistic and accurate understanding of player performance.

(Insert table 8 here.)

7 Results

We found substantial support for H1 and H3 as for each of the four models win share per 48 minutes for contract year and the year prior to contract year were both significant in predicting future win share. This finding concurs with Fox's finding. Thus this paper suggests that NBA executives should only take into consideration the past two years of win share when evaluating talent in the framework of contract negotiation.

There is mixed, but mostly supportive evidence for H2. Although models 1 and 2 suggest that performance two years prior to contract year was significant in predicting the monetary value of the contracts, the estimates were both very small in comparison to the estimates for performance during contract year. Furthermore, they also had small p-values particularly in model 2 (.0931). Although we cannot conclusively say that executives suffer from recency bias, clearly the most recent performance was the dominating win share related factor in determining contract value. Furthermore, performance for the year prior to contract year was not remotely significant, meaning that executives are not taking into consideration a statistical measure that does predicting future win share.

Finally, despite expectations that the new CBA would influence more recency bias we find that there is no evidence of recency bias for the seasons between the 2012-2013 season and the 2014-15 season, not supporting H4. Models 3 and 4 show that performance for the year prior to contract year were significant in determining contract duration, average value, and total value. Given this, it seems that NBA executives have an accurate understanding of player value with regards to future win share and contracts. This could be because of the concurring rise of analytics in the NBA.

Our paper has affirmed the finding that NBA executives should not give large contracts to players who have had only one good year of performance even in the post 2011 CBA NBA. Although executives in Fox's analysis were prone to recency bias, which we confirm, modern NBA executives seem to have more accurate understanding of player value and less susceptible to recency bias despite the policies in the CBA encouraging recency bias. Further research should be done on a team by team basis seeing if teams that use more analytics are less or more prone to recency bias.

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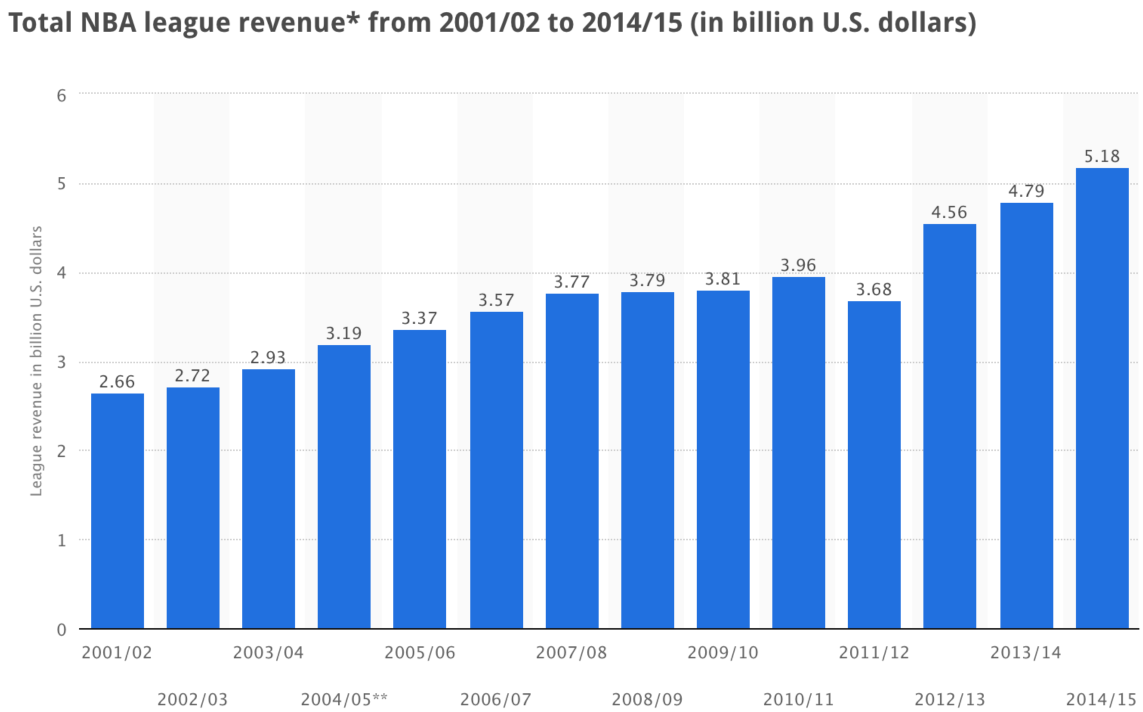
Figure 1:



Source: https://www.statista.com/statistics/193467/total-league-revenue-of-the-nba-since-2005/

Figure 2: Histogram of All Contract Duartions

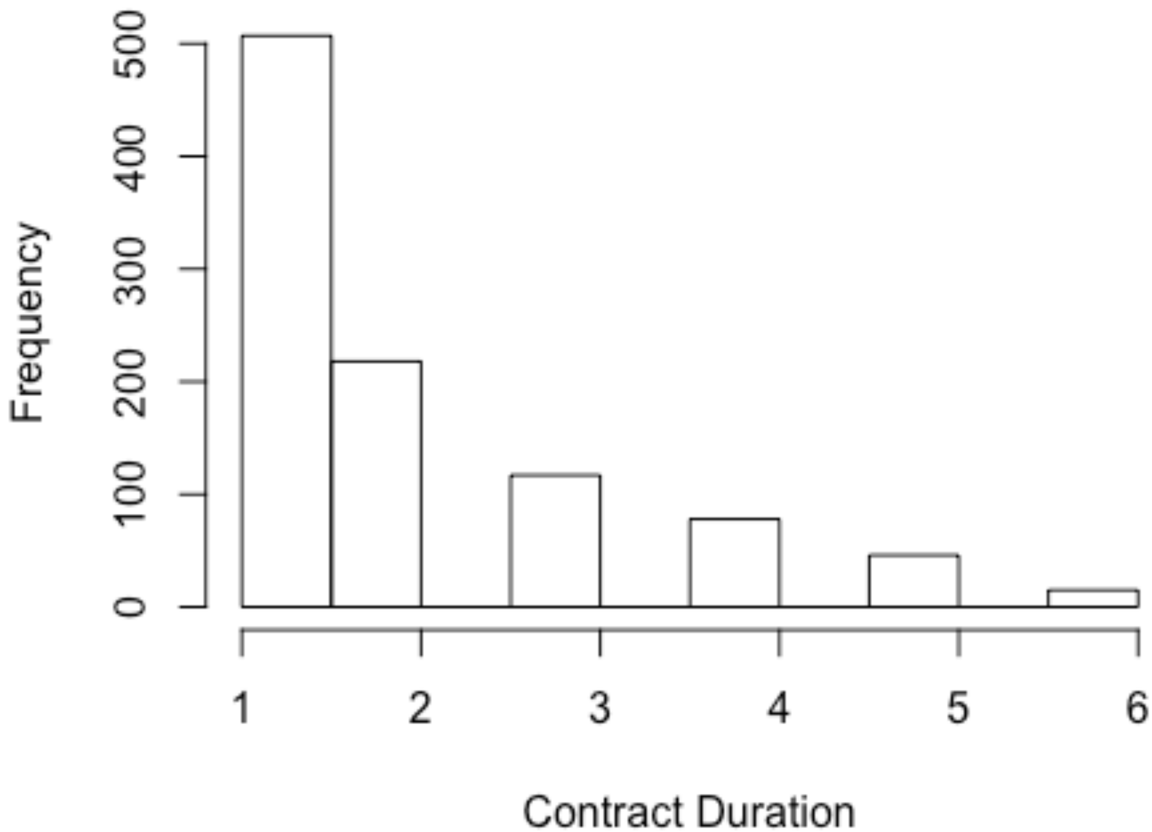


Figure 3: Histogram of All Contract Aver Values

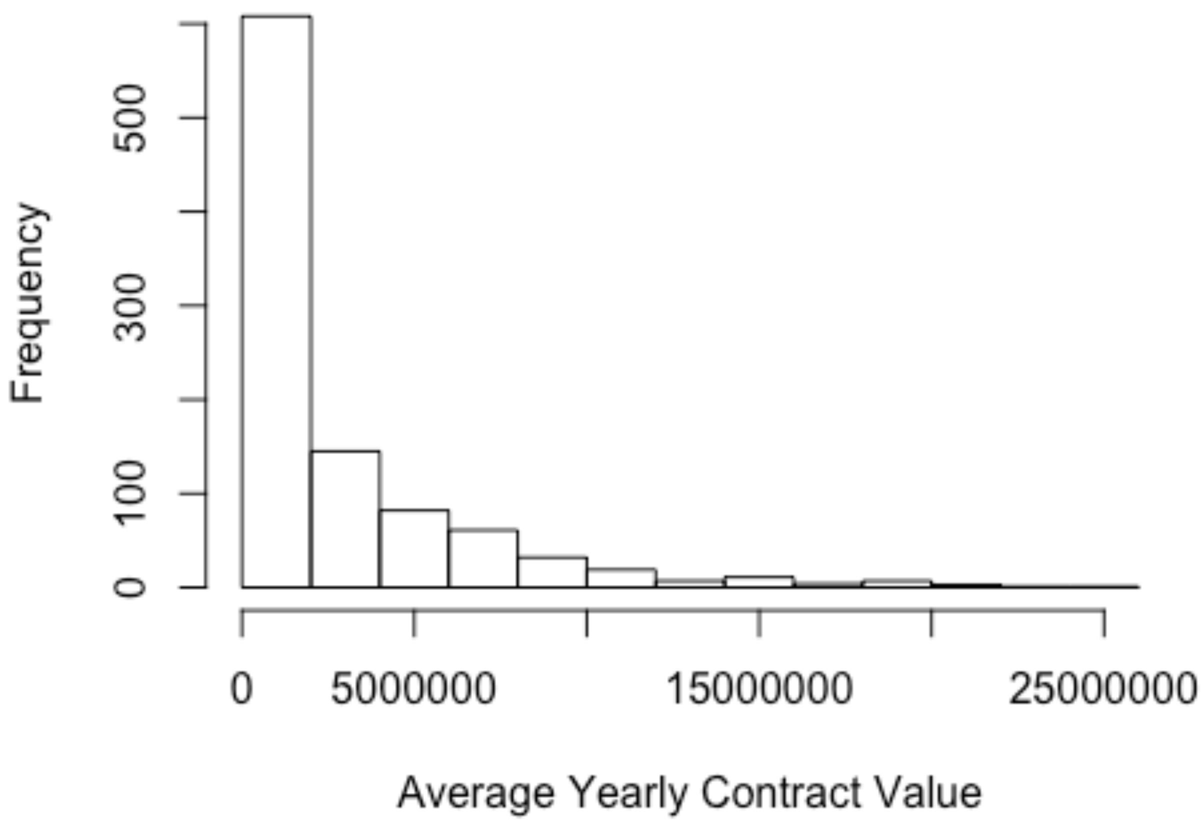


Figure 4: Histogram of All Total Contract Values

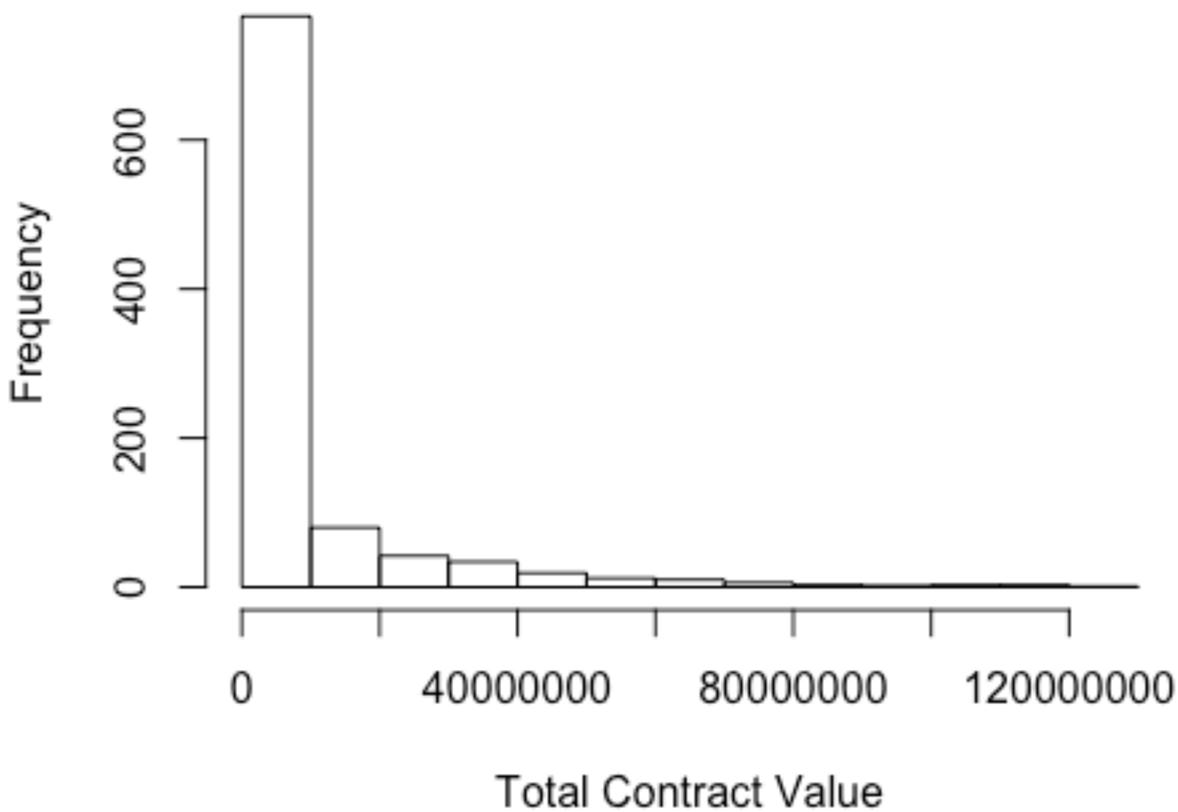


Table 1: Model 1 - Replication of Fox Model: Future Win Share (2005-11)

	Future Win Share	
	Coefficient	p-value
(Intercept)	-0.0932	0.7083
Win Share		
$WS/48_{CY}$	0.8634	p< .0001***
$WS/48_{CY-1}$	0.4277	0.0006***
$WS/48_{CY-2}$	0.0472	0.7083
Demographic		
Age	0.0116	0.5109
Age^2	-0.0002	0.4164
Center	0.0043	0.717
Minutes Played		
MP_{CY}	0.00004	0.4474
MP_{CY-1}	-0.000002	0.8181
MP_{CY-2}	0.000007	0.422

$R^2 = 0.337$, n = 204, df = 195

Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table 2: Model 1 - Replication of Fox Model: Contracts (2005-11)

	Natural Log of Contract Duration		Natural Log of Average Contract Value		Natural Log of Total Contract Value	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
(Intercept)	1.807	0.253	16.71	p< .0001***	18.51	p< .0001***
Win Share						
$WS/48_{CY}$	2.84	0.0002***	3.591	p< .0001***	6.432	p< .0001***
$WS/48_{CY-1}$	0.837	0.2809	0.1129	0.9035	0.9499	0.5226
$WS/48_{CY-2}$	0.4141	0.5555	1.8631	0.0281**	2.277	0.0916*
Demographic						
Age	-0.0984	0.3755	-0.2	0.1328	-0.2992	0.1601
Age^2	0.0008	0.6672	0.0026	0.2624	0.0034	0.3537
Center	0.1066	0.1602	0.2035	0.0261**	0.3101	0.0334**
Minutes Played						
MP_{CY}	0.0003	p< .0001***	0.0004	p< .0001***	0.0007	p< .0001***
MP_{CY-1}	0.00006	0.3397	0.0003	0.0006***	0.0003	0.0078***
MP_{CY-2}	0.00004	0.4474	0.0001	0.1274	0.0001	0.1762

$R^2_{Duration} = 0.4769$, $R^2_{Avg} = 0.6221$, $R^2_{Total} = 0.6255$, n = 204, df = 195

Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table 3: Model 2 - Replication of Fox Model with Awards: Future Win Share (2005-11)

	Future Win Share	
	Coefficient	p-value
(Intercept)	-0.0102	0.9668
Win Share		
$WS/48_{CY}$	0.7281	p< .0001***
$WS/48_{CY-1}$	0.3394	0.0068***
$WS/48_{CY-2}$	0.0248	0.8197
Demographic		
Age	0.0077	0.6568
Age^2	-0.0002	0.5231
Center	0.0047	0.6881
Minutes Played		
MP_{CY}	0.000007	0.422
MP_{CY-1}	-0.000003	0.7333
MP_{CY-2}	0.000002	0.8428
Awards		
All Star	0.0459	0.0963*
All NBA	0.0084	0.7909
All Defense	0.0486	0.083*

$R^2 = 0.4962$, n = 204, df = 192

Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table 4: Model 2 - Replication of Fox Model with Awards: Contracts (2005-11)

	Natural Log of Contract Duration		Natural Log of Average Contract Value		Natural Log of Total Contract Value	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
(Intercept)	2.071	0.1961	17.45	$p< .0001$***	19.52	$p< .0001$***
Win Share						
$WS/48_{CY}$	2.556	0.0014***	3.111	0.001***	5.668	0.0002***
$WS/48_{CY-1}$	0.6085	0.4474	-0.5047	0.5942	0.1038	0.9456
$WS/48_{CY-2}$	0.3586	0.6174	1.431	0.0931*	1.789	0.1902
Demographic						
Age	-0.1126	0.3148	-0.2421	0.0686*	-0.3547	0.0963*
Age^2	0.0011	0.5852	0.0033	0.1528	0.0043	0.2386
Center	0.1043	0.1716	0.1969	0.0297**	0.3011	0.0382**
Minutes Played						
MP_{CY}	0.0003	$p< .0001$***	0.0005	$p< .0001$***	0.0007	$p< .0001$***
MP_{CY-1}	0.00005	0.3849	0.0002	0.0011***	0.0003	0.0127**
MP_{CY-2}	0.00003	0.5909	0.00007	0.3207	0.0001	0.3673
Awards						
All Star	0.0973	0.5746	0.2850	0.1655	0.3824	0.2462
All NBA	0.0262	0.8997	0.3056	0.2156	0.3318	0.4018
All Defense	0.1801	0.3467	0.0081	0.9713	0.1882	0.6043

$R^2_{Duration} = 0.4809$, $R^2_{Avg} = 0.6362$, $R^2_{Total} = 0.6347$, n = 204, df = 195

Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table 5: Model 3 - Update of Fox Model with Awards: Future Win Share (20011-14)

	Future Win Share	
	Coefficient	p-value
(Intercept)	0.1043	0.7253
Win Share		
$WS/48_{CY}$	0.5835	p< .0001***
$WS/48_{CY-1}$	0.5762	p< .0001***
$WS/48_{CY-2}$	0.1188	0.3288
Demographic		
Age	-0.0018	0.9268
Age^2	-0.00004	0.9168
Center	0.0223	0.0895*
Minutes Played		
MP_{CY}	-0.00001	0.1084
MP_{CY-1}	0.00002	0.1136
MP_{CY-2}	0.00001	0.0711*
Awards		
All Star	-0.0472	0.1224
All NBA	0.0189	0.6123
All Defense	0.0378	0.2416

$R^2 = 0.3706$, n = 253, df = 241

Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table 6: Model 3 - Update of Fox Model with Awards: Contracts (2011-14)

	Natural Log of Contract Duration		Natural Log of Average Contract Value		Natural Log of Total Contract Value	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
(Intercept)	0.041	0.9724	12.63	p< .0001***	12.67	p< .0001***
Win Share						
$WS/48_{CY}$	1.002	0.0242**	1.396	0.0287**	2.399	0.012**
$WS/48_{CY-1}$	1.427	0.0039***	2.14	0.0026***	3.567	0.0008***
$WS/48_{CY-2}$	0.117	0.7934	0.4437	0.489	0.5607	0.5585
Demographic						
Age	0.0218	0.7887	0.0771	0.5087	0.0989	0.5707
Age^2	-0.0009	0.5255	-0.0018	0.3594	-0.0027	0.3633
Center	0.0429	0.4499	0.3566	p< .0001***	0.3995	0.0011***
Minutes Played						
MP_{CY}	0.0002	p< .0001***	0.0004	p< .0001***	0.0006	p< .0001***
MP_{CY-1}	0.00005	0.2583	0.0002	0.0007***	0.0002	0.0051***
MP_{CY-2}	0.00006	0.1527	0.00004	0.5486	0.0001	0.2855
Awards						
All Star	0.051	0.7428	0.5221	0.0197**	0.573	0.0862*
All NBA	0.0674	0.7309	0.2582	0.3591	0.3256	0.4389
All Defense	0.0922	0.5984	0.1225	0.6257	0.2146	0.5674

$R^2_{Duration} = 0.3595$, $R^2_{Avg} = 0.5559$, $R^2_{Total} = 0.5409$, n = 372, df = 360

Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table 7: Model 4 - General Additive Model: Future Win Share (2011-14)

	Future Win Share	
	Coefficient	p-value
(Intercept)	.135	0.0027***
Win Share		
$WS/48_{CY}$	0.5822	p< .0001***
$WS/48_{CY-1}$	0.5771	p< .0001***
$WS/48_{CY-2}$	0.1188	0.3274
Demographic		
Age	-0.004	0.0085***
Center	0.0221	0.0894*
Minutes Played		
MP_{CY}	-0.000014	0.108
MP_{CY-1}	0.0000168	0.11
MP_{CY-2}	0.0000167	0.0671*
Awards		
All Star	-0.0474	0.1186
All NBA	0.01886	0.6118
All Defense	0.0379	0.238

$R^2 = 0.3705$, n = 253, df = 242

Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table 8: Model 4 - General Additive Model: Contracts (20011-14)

	Contract Duration		Average Contract Value		Total Contract Value	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
(Intercept)	2.443	p< .0001***	4,300,062	p< .0001***	16,685,119	p< .0001***
Win Share						
$WS/48_{CY}$	1.977	0.0014***	576,457	0.1348	15,766,510	0.1938
$WS/48_{CY-1}$	2.963	0.0036***	7,612,039	0.0063***	27,183,893	0.0439**
$WS/48_{CY-2}$	0.2988	0.7456	576,457	0.819	553,472	0.9639
Demographic						
Age	-0.0603	p< .0001***	-196,738	p< .0001***	-876,215	p< .0001***
Center	0.1409	0.2283	1,557,945	p< .0001***	5,843,745	.0001***
Minutes Played						
MP_{CY}	0.000426	p< .0001***	1,526	p< .0001***	6,209	p< .0001***
MP_{CY-1}	0.0001	0.3038	989	p< .0001***	3,168	0.0163**
MP_{CY-2}	0.000102	0.2246	72	0.755	456	0.6849
Awards						
All Star	0.1458	0.6483	3,705,379	p< .0001***	15,420,183	0.0003***
All NBA	0.1924	0.6339	4,404,863	p< .0001***	16,934,693	0.0017***
All Defense	0.1551	0.667	1,435,012	0.1472	166,152	0.9723

$R^2_{Duration} = 0.3641$, $R^2_{Avg} = 0.6177$, $R^2_{Total} = 0.4953$,n = 372, df = 361
Significance levels: * p<0.1, ** p<0.05, *** p<0.01