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Abstract

Every year the National Football League has a draft selection process to recruit new talent. Despite the overwhelming amount of analysis performed on players, bad draft picks happen every year. Little research has previously been done to determine whether player performance is predictable at the time of the NFL Draft. Rafferty and Johnson chartered new territory in 2008 with their study entitled *Is the NFL Draft a Crap Shoot? The Case of Wide Receivers*. The purpose of this paper is to help fill the void of literature on performance prediction by extending the study by Rafferty and Johnson to analyze quarterbacks instead of wide receivers.

The empirical results of this study were limited by the amount of data available. The sample size was smaller than desired and subject to a selection bias that included performance measures from only the top quarterbacks. Unfortunately the appropriate data will never be obtainable so this study has made as many inferences as possible.

In general, the results are similar to Rafferty and Johnson; however, not as significant. Both studies conclude that the information available to scouts and NFL teams is useful; however, the majority of NFL performance is unpredictable at the time of the NFL Draft. That isn't to say that drafting players should just be decided by a coin flip, but it does indicate that an educated guess seems to be the best that NFL teams can do.

I. Introduction

Every year the National Football League has a draft selection process to recruit new talent. Teams simply pick players as if they were on a school playground; however, a tremendous amount of preparation goes into this process. Many books, magazines, and articles are published annually to educate NFL teams and the public about the players entering the draft. Despite the overwhelming amount of analysis that is performed, bad draft picks happen every year. This paper will empirically study the ability of scouts and NFL general managers to predict future quarterback success at the time of the NFL Draft because poor drafting decisions cost teams a lot of money and cause them to miss out on players they could have drafted.

An example of the consequences associated with a bad drafting decision took place in 1998. All the literature and scouting reports indicated that Peyton Manning and Ryan Leaf were the top two players entering the NFL Draft. The San Diego Chargers traded a four-time Pro Bowler and another player to move up in the draft order to select Ryan Leaf second overall. The Chargers paid Leaf a guaranteed $11.25 million signing bonus that was, at the time, the largest signing bonus ever received by a rookie. The highly paid and anticipated quarterback only played two seasons for the Charges where he completed less than half his passes, had around a 50 QB Rating, threw more than twice as many interceptions as touchdowns, struggled to prove himself as a leader, and maintained poor relationships with players and the media. To add insult to injury, 27 Pro Bowl players were drafted after Ryan Leaf in 1998. A few of those players were Randy Moss, Alan Faneca, Hines Ward, and Matt Hasselbeck. All of these players have become the faces of their teams and either won or played in a Super Bowl. On the other hand, Peyton Manning was selected first overall by the Indianapolis Colts. He went on to become a three-time

NFL MVP, a Super Bowl Champion, one of the most marketable NFL players, and statistically one of the greatest quarterbacks of all time.

As this example illustrates, predicting a player's future success in the NFL is crucial to the future of NFL teams and should be the topic of many scholarly articles; however, little research has been done to determine whether player performance is predictable at the time of the NFL Draft. Rafferty and Johnson chartered new territory in 2008 with their study entitled *Is the NFL Draft a Crap Shoot? The Case of Wide Receivers*. The economists determined that scouts and NFL general managers were able to predict some future performance for college wide receivers, but the majority is unpredictable (Rafferty and Johnson, 2008). The purpose of this paper is to help fill the void of literature on performance prediction by extending the study by Rafferty and Johnson to analyze quarterbacks instead of wide receivers.

II. Literature Review

As discussed above, the success of the NFL depends heavily on the players, but predicting who will become the "best" players is difficult. Former San Francisco 49ers head coach, Bill Walsh, talked with Inside Sports Magazine about the complexity of drafting players into the NFL. He said, "They're all good. That's the problem. It's hard to find one that is so much better that he'll make a difference." To overcome this difficulty, teams go to great lengths to evaluate new talent and determine draft strategies, but have they succeeded? The following paragraphs highlight articles that discuss the different factors that influence teams' decisions, evaluate how teams have performed in the past, and explain the void that this paper intends to fill.

The goal of NFL teams on draft day is to acquire the best players while incurring the least amount of cost. To do this, teams must be able to accurately predict a player's future performance. There are many different ways that teams pursue this goal, but all of them consider the NFL Combine. The Combine, as it has become known, is the highly publicized statistic gathering frenzy held in Indianapolis, Indiana every February. The top NFL prospects are invited to perform in a series of athletic events that are designed to help predict their NFL playing career. The players are divided up by position and participate in position specific drills as well as universal events. Most people view these trials as make or break where every tenth of a second and half of an inch mean life or undrafted. The article entitled *The National Football League Combine: A Reliable Predictor of Draft Status* by McGee and Burkett attempted to determine the impact the NFL Combine has on teams' drafting decisions. They concluded that combine performances can be used to accurately predict the draft outcomes for a few positions (running backs, defensive backs, and wide receivers), but only provides a good to fair estimate for other positions (quarterbacks, offensive linemen, defensive linemen, and linebackers) (McGee and Burkett, 2003). From these results it can be concluded that NFL teams depend on more than the NFL Combine to evaluate players.

In fact, players' teammates have a significant impact on where they will be drafted. Consider the quote, "A great player makes the players around him better." In this context, the saying means that someone may appear to be a better player because the players around him make him better, not because he is good on his own. One example of this situation is Ken Dorsey who played quarterback for the University of Miami Hurricanes when they were a national powerhouse. Behind a great offensive line and receiving core, he appeared to be a great player; however, this may not have been true because he never showed success in the NFL. In *The Peer*

Effect in the NFL Draft, Mirabile tried to determine how playing with NFL caliber teammates effected draft position and salary of a quarterback prospect. He concluded that a quarterback will on average be selected about five and a half places sooner for each additional college teammate that was drafted the same year (Mirabile, 2005). These results indicate that NFL teams do not draft quarterbacks on their performance alone, but also on the performance of their teammates.

They also consider the university that players attended when making drafting decisions. Top draft picks demand an extraordinary amount of money even though they've never played a down in the NFL; therefore, teams try to reduce their risk of drafting the next biggest flop. Most often only players from the biggest and most prominent football schools will be discussed as the next great NFL stars. Players from lower divisions or smaller schools rarely get the same attention. Hendricks, DeBrock, and Koenker discussed this issue in their paper entitled *Uncertainty, Hiring, and Subsequent Performance: The NFL Draft.* The authors found that during the high risk high cost beginning rounds of the draft that teams were more likely to draft players from high profile schools; however, this trend seemed to be reversed in less risky later rounds. Therefore, players from less-visible schools appear to be discriminated against early in the draft, and benefit in later rounds when teams are searching for superstars in low key places (Hendricks, 2003). The articles above explain how and why NFL teams make drafting decisions, but do these strategies work?

In the study *Overconfidence vs. Market Efficiency in the National Football League,* Massey and Thaler address the rationality of NFL teams' behavior. They found that NFL teams overvalue top draft picks and subsequently allocate more money to them than they are worth. This behavior is irrational because the fall-off in performance of later round selections is nowhere near as steep as the decline in price (Massey and Thaler, 2005). For example, there have

been a lot of top draft picks who have gone on to be some of the greatest players to ever play the game, but there have also been a lot of low draft picks and even undrafted players that have reached that status as well. Consider the two best quarterbacks in the NFL today – Peyton Manning and Tom Brady. Peyton was drafted first overall in 1998 while Tom Brady was drafted in the sixth round in 2000. In the article *Passing on Success? Productivity Outcomes for Quarterbacks Chosen in the 1999-2004 National Football League Player Entry Drafts*, Quinn, Geier, and Berkovitz addressed the issue of quarterback success from early and later round draft picks. They found that more highly drafted quarterbacks see significantly more playing time; however, they found no evidence to suggest that higher drafted quarterbacks are more productive than lower drafted quarterbacks that get significant playing time (Geier and Berkovitz, 1994). Both of these articles insinuate that NFL teams do not successfully draft the future NFL stars with the most expensive top picks, but why have the teams failed to meet their goals?

NFL teams have failed because they are unable to fully predict a player's future NFL performance. The only paper that has attempted to study this aspect of the NFL Draft is entitled, *Is the NFL Draft a Crap Shoot? The Case of Wide Receivers* by Rafferty and Johnson. They concluded that the information obtained by scouts and NFL general managers is useful in predicting future player performance; however, the majority of performance is unpredictable (Rafferty and Johnson, 2008). It seems that drafting players may come down to a lucky educated guess.

III. Theory

At the root of drafting players lies the task of predicting a player's future success. No matter what pick a team has, what position they are drafting, or price they are willing to pay, a

team must be able to accurately evaluate the players they draft. The NFL Draft market comes down to basic supply and demand. At the time of the draft, teams know basically what price each pick is worth because of past drafts; however, the quantity they are going to receive depends on the player's future performance. The market will only work effectively when both price and quantity can be accurately determined because NFL teams need to realize the real cost of each unit of output. The market fails and poor draft choices occur when teams over estimate the quantity of output they are going to receive; therefore, they pay a higher price than that quantity is worth. As mentioned before, the only paper that has attempted to study NFL teams' ability to predict a player's future NFL performance is by Rafferty and Johnson and entitled, *Is the NFL Draft a Crap Shoot? The Case of Wide Receivers*. They developed a model to compare wide receivers' predicted performance with their actual performance (Rafferty and Johnson, 2008). This paper will continue to help prevent market failure in the NFL Draft by adapting Rafferty and Johnson's model to include quarterbacks instead of wide receivers.

IV. Empirical Model

This paper uses two separate models to determine scouts' and NFL general managers' ability to predict future quarterback success. The first model, referred to as the basic model, replicated Rafferty and Johnson's paper as closely as possible, while the second model, called the modified model, makes more severe adjustments. Both models, like Rafferty and Johnson's study, assume that a player's future NFL performance is a function of the scouts' talent rating as well as the NFL general managers' talent rating and assessment of a players fit into their team's system (Rafferty and Johnson, 2008).

A. Basic Model

The basic model is:

[1] $Performance_i = \mu + \alpha PFW_i + \beta_1 Team_i + \beta_2 Team^2_i + X_i \gamma + \delta Trend_i + \varepsilon_i$

where *PFW* and *Team* are the focal variables and the other variables are controls.

The following table describes each independent variable included in the basic model, and the subsequent sections explain these variables and the dependent variables in more detail.

Table 1:

Variable	**Description**	**Purpose**	**Predicted Sign**
μ	intercept	To signify where the line of best fit intersects the Y-axis	?
PFW	Scouts' rating	To quantify the scouts' rating	+
Team	NFL general managers' rating	To quantify the NFL general managers' rating	–
$Team^2$	Quadratic of Scouts' rating	To account for any non-linear relationships between a player's future NFL performance and the *Team* variable	?
X	Vector parameter consisting of dummy variables for: Player attended a Division I-AA school Player suffered a significant injury	To account for any information that scouts' or NFL general managers' failed to incorporate in their ratings	–
Trend	List of the years in which the data originated	To account for the evolution of the passing game	?

B. Scouts' Rating (*PFW*)

The data for the scouts' rating, *PFW*, will be taken from the NFL Draft magazine *Pro Football Weekly* from 1994-2002 for several reasons. First, this paper seeks to extend the study performed by Rafferty and Johnson; therefore, the same evaluation for scouts' ratings will be used. Second, the magazine provides a single number rating for each player entering the draft in every position, which will allow the study to be extended to all positions while keeping the same source for the scouts' rating. Third, *Pro Football Weekly* only has archives back to 1994 available for sale, and the performance evaluations, which are discussed later, span 5 years so the most recent draft data could be 2002. The following table shows the scouts' rating scale and how each number value can be interpreted.

Table 2:

PFW Rating	**Interpretation**
9.00	A once-in-a-lifetime player.
8.00-8.99	Perennial All-Pro.
7.50-7.99	Future All-Pro.
7.00-7.49	Should become a Pro Bowl-caliber player.
6.50-6.99	Surefire first-rounder who, unless he's a quarterback, should contribute as a rookie.
6.00-6.49	Has a good chance to go in the first round and be a starter by his second season.
5.50-5.99	Could become a quality NFL player and should be a first-day pick.
5.10-5.49	Could make an NFL roster. Has a good to great chance of being drafted.
5.00-5.09	Has a better than 50-50 chance to make a roster or practice squad.
4.75-4.99	Should be in an NFL training camp.
4.50-4.74	Solid free agent who has an outside chance to make the right NFL team.
4.00-4.49	A player who could be in an NFL training camp but who likely will need to develop in the CFL, Arena League or NFL Europe.

If a player doesn't have a *Pro Football Weekly* rating, then he will be given a rating of 4.8, which is one tenth of a point lower than the lowest rating of all the quarterbacks. This number is used because it assumes that *Pro Football Weekly* would have rated the player had they thought he would have scored higher than the lowest rated player.

C. NFL General Managers' Rating

The NFL general managers' rating will be quantified by the pick number in which each player was taken with in the NFL Draft. This allows the variable to absorb both the NFL general managers' talent rating and their rating of how each player fits into their system. For example, consider two quarterbacks with equal talent – quarterback A and quarterback B. A team will select quarterback A over quarterback B if they think he will fit into their offensive scheme better.

The structure of the NFL Draft has changed over the years, but it is roughly divided into 7 rounds of 32 picks not including supplementary and compensatory picks. Therefore, the *Team* variable can vary from 1 to around 252 depending on the number of supplementary and compensatory picks for a given year. In the case of undrafted players that do not have a pick number, they will be given a NFL general managers' rating of 253, which is equal to the last draft pick plus one. This number is used because it assumes that NFL general managers would have drafted the quarterback had they thought he was better than the last player selected.

D. NFL Performance Variables

The dependent variables used to represent the players' NFL performance are quarterback rating, completion percentage, passing yards, passing touchdowns, and whether or not the player has made a Pro Bowl. Each player will be evaluated on the first 3 and 5 years that he played in the NFL; however, there are exceptions for players who did not immediately play, had a gap in playing years, or had injuries. For example, Tom Brady played behind Drew Bledsoe during the first season of his career so his performance evaluation doesn't start until his second year when

he was the starting quarterback. Also, if a player sustains an injury that keeps him out for an extended period of time or he didn't receive substantial playing time for any other reason, then that year will not be included in the performance evaluation.

Regressions will be performed on each dependent variable for the 3 and 5 year performance evaluation periods because a player's first contract normally extends 3 years; therefore, NFL teams will have to make decisions about each player's future between the 3 and 5 year mark.

E. Modified Model

The modified model is:

[2] $Performance_i = \mu + \alpha_1 PFW_i + \alpha_2 PFW^2_i + \beta_1 Team_i + \beta_2 Team^2_i + X_i \gamma + \delta Trend_i + \varepsilon_i$

where PFW^2 is added and X includes two additional binary variables, one for whether or not a player was rated by *Pro Football Weekly* and one for whether or not a player was draft. These variables were included on the recommendation of Dr. Robert Schmidt. He found that the performance data had a quadratic relationship with *PFW* as well as with *Team*. That is, as *PFW* decreased, the performance evaluations decreased up to a point, then began to rise. A quadratic variable for *Team* was already included in the basic model, but not for *PFW*; therefore, PFW^2 was added in the modified model.

The two additional binaries for players who were not rated by *Pro Football Weekly* and players who were not drafted were added because Rafferty and Johnson did not specify their methods for these players. Also, the inclusion of these binaries allows the model to focus on predicted performance versus actual performance instead of being skewed by unrated and undrafted players.

F. Caveats

Unfortunately, there are a couple problems with this study that need to be highlighted. First, the sample size is smaller than desired, especially for the different striations in *Pro Football Weekly* ratings. For instance, David Carr is the only quarterback included in the study that had a *PFW* rating between 7.00 and 7.49. The small sample size makes it very difficult to show any type of relation between predicted performance and actual performance. More quarterbacks would have been included in the study, but only a few quarterbacks are drafted per year and *Pro Football Weekly* only had archive data back to 1994 available. Other positions, such as the wide receivers used by Rafferty and Johnson, have a greater sample size because more than one player in the position can play at a time; therefore, those studies should be more accurate.

Second, future performance data isn't available for all the quarterbacks that scouts and NFL general managers evaluate. For example, every year roughly 50 quarterbacks are available to be drafted; however, only 7 or 8 will be drafted and out of them only 3 or 4 will play 3 years and only 2 or 3 will play 5 years in the NFL. This means that only the cream of the crop will ever have a NFL performance evaluation, which limits the variability in the data. The data used in this study came from the tip of the right tail of the bell curve of predicted performances. If the lower rated quarterbacks were able to have NFL performance measures, then the entire bell curve of predicted performance would be available and the results would be clearer. Unfortunately, this data will never be available and we must do the best with what's available.

V. Results

The following section discusses the results of the study by first generally viewing the descriptive statistics, then becoming more detailed with the ordinary least square regressions and comparison to Rafferty and Johnson.

Table 1 shows the descriptive statistics for the first three years that the quarterbacks played in the NFL. As can be seen, the minimum *PFW* rating is 4.8 and the maximum is 7.9. The highest rating was given to Peyton Manning, and the second highest rating, 7.8, was given to Ryan Leaf. The players who were not rated by *Pro Football Weekly* were given the lowest ratings. The average *PFW* is 5.57 meaning that the average player, who has performance measures in the NFL, is predicted to be a quality NFL player and should be a first day draft pick. This was generally the case because the average draft pick was 121, which is during the first day and occurs in the later part of the 3rd round.

The results show that only a small percentage of players, 6%, came out of smaller, Division I-AA schools. This observation was not unexpected because most teams reduce their risk of drafting bad players by selecting from the big name football schools.

Table 1: 3 Year Descriptive Statistics

	Mean	Standard Error	Median	Standard Deviation	Range	Minimum	Maximum
PFW Rating	5.57	0.10	5.27	0.80	3.1	4.8	7.9
Team	121.36	11.69	102.50	93.53	252	1	253
Team^2	23340.05	3128.30	10518.50	25026.39	64008	1	64009
Div 1-AA	0.06	0.03	0	0.24	1	0	1
Injury	0.14	0.04	0	0.35	1	0	1
QB Rating	70.47	1.84	71.32	14.73	66.87	36.77	103.63
Pct	54.17	0.99	54.93	7.90	52.60	34.23	86.83
Yds	1258.32	128.00	1045.67	1023.97	4066.33	29.33	4095.67
TD	7.21	0.84	5.17	6.69	28.33	0	28.33
Int	6.63	0.66	5.50	5.26	19.67	0	19.67
Pro Bowl	0.28	0.06	0	0.45	1	0	1

Table 2 shows the descriptive statistics for the first five years that the quarterbacks played in the NFL. These results are very similar to those in Table 1; however, there are important differences. As expected, the average performance variables (*QB Rating, Completion Percentage, Touchdowns, Interceptions, Pro Bowls*) are generally better for the five year period because the better players were resigned after three years and given the opportunity to play longer.

Unexpectedly, the percentage of Division I-AA players increased in the five year period from 6% to 9%. This number was hypothesized to decrease because players from lower level schools are typically rated lower; however, this wasn't the case because the *PFW Rating* and *Team* increased. These results are probably explained by a greater number of players rated in the middle-of-the-road leaving the NFL between the three and five year periods as compared to unrated players leaving.

Table 2: 5 Year Descriptive Statistics

	Mean	Standard Error	Median	Standard Deviation	Range	Minimum	Maximum
PFW Rating	5.60	0.12	5.35	0.78	3.1	4.8	7.9
Team	118.16	14.13	106	94.77	252	1	253
Team^2	22741.84	3702.71	11236	24838.53	64008	1	64009
Div 1-AA	0.09	0.04	0	0.29	1	0	1
Injury	0.09	0.04	0	0.29	1	0	1
Rating	76.47	1.53	75.98	10.24	47.56	49.4	96.96
Pct	57.26	0.87	56.92	5.81	31.32	45.34	76.66
Yds	1719.72	153.47	1806.2	1029.52	3915.4	208.2	4123.6
TD	10.26	1.02	10	6.82	25.8	1.8	27.6
Int	8.31	0.72	8	4.83	18.8	1.2	20
Pro Bowl	0.4	0.07	0	0.50	1	0	1

Table 3 is organized by the different *PFW Rating* categories, and shows the average draft position and performance measures associated with the *PFW Ratings*. As can be seen, draft pick number and draft round correspond to the *PFW* closely. That is, the higher the rating, the lower the draft *Pick Number* and *Draft Round*. However, the performance measures do not seem to be related. In particular, the highest average *QB Rating* and *Completion Percentage* is from those who didn't have a *PFW Rating* and were on average undrafted. Unfortunately, these observations showed up in the regressions.

Table 3: 3 Year *PFW* Descriptive Statistics

PFW Rating	7.50-7.99	7.00-7.49	6.50-6.99	6.00-6.49	5.50-5.99	5.10-5.49	5.00-5.09	4.75-4.99	Not Ranked
QBs	4	1	5	4	13	13	11	6	7
QB Rating	61.04	63.22	75.13	80.39	65.35	68.22	66.81	74.5	82.61
Pct	52.81	53.6	57.05	53.66	53.85	53.42	54.53	48.94	58.72
YDs	2142.5	2256.4	2096.27	1784.92	1135.62	848.9	1082.58	563.06	1506.33
TDs	10.92	11	12.4	10.25	6.1	4.33	6.55	3.78	10.43
INTs	14.17	14.13	10.47	8.42	6.72	4.46	5.42	3.06	6.29
Pro Bowl	2	0	3	2	3	2	2	1	3
Round	1	1	1	1.25	3.54	3.08	5.9	UD	UD
Pick #	3	2.6	4	13.5	96.23	88.67	179.3	UD	UD
PFW Rank	1.5	1.4	2.2	1.5	4.46	6.23	11.09	19.67	NR
PFW Rating	7.68	7.56	6.74	6.19	5.68	5.23	5.03	4.95	NR
Injury	1	0	0	1	2	1	1	1	0
Div I-AA	0	0	1	0	0	2	1	0	3

Table 4 is organized like Table 3, except it includes the five year performance average period instead of the three year. As observed in the difference between Table 1 and Table 2, the five year period showed higher performance measures than the three year period. Again, these results are expected because the better players would have been resigned to another contract after three years, whereas, the lower performing players would have exited the NFL or not given the opportunity to play. Also, Table 5 shows similar discrepancies in actual performance compared to *PFW Ratings* and *Pick Number*. That is, the higher ratings did not correlate with the highest NFL performance. Again, the highest *QB Rating* and *Completion Percentages* were recorded by quarterbacks who were unrated.

Table 4: 5 Year *PFW* Descriptive Statistics

PFW Rating	7.50-7.99	7.00-7.49	6.50-6.99	6.00-6.49	5.50-5.99	5.10-5.49	5.00-5.09	4.75-4.99	Not Ranked
QBs	2	1	4	4	10	8	7	4	5
QB Rating	74.75	75.02	81.56	81.2	68.64	72.86	81.31	77.33	83.6
Pct	57.46	59.82	59.14	56.46	55.01	54.71	60.47	55.54	61.32
YDs	3196.8	2678.2	2630.9	2097.4	1228.82	1142.5	1819.66	1003.15	2244.76
TDs	19.7	11.8	16.5	12.8	6.32	6.23	11.57	6.15	14.96
INTs	16.9	13	11.3	9.8	6.92	6.1	7.77	5	10.08
Pro Bowl	2	0	3	2	3	2	2	1	3
Draft Round	1	1	1	1.25	3.6	2.75	5	UD	UD
Pick #	3.5	1	4.25	13.5	100	76.88	151.86	UD	UD
PFW Rank	1	1	2.25	1.5	4.4	5.75	10.57	19	NR
PFW Rating	7.7	7.1	6.73	6.19	5.71	5.22	5.04	4.94	NR
Injury	0	0	0	1	1	0	1	1	NR
Div I-AA	0	0	1	0	0	2	1	0	3

Table 5 shows the regression coefficients and t-values, in parenthesis, for each dependent performance variable (*QB Rating, Completion Percent, Yards, Touchdowns, Interceptions, and Pro Bowl*). The coefficients for the *Team* variable are negative for all the performance variables and significant for four out of the six. This was expected for all the dependent variables, except *Interceptions,* because a higher draft pick numbers should result in lower NFL performance. For example, the interpretation of the *QB Rating* is for every one pick increase in draft pick number, the *QB Rating* is expected to decrease by 0.28.

Unfortunately, there are some discrepancies in the *PFW Rating* variable. It was hypothesized to be positive, that is, the higher the *PFW Rating* the higher the NFL performance; however, the signs of the coefficients switch for different dependent variables, and is statistically significant with the incorrect sign for *QB Rating*. An interpretation of the coefficient is: for every

1 point increase in *PFW Rating*, the *QB Rating* is expected to fall 8.2 points. This analysis is the opposite from the hypothesis.

Table 5: 3 Year Basic Model Regression Results

	QB Rating	Comp Pct	YDs	TDs	INTs	Pro Bowl
PFW Rating	-8.1547*	-1.1988	154.0916	0.0025	1.6409	0.0208
	-1.7582	-0.4504	0.5059	0.0012	1.1430	0.1452
Team	-0.2833**	-0.0524	-13.6927*	-0.0973*	-0.0631*	-0.0039
	-2.3403	-0.7539	-1.7224	-1.7747	-1.6841	-1.0393
Team^2	0.0010**	0.0002	0.0416*	0.0003*	0.0002	0.0000
	2.5430	0.7440	1.6842	1.8201	1.5751	1.0520
Div I-AA	0.0524	1.9359	232.3917	0.4981	0.3453	0.1916
	0.0069	0.4436	0.4654	0.1447	0.1467	0.8162
Injury	-7.5037	-0.0380	185.9210	1.4979	1.6786	-0.0326
	-1.4389	-0.0127	0.5429	0.6344	1.0399	-0.2024
Trend	0.5794	-0.2650	-28.2901	-0.1547	-0.2054	-0.0413*
	0.8514	-0.6785	-0.6331	-0.5021	-0.9752	-1.9671

The ordinary least squares regression results for the five year NFL performance evaluations are in Table 6. The signs of the coefficients are the same as the three year period; however, the magnitudes are slightly different. In general, the coefficients have become less significant for all the dependent variables. This is probably due to the decrease in sample size between the three and five year periods because fewer quarterbacks recorded NFL performance data for at least five years.

Table 6: 5 Year Basic Model Regression Results

	QB Rating	Comp Pct	YDs	TDs	INTs	Pro Bowl
PFW Rating	-6.0162	-0.1654	370.1067	2.1663	1.5053	0.1191
	-1.4761	-0.0683	0.9694	0.8283	0.8911	0.6223
Team	-0.1529	-0.0181	-10.9506	-0.0718	-0.0693*	-0.0027
	-1.5539	-0.3088	-1.1877	-1.1371	-1.6990	-0.5877
Team^2	0.0005	0.0001	0.0394	0.0003	0.0002*	0.0000
	1.5227	0.4685	1.3485	1.3930	1.8282	0.5883
Div I-AA	-3.7067	-0.3015	160.0915	0.4106	0.1854	0.1122
	-0.6604	-0.0904	0.3045	0.1140	0.0797	0.4260
Injury	-8.5370	0.2833	245.6623	0.6624	2.0923	0.0247
	-1.4878	0.0831	0.4570	0.1799	0.8798	0.0915
Trend	0.4175	-0.2343	-28.4029	-0.0906	-0.2085	-0.0514
	0.6871	-0.6493	-0.4990	-0.2325	-0.8280	-1.8015

The regression results for the three year modified model are shown in Table 7. The modified model successfully reversed the wrong signs recorded in the basic model; however, the results are less significant. The *PFW Rating* changed from being negative and significant for *QB Rating* in the basic model to positive with a value of 5.5 in the modified model. The only sign for *PFW Rating* that is out of order in the modified model is *Touchdowns*. Sadly, as the *PFW Ratings* improved, the *Team* variable got worse. It no longer has any significant coefficients, and the coefficient for *Interceptions* is still negative.

Table 7: 3 Year Modified Model Regression Results

	QB Rating	Comp Pct	YDs	TDs	INTs	Pro Bowl
PFW	5.5074	14.2871	103.1195	-1.9463	-3.1031	0.5334
	0.1224	0.5510	0.0348	-0.0958	-0.2194	0.3807
PFW^2	-0.7710	-1.1287	12.8877	0.2341	0.4037	-0.0419
	-0.2235	-0.5677	0.0567	0.1503	0.3722	-0.3900
Team	-0.1369	-0.0237	-11.6318	-0.0734	-0.0553	-0.0059
	-0.8178	-0.2462	-1.0546	-0.9716	-1.0519	-1.1285
Team^2	0.0004	0.0001	0.0353	0.0002	0.0001	0.0000
	0.5631	0.2537	0.8598	0.7843	0.7507	1.2200
Div I-AA	-1.1257	1.4527	167.9492	-0.0304	0.1137	0.1845
	-0.1475	0.3303	0.3339	-0.0088	0.0474	0.7763
Injury	-8.0056	0.2260	205.6152	1.5658	1.6743	0.0000
	-1.5162	0.0743	0.5908	0.6567	1.0089	0.0000
Trend	0.8226	-0.1112	-9.1519	-0.0086	-0.1446	-0.0357
	1.1698	-0.2745	-0.1975	-0.0271	-0.6541	-1.6298
Not Rated	10.4751	7.2903	778.4711	5.8110	2.1614	0.2731
	1.3352	1.6127	1.5054	1.6402	0.8765	1.1181
Undrafted	8.3337	-2.1121	-263.7550	-1.0213	-0.3386	-0.3980
	0.7249	-0.3188	-0.3481	-0.1967	-0.0937	-1.1118

Table 8 shows the regression results for the five year modified model. These statistics show the reoccurrence of negative coefficients for the *PFW Ratings*. In fact, these are the most significant negative signs out of both models and both time periods. The *Team* variable retained the negative coefficients, as in all the other regressions, including the unexpected negative sign for *Interceptions*. As in the three year modified model, none of the coefficients were significant.

Table 8: 5 Year Modified Model Regression Results

	QB Rating	Comp Pct	YDs	TDs	INTs	Pro Bowl
PFW	-85.9481**	-25.1373	-4693.3900	-35.4892	-20.1150	-1.2368
	-2.2568	-1.0592	-1.3246	-1.4917	-1.2512	-0.6573
PFW^2	6.1918**	1.9407	402.6190	3.0138	1.7435	0.1006
	2.1308	1.0717	1.4892	1.6602	1.4213	0.7008
Team	-0.2880*	-0.0687	-17.1294	-0.1057	-0.0755	-0.0088
	-1.9177	-0.7344	-1.2258	-1.1267	-1.1907	-1.1923
Team^2	0.0010	0.0003	0.0622	0.0004	0.0002	0.0000
	1.6211	0.7831	1.1310	1.0598	0.9366	1.2308
Div I-AA	-4.5902	-0.7137	43.9958	-0.4908	-0.3044	0.0944
	-0.8537	-0.2130	0.0879	-0.1461	-0.1341	0.3553
Injury	-6.9045	0.9131	391.9385	1.7600	2.6793	0.0608
	-1.2550	0.2663	0.7657	0.5121	1.1537	0.2238
Trend	0.5891	-0.1175	2.0683	0.1341	-0.1080	-0.0422
	0.9752	-0.3122	0.0368	0.3552	-0.4235	-1.4131
Not Rated	3.7216	3.3593	935.8672	6.9381	3.0285	0.2706
	0.5734	0.8305	1.5497	1.7111	1.1053	0.8436
Undrafted	-12.2491	-5.9003	-911.0836	-5.5166	-1.2733	-0.7182
	-1.0984	-0.8490	-0.8781	-0.7919	-0.2705	-1.3034

The comparisons of this study to *Is the NFL Draft a Crap Shoot? The Case of Wide Receivers.* by Rafferty and Johnson are shown in Table 9 and Table 10. In general, Rafferty and Johnson have stronger results for a couple reasons (Rafferty and Johnson, 2008). First, they were able to have a larger sample size because more wide receivers play in the NFL than quarterbacks and there data stretched back farther than 1994. Second, wide receivers do not need as much time to develop into NFL players as quarterbacks because the position doesn't require as extensive mental capabilities. As a result, wide receivers can generally contribute to their team right away, whereas, quarterbacks tend improve over time.

Table 9: Rafferty and Johnson vs. 3 Year Basic Model

	Rafferty and Johnson					*3 Year Basic Model*					
	Pro Bowl	**Games**	**Receptions**	**YDs**	**TDs**	**QB Rat**	**Pct**	**YDs**	**TDs**	**INTs**	**Pro Bowl**
PFW	.190***	3.144***	10.460***	147.603***	1.127***	-8.1547*	-1.1988	154.0916	0.0025	1.6409	0.0208
Team	-0.001	-0.018	-0.259***	-3.701***	-0.019***	-0.2833**	-0.0524	-13.6927*	-0.0973*	-0.0631*	-0.0039
Team^2	0.003	-0.044	0.591***	8.58***	0.045**	0.0010**	0.0002	0.0416*	0.0003*	0.0002	0.0000
I-AA	0.098***	0.009	1.085	17.922	0.209	0.0524	1.9359	232.3917	0.4981	0.3453	0.1916
Injury	-0.006	-1.011	0.765	14.915	0.094	-7.5037	-0.0380	185.9210	1.4979	1.6786	-0.0326
Trend	-0.002	0.075	0.291	2.942	0.015	0.5794	-0.2650	-28.2901	-0.1547	-0.2054	-0.0413*

Table 10: Rafferty and Johnson vs. 3 Year Modified Model

	Rafferty and Johnson					*3 Year Modified Model*					
	Pro Bowl	**Games**	**Receptions**	**YDs**	**TDs**	**QB Rat**	**Comp Pct**	**YDs**	**TDs**	**INTs**	**Pro Bowl**
PFW	.190***	3.144***	10.460***	147.603***	1.127***	5.5074	14.2871	103.1195	-1.9463	-3.1031	0.5334
Team	-0.001	-0.018	-0.259***	-3.701***	-0.019***	-0.1369	-0.0237	-11.6318	-0.0734	-0.0553	-0.0059
Team^2	0.003	-0.044	0.591***	8.58***	0.045**	0.0004	0.0001	0.0353	0.0002	0.0001	0.0000
I-AA	0.098***	0.009	1.085	17.922	0.209	-1.1257	1.4527	167.9492	-0.0304	0.1137	0.1845
Injury	-0.006	-1.011	0.765	14.915	0.094	-8.0056	0.2260	205.6152	1.5658	1.6743	0.0000
Trend	-0.002	0.075	0.291	2.942	0.015	0.8226	-0.1112	-9.1519	-0.0086	-0.1446	-0.0357
PFW^2	N/A	N/A	N/A	N/A	N/A	-0.7710	-1.1287	12.8877	0.2341	0.4037	-0.0419
Not Rated	N/A	N/A	N/A	N/A	N/A	10.4751	7.2903	778.4711	5.8110	2.1614	0.2731
Undrafted	N/A	N/A	N/A	N/A	N/A	8.3337	-2.1121	-263.7550	-1.0213	-0.3386	-0.3980

VI. Conclusion

The empirical results of this study were limited by the amount of data available. As highlighted previously, the sample size was smaller than desired and subject to a selection bias that included performance measures from only the top quarterbacks. Unfortunately the appropriate data will never be obtainable so this study has made as many inferences as possible with what's available.

In general, this study found similar results as Rafferty and Johnson; however, not as significant. Both studies conclude that the information about players obtainable by scouts and NFL teams is useful; however, the majority of NFL performance is unpredictable at the time of

the NFL Draft (Rafferty and Johnson, 2008). That isn't to say that drafting players should just be decided by a coin flip, but it does indicate that an educated guess seems to be the best that NFL teams can do.

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