

Introduction

Racial discrimination in professional sports has been a hot button issue for many years now. Players have knelt during national anthems to bring attention to police brutality among the African American community, Donald Sterling, the former team owner of the NBA team Los Angeles Clippers was banned for life for making racist remarks, and there have been many instances of fans across the globe shouting racist indecencies at people who were just doing their job. In the everyday world, a wage gap is not unheard of either, as the Pew Research Center claims that women in America earn 82 cents for every dollar made by a man (Kochhar). The goal of this study is to combine these two problems and test if there is racial discrimination in the salaries of NFL quarterbacks.

The NFL is a multibillion-dollar industry, with revenues across all thirty-two teams estimated to be \$18.6 billion in 2022 (Statista). The quarterback (QB) position is regarded as the most important position on the field. Barring few exceptions, they are one of two positions that touch the ball on every play, and the only one who must make important decisions on every play. Because of the importance that comes with the position, team owners are willing to pay a hefty sum to ensure that their quarterback is of the top quality.

Literature Review

While studies in the past have found evidence of salary discrimination, more recent studies have found little proof. These studies find that there is either no premium based upon race, or that white players earn less than non-white players. This study differs slightly from the other in that the purpose of this study is to determine if NFL quarterbacks who have completed

their rookie contract and earned the right to play on a second contract earned differing amounts based upon race.

Mahoney (2009) examines if race affects the salaries of NFL players in the 2005 season who occupied a roster spot, regardless of position and playing time. The study finds that race is not a statistically factor in determining player salary. In addition, they find that other statistics including games played, years of experience, and number of Pro Bowl appearances are all more impactful factors when determining salary. These results are important because it does not find evidence of racial discrimination in NFL salaries across all players.

Gius and Johnson (2000) examines NFL players of all positions' salaries from the 1996 NFL season with regards to the player's race. In their regression, other independent variables include experience, whether the player was a first-round draft pick or not, the playoff status of the team, and the income of the city the team is in. The results from this study find that white NFL players earn approximately ten percent less than non-white players. The study also finds that there is a positive correlation with being drafted in the first round as well as a higher percentage of games started and salary.

Ducking, Groothuis, and Hill (2013) examines salary discrimination of NFL players that play defensive backs, defensive lineman, linebackers, wide receivers, running backs, and tight ends from 2000-2008. They create two samples, one of offensive players and the other of defensive positions. The conclusion of this study is that there is no wage premium based upon race, and teams that are consistently in pursuit of a championship will especially pay players based upon ability and performance, not race.

Descriptive Analysis

This paper will focus on quarterbacks drafted into the NFL from 2011-2020, who attempted at least five hundred pass attempts while on their rookie contract and analyze the effect of certain independent variables on the dependent variable, which is specifically guaranteed money (amount of money in a contract that the player will make regardless of playing time/injuries/other outside factors) on their second contract (first one negotiated as an NFL player). 500 pass attempts are roughly the equivalent of starting slightly more than one season. This helps narrow down the field slightly to only allow quarterbacks who were good enough to start and played well enough to remain the starter for an extended period. There are 37 quarterbacks who fit this criterion, which essentially allowed for the quarterbacks to have gotten a fair share of playing time whilst on their rookie deals. This provides teams who are negotiating their second contract to have a good understanding of the quarterback's ability in the NFL. The contract data (Cap space and amount guaranteed) was obtained from [spotrac.com](https://www.sportradar.com) (Spotrac), and the performance data (QBR) and draft position data was obtained from [pro-football-reference.com](https://www.pro-football-reference.com) (Pro Football Reference).

Guaranteed money (Gmoney) is the dependent variable and will be reported as millions of dollars per year. It is reported in millions of dollars because there is typically never less than five hundred thousand dollars guaranteed, and more often is more than one million, so dividing the number of dollars guaranteed by that amount provides for easier interpretation. The length of the contract is also controlled for in the dependent variable, because \$40 million guaranteed for one year is much different than \$45 million over 5 years.

African American Dummy (AA) is the main independent variable being studied. The data collected for the race of each NFL quarterback was obtained via their headshots on the NFL

website, with any ambiguous results being determined through other websites. The data will be reported as a 1 meaning the player is African American, and 0 if not.

Quarterback rating (QBR) is a metric used by NFL analyst to quantify the performance of a quarterback in each game/season. QBR is measured on a scale of 0-100, which essentially quantifies the “estimated points added” per play from a quarterback. For instance, if a quarterback makes a difficult throw that results in a positive yardage gain, an estimate of points is added to his score considering outside factors (situation, score, down and distance, etc.). The opposite is also true, if the quarterback consistently makes poor decisions that results in turnovers, his score will be subtracted by that estimated value of points lost. The typical evaluation being 50 being an average performance, 25 is a poor score, 75 is excellent. The data for QBR used is an average seasonal QBR of a player as a starter whilst on their rookie contract. For example, if a quarterback was the primary starter on his team in three out of four seasons on his rookie contract, then the QBR listed would be the total of his QBR’s of those three seasons, divided by three. The reason being that QBR is not an accurate measurement when given small samples, as one play could either extremely inflate or deflate the calculation.

Draft position (Drafted) is another independent variable that should have correlation with the dependent variable. The lower number given for the variable means that the quarterback was taken with a more valuable draft pick and implies that the player was expected to be an excellent NFL player. The higher the number, the more teams had the opportunity to select this player.

Cap Space (Cap) is a numeric variable that represents the amount each NFL team is allowed to spend before paying an extra tax on all additional money spent beyond the cap limit. The cap space always changes yearly, and usually increases. Like *guaranteed money*, Cap Space will be divided by one million since the typical cap space is near two hundred million.

Figure 1. Summary Statistics

Statistic	N	Mean	St. Dev.	Min	Median	Max
Gmoney	37	11.193	10.630	0.250	8.000	46.000
AA	37	0.378	0.492	0	0	1
QBR	37	55.660	12.018	20.767	54.900	85.250
Drafted	37	39.027	55.361	1	10	250
Cap	37	182.786	28.976	133.000	182.500	224.800

Figure 1 provides summary statistics for the dependent and all independent variables. Guaranteed money has an average value of 11.193 million. The median is much lower, however, at 8 million. This, along with a large standard deviation of 10.63 million, implies that there is a great spread amongst the data, with more values under the mean, but with few values very high above the mean. The mean for the African American dummy implies that approximately 37.8% of the 37 quarterbacks in the study are black, meaning there are 14 black quarterbacks and 23 non-black quarterbacks. The mean QBR is very close to the median, coming in at 55.66 and 54.9 respectively, which means that the QBR values are evenly spread. The median draft position is much higher than the mean, which can be interpreted as quarterbacks who were selected earlier in their draft class are more likely to play sufficient time on their rookie contract and earn a second one. Finally, cap space increases from 133 million to 224.8 million over the course of the study.

Figure 2.

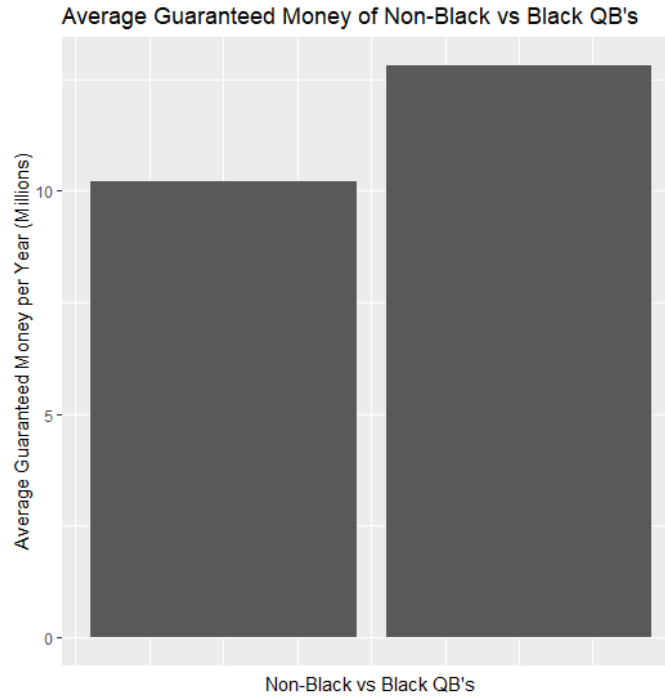


Figure two contains a bar graph representing the total amount of guaranteed money at signing for QB's who are nonblack (represented as 0.0 in the graph) and black (1.0). This shows that while there is a difference in total guaranteed money, the data suggests that on average, black quarterbacks make more guaranteed money than non-black QB's. This is slightly skewed, however, by Deshaun Watson's contract. Watson's contract is fully guaranteed, meaning all \$240 million of his contract was guaranteed from the start. This is the highest number in the data by far, being almost \$85 million higher than the second most.

Empirical Strategy

The main regression equation is as follows:

$$Gmoney_i = \beta_1 + \beta_2(AA) + \beta_3(QBR) + \beta_4(Drafted) + \beta_5(Cap) + e_i$$

Figure 3.

Variable	Relationship with Guaranteed Money
African American Dummy	≈ 0
Quarterback Rating	+
Draft Position	-
Cap Space	+

Figure 3 contains a table of which contains the expected relationship of all the independent variables with the dependent variable, guaranteed money. The expected result of the African American dummy is close to zero, which would mean that there is no correlation between a player's race and the amount of guaranteed money. The expected correlation of QBR is positive, as a higher number means a better performance, so teams would be willing to pay them more to be on their roster. Draft position, however, is expected to have a negative correlation, because these "better" draft picks should on average perform better in the NFL than "worse" draft picks. Lastly, as while cap space increases, it gives teams more money to spend, so the relationship with guaranteed money is expected to be positive. These four independent variables cover a plethora of different categories that could impact a contract value, ranging from personal characteristics to amount of money to be spent.

Results

	<i>Dependent variable:</i>			
	Gmoney			
	Main Model (1)	AA Dummy, QBR, and Draft Position (2)	AA Dummy and QBR (3)	African American Dummy Only (4)
AA	0.153 (3.242)	-0.266 (3.680)	-0.252 (3.635)	2.594 (3.628)
QBR	0.306** (0.133)	0.340** (0.151)	0.345** (0.149)	
Drafted	-0.011 (0.027)	-0.013 (0.031)		
Cap	0.169*** (0.052)			
Constant	-36.321*** (11.626)	-7.127 (8.401)	-7.889 (8.090)	10.212*** (2.232)
Observations	37	37	37	37
R ²	0.364	0.153	0.149	0.014
Adjusted R ²	0.284	0.076	0.099	-0.014
Residual Std. Error	8.994 (df = 32)	10.218 (df = 33)	10.092 (df = 34)	10.703 (df = 35)
F Statistic	4.573*** (df = 4; 32)	1.989 (df = 3; 33)	2.972* (df = 2; 34)	0.511 (df = 1; 35)
<i>Note:</i>				* p<0.1; ** p<0.05; *** p<0.01

Each variable contained the expected sign from the descriptive analysis section in the regression. The R² value means that the whole model would explain approximately 36.4% of the variance within the dependent variable Gmoney. The African American Dummy was determined to be not significant in the regression. The R² for the model only including the African American dummy was 0.014, meaning that it explained 1.4% of variance in the among of guaranteed money. The p values of all African American dummy coefficients are all too large, which can interpret as race having no effect on guaranteed money. The QBR variable was determined to be statistically significant, as well as the Cap space variable. Both variables performed in the regression as expected, as they both had a positive relationship with Gmoney. A one-point increase in average QBR across a rookie contract would result in approximately a \$320,000

increase in guaranteed money. A one million dollar increase in cap space results in around \$169,000 increase in guaranteed money. The draft variable was also deemed to be not significant, with p values being too high.

Figure 4

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RESET test  
  
data:  Gmoney ~ AA + QBR + Drafted + Cap  
RESET = 1.0697, df1 = 2, df2 = 30, p-value = 0.3558
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To ensure the model has no functional form problems, it was tested using RESET. Figure 4 shows the results of the RESET test, which has a p-value of 0.358, which implies the results are not statistically significant. This means we cannot reject the null hypothesis, and the model is valid.

Conclusion

The regression implies simply: if you play well, you will get paid well. The results in this model are consistent with the similar research done on this topic, including Gius and Johnson (2000) and Ducking, Groothuis, and Hill (2013). All the independent variables had their expected relationships with the dependent variable, except for the main independent variable, the African American money. The results of this regression suggest that race has no impact on the amount of guaranteed money. As expected, quarterbacks who perform better (via QBR) get paid more than those who do not. In addition, an increase in cap space gives teams more money to spend, so it makes sense that the amount of guaranteed money would increase as a percentage of total cap space.

Qualifying Quarterbacks

Cam Newton
Colin Kaepernick
Andy Dalton
Blaine Gabbert
Andrew Luck
Robert Griffin III
Ryan Tannehill
Brock Osweiler
Russell Wilson
Nick Foles
Kirk Cousins
Geno Smith
Mike Glennon
Blake Bortles
Teddy Bridgewater
Derek Carr
Jimmy Garoppolo
Jameis Winston
Marcus Mariota
Trevor Semian
Jared Goff
Carson Wentz
Jacoby Brissett
Dak Prescott
Mitchell Trubisky
Patrick Mahomes
Deshaun Watson
Baker Mayfield
Sam Darnold
Josh Allen
Lamar Jackson
Kyler Murray
Daniel Jones
Gardner Minshew
Joe Burrow
Justin Herbert
Jalen Hurts

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