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Senior Project

Title:

Evaluating the Value of an NFL

Quarterback

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ABSTRACT

The research question in this paper is evaluating the value of an NFL Quarterback. The way this will be done is by using quarterback rating (QBR) and PFF grades as two determinants of the QBs marginal productivity of labor for his given team. First the paper seeks to explain the issues present in the NFL and relate them to the overall idea of salary overpayment. In this section I have found that there are general drafting issues and payment issues in the market as a whole that affect teams salary dispersion and use of their salary cap. Next the paper explains the facts surrounding the areas of the NFL such as draft processes and ways of player acquirement. In this section I highlight the errors that NFL teams could avoid during drafting and player acquirement and why there are more full proof ways of doing this. Then the paper breaks down multiple tables and graphs in terms of marginal productivity to highlight the importance of QB salary dispersion in the NFL and the large presence of overpayment. This area I have chosen to focus on QBR and PFF grades as my statistical determinants and have done multiple comparison tables with these stats and players marginal productivity as well as comparisons to their salary over a period of years. Finally, the paper will discuss and conclude the findings that are present and tell the reader why NFL teams need to evaluate QB salaries that are overpaid and underpaid on a better basis. The limitations of the research are then discussed at the end so the reader has an idea of the areas of the study that were hardest to perform and what may be lacking data.

INTRO

Every year in the NFL teams draft Quarterbacks that are busts or teams overpay Quarterbacks who severely underperform. There must be a way in which to fix this issue. In this paper I will be examining how an NFL team determines the value of a Quarterback. This topic is interesting because every year we see teams entering the season with their hopes high on a new young QB. Well rarely do these hopes ever come to fruition considering many of these drafted QBs crash and burn or simply play mediocre football. Even long time QBs in the league we see their game decline and wonder why they are making so much money. Wouldn't it be great if there was a way to predetermine how much a QB is worth, so teams don't overpay them? That is the exact goal of this paper, to find a system in which to determine what factors attribute most to determining the skill of a QB so they can be paid the proper salary.

This problem is very intricate, so it requires multiple methods of analyses. To start the salaries of NFL QBs over the last 5 years will be analyzed to determine how accurate or inaccurate these salaries are. To determine a basis for what a QB should be paid factors that attribute to their skills must be considered. The first factor we will start with is PFF grades. By use of QBs and their surrounding cast PFF grades we can determine whether the QB is performing to the tune of how many bills he is making. Then we will look at what the biggest issues are with the QBs that we deem as overpaid for their performance. The analysis will also require examination of college QBs to determine what does or doesn't make them a draft bust. In this we will examine college PFF grades and combine, along with other measurables. The goal of this analysis is to lay a foundation for a model to better determine how much to pay a QB.

The paper will first give a brief background as to what the job is of an NFL Quarterback to highlight the player's importance to their team and give non-NFL viewers a background on what this topic is all about. After this effective comparison between QBs in the league will be made.

These comparisons will serve to determine which QBs have been consistently overpaid and underpaid. A background will be given on what the salary cap is and how this comes into play when paying a Quarterback as well as how the teammate salaries may affect the QBs pay. There will also be a background given on the drafting process as this is a primary part of the paper. Once this has been established the paper will get into the relation of this topic in the field of economics. There will be a model given on the marginal productivity along with explanation as well as a section talking about wage determination in the NFL. Once this has been established the paper will take into account all the statistical factors and attempt to state a better way to select QBs and determine their value once already in the league.

Background on QB Position

The Quarterback is the most important position in the NFL. This player is considered the field general and team leader. Having a good franchise QB will not only make your team more successful but also the business aspect because fans will be more invested in your team's success because they know the team has a good leader. The Quarterback position is the highest paid position in the league, and it has been like that for a while. Many of these players have contracts extending over 30 million dollars each season. The problem is whether they really earn them. This paper will attempt to look at the ways in which a QB is evaluated before a team decides to give them such a large sum of money. Although the QB is the face of the team, and the franchise does not necessarily mean they deserve to be paid such high fees for poor performance. There are many things in place in the NFL that impact how a team can pay a QB and things they must account for before paying a QB.

The salary cap plays a huge role in its effect on player salaries in the NFL. Each team is given a certain amount of money each season that they cannot pay their roster more than this amount in order to keep the league a level playing field. This salary cap can often affect how much a QB is being paid considering the cost it is to keep other players on the team as well. There must be consideration on pay cuts when finding a QBs value. A player such as Tom Brady salary throughout the year is not reflective to his actual value because of the pay cuts he was willing to take throughout his career to have a good roster around him. There aren't many other QBs willing to do this, but it still must be taken into consideration when figuring out whether their salary is reflective of their statistical value.

The job of a Quarterback is to lead their team so the importance of this position cannot be said enough. The NFL draft hold primary weight on selecting of a QB because the importance of a first-round draft pick is so important considering you get a choice out of the best batch of college players. Due to bad drafting techniques many teams take a QB that is completely unsuccessful and doesn't even last over a year in the NFL. This is a major issue and considering the importance of this draft pick there needs to be a better method of selecting the QB position out of the draft. Many NFL teams have analysts to help them determine the best QBs in the draft class for any given year. The is question are these analysts looking at the right things from college QBs or are they simply looking at stats and measurables which is often the case. Using a first-round draft pick on a QB has always been risky but with this paper I look to make that process slightly less of a risk for these teams faced with that problem.

The Quarterback position is the highest paid in the league which makes sense but there are situations in which QBs are being overpaid to underperform. Russell Wilson is the perfect example of this. This season Wilson is the highest paid QB in the NFL and his team's record is 5

wins and 8 losses which is the 7th worst record in the NFL of 32 teams. Although Wilson was injured this year for part of the season this isn't the first year where he has been overpaid to underperform. Every season Wilson seems to start off at the top of the totem pole among QBs but after the bad opponents are out of the way his success becomes a fluke as he quickly falls off. Last season Wilson's team was 1st in their division barely scraping by the good opponent and then lost in the first round of the playoffs. There is obviously no doubt that Russell Wilson is a top tier QB because nobody can argue that but does, he really deserves to be making such a large amount of money if he can't be consistent against good teams when it really matters.

Wilson is far from the only QB in this situation and many people may even disagree with the argument I present on him so I will give another example of an overpaid QBs to lay a basis for the problem my research attempts to fix. Matt Ryan is the fourth highest paid QB in the entire NFL carrying a cap hit of 26.9 million and plays for the Falcons. The Falcons have had a negative record the last three years going 7-9 twice and 4-12. So why is a QB on a consistently losing team one of the highest paid in the NFL. This year the Falcons are yet again negative so why continue to pay such a high price. Matt Ryan may be the face of this franchise and contributes to a lot of their past success but either him or the coaching isn't cutting it anymore and an almost 27-million-dollar salary cannot be given to the leader of bottom a feeder that needs improvement in so many other places. There has to be a way in which a team can fairly pay a QB what they are worth without giving ridiculous amounts of money to a player who will bring them little to no success.

Obviously, there are many other factors that come into play when teams decide to resign QBs besides wins. Things like jersey sales and ticket sales are definitely taken into consideration. This is where the economic aspect of the game comes into play. Teams obviously care about

their success, but they also care about how much money they are making. So, they may resign a certain QB based simply off his popularity in order to raise sales for their franchise. After all there is a reason why Mark Sanchez was on the Jets for so long considering he had very little talent at the QB position. This is where an aspect of wage determination comes into play. If the desire in a city or area for a QB is high and fans want that player to stay with the franchise the wages for that player will rise due to a demand for their services. So even though the contribution to a team's success may be low the player could still be paid handsomely simply off the fact that the city he plays for wants him there.

Money Balling in the NFL

Money Balling is a popular term you usually hear in terms of Major League Baseball. It is defined as the use of statistical analysis of measurable factors to determine how much to pay players. It may come as a surprise to many people, but it is believed that certain NFL teams do use money balling, but it is not done in an obvious way, so it isn't really noticeable. It is hard to believe because of the implicit team nature that exists at such a higher level of cooperation in the NFL rather than the MLB. The field of analytics among the NFL hiring market has been widely untapped in comparison to the MLB (Brower 2020). I would like to think that in my research I'm encouraging more NFL teams to use money balling techniques of statistical examination when looking at the QB position. The author of an article about money balling mentions that someone said the Dallas Cowboys used a regression model drafting technique when choosing their players similar to money balling and were known for having good draft picks (Armstrong, 2012). There is definitely room for aspects of money balling to make their way into the NFL, but the real question is whether the team complexity of the sport will prevent that from happening on a large scale.

Wage Determination in the NFL

Wage determination is defined as the process of setting wage rates or establishing wage structures in particular situations. The wage determination in the NFL is that the QB is the highest paid position in the league's wage structure. But the relative wage rates are affected by demand and supply. Tom Brady going to the Buccaneers is a great example of this. The Buccaneers had a large demand for a player at the QB position and felt that Brady could fill that demand, so the wages rose for him since they were willing to pay him more to be their QB due to an increase in demand for services at that position. This is also a primary reason why a player like Cam Newton has settled for such low contracts the past two years. His services aren't desired as much and there is less demand for him among teams in the league therefore the salary at his position decreased for him due to lack of demand for him. Wage determination plays an important role in the NFL because certain players are paid higher than others in their position as a result of the effects of wage determination.

Statistics to use in QB Analysis

There are multiple different ways to analyze the best QB and determine their value. Firms or teams use a variety of sources to determine what players' future productivity will be (Hendricks, DeBrock, and Koenker 2003). Many of these ways will be explained in depth later in this research paper. For now, I will give a background on the two main grading systems that relate to the QB position. These two grading systems are QBR and PFF. QBR stands for Quarterback Rating and each quarterback is given this at the end of every game. The QBR is a stat that is determined by the QB's general line of stats including: completion percentage, yards, TDs, and INTs. The QBR reflects the overall performance of how the QB played in conjunction

with his team. PFF grades or Pro Football Focus grades are a much different beast. These grades singularly break down how the QB played and factor out any errors his team made that may negatively affect him to give an accurate representation of how he did based on what he can control. Although both stats do a good job of highlighting the play of the QB many say the PFF system is much more critical and a better baseline. In this research we will be using both.

Marginal Productivity of QBs

Another thing that comes into play when determining the value of a Quarterback in the NFL is what their Marginal Productivity is. Marginal productivity is defined as the extra output, return, or profit yielded per unit from production inputs. In this case the QB is the unit and whatever team hired him is the firm he is working for. So, the team is expecting him to be successful in order to give them good output. If the QB is not successful than he wasn't worth it as a unit for the team. In this situation the things that attribute to the QBs output and return would be wins and jersey sales. Ticket sales are a result of wins and therefore contribute to the whole team so they can't really be considered in this situation. For this to work in determining value there needs to be a brief analysis as to what this means.

If there was to be a brief rundown in simple terms marginal productivity of a QB works itself out somewhat easily. If a QB gets a win their marginal productivity increases and if they get a loss their marginal productivity decreases. As far as the jersey sales go, they can't lose it just the more they sell the more successful they were as a unit in terms of marginal productivity. For a QB to produce negative marginal product he would have to have low jersey sales attached to a losing record. So, if a team for example were to go 6-10 on a season their marginal

productivity as a team would not be good, but if they hire a new QB and then go 13-3 their marginal productivity will skyrocket. As a result of this the first QB was a bad unit of labor for them and the second one wasn't. Since the second QB provided such a large change in output for the firm/team he had a high rate of marginal productivity of labor. A player like Tom Brady for example has always had positive marginal productivity because every year he consistently has a positive record and sells a lot of jerseys. On the other hand, the QBs for the firm of the Jets have all had negative marginal productivity in recent years.

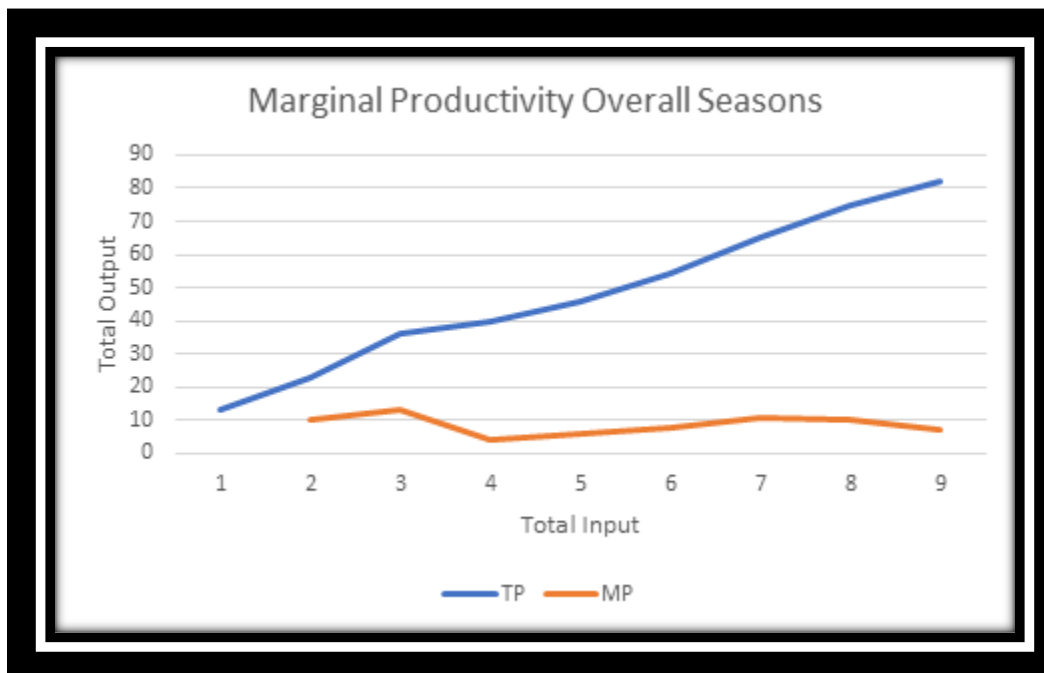
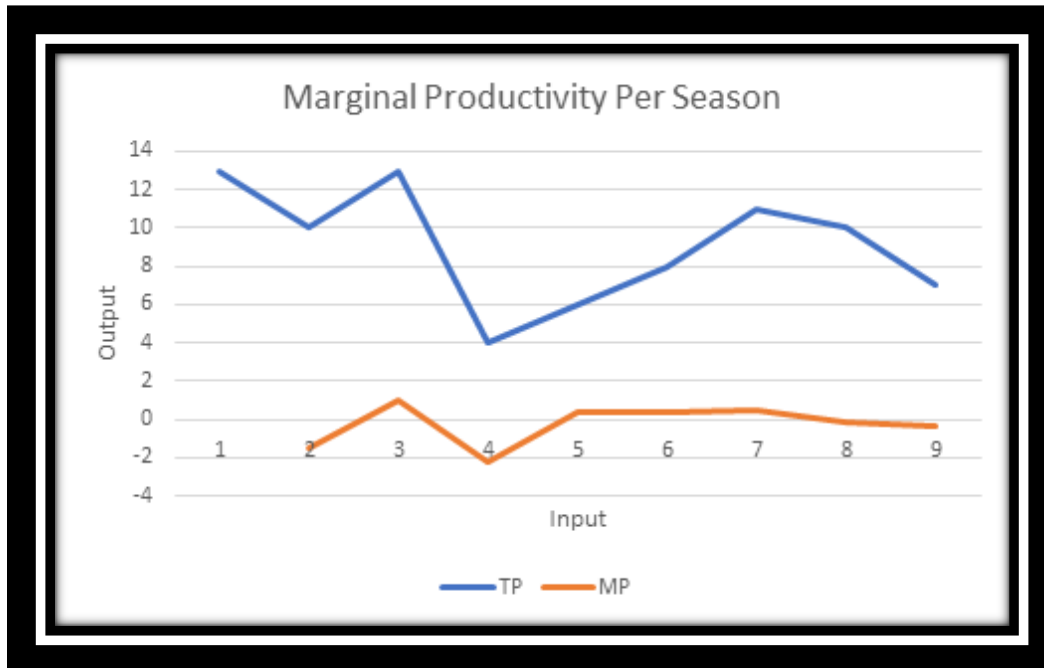
In economics there is a formula to determine marginal product. This formula is $MP = \text{change in } Y / \text{change in } X$. In this case X is the amount of play time the QB gets or how many games he starts in while the Y is the amount of wins the QB gets. It says to ignore external costs and benefits in this equation for Y so we can keep it exclusively to wins and cut out jersey sales. So, we can use as an example the Matt Ryan on the Falcons from the year 2009 to 2010. In 2009 Matt Ryan played 14 games and won 9 and in 2010 he played 16 and won 13, so he won 4 more games and was used 2 more games. So, our equation would be $MP = 4/2$ so Matt Ryans marginal product of labor increased by 2 for that season.

Labor per Season	Output	Marginal Product of labor		
1	13	13		
2	23	10		
3	36	13		
4	40	4		
5	46	6		
6	54	8		
7	65	11		
8	75	10		
9	82	7		

This chart shows Matt Ryan's total career marginal product of labor for the seasons of 2010 through 2018 and shows its fluctuations. He was not very successful in certain years so his marginal product of labor was lower in those and in some extremely low if it was done year to year, he would have some years with negative.

Labor per Season	Output	Marginal Product of labor		
1	13	13		
2	10	-3		
3	13	3		
4	4	-9		
5	6	2		
6	8	2		
7	11	3		
8	10	-1		
9	7	-3		

This is what his marginal productivity of labor would be if you go by each season from one to the next. When he goes from a winning record to a losing record it becomes negative. But if the year after his bad record he gets more wins it will become positive considering the model is based off the previous season. Therefore, if a QB were to go a perfect 16-0 unless they could repeat that there is a high likelihood the year after they will have a negative marginal productivity of labor. Next, we can make two graphs by finding total and marginal product from season to season and by finding it cumulatively for the player's career. These graphs may be a bit messed up because the only change in input we must consider is each season.



The first graph highlights the change on a game-to-game basis which is why it looks less traditional because there is less variables to consider since it is only wins and games played. The second graph looks far more traditional because it shows wins for career so we can do it on a year-to-year basis and accumulate the numbers based on how many more wins the QB is getting

per year. So, in the second case you want the highest possible sloping curve for both categories. As far as the first curve you would want it to stay somewhat even or have slight fluctuations because if there are large fluctuations that means your QB is having inconsistent seasons. Both these curves highlight Matt Ryan's record from 2010 to 2018 in the NFL. His win stats can be found at the link below.

<https://www.pro-football-reference.com/players/R/RyanMa00.htm>

So, a marginal productivity curve is important because it highlights a QB's success and his downfalls on a year-to-year basis for a curve. It will always look somewhat skewed because you always have one unit of labor considering every team can only start one QB. There is definitely a way to make this in relation to salary vs wins and I will attempt that in my next section, but this is just an analysis of wins vs total games played from a set of years by this QB in the league.

Quarterback Rating and Marginal Productivity

One of the most important stats when talking about NFL quarterbacks is their QBR. For anybody who doesn't watch football a QBR is essentially the main way of measuring how good any given Quarterback is. QBR stands for Quarterback Rating. This statistic takes multiple factors of a QB's gameplay into account to come up with a rating that can vary between 0 to 158.3 for the NFL and 731.6 to 1261.6 in NCAA football. Quarterbacks with higher QBRs are usually the ones that fare better in the NFL even though some QBs can have good QBRs but still not be successful in the NFL. The biggest problem with QBR is that sometimes people take this into full account without consideration on the other players around the QB that affect this rating or improve it. Without this outlier we can focus solely on the QB and assume that if everyone alongside him does their job properly this QBR should be reflective of how well he played. Overall, generally

QBs with a higher QBR are the ones who end up winning the games so this stat can be truly shown to have an impact on a QBs value and effect on a team's performance.

The QBR in general works to incorporate all the QBs contributions to winning into a rating that people can then use to compare QBs between each other and how well they have played against certain teams. The QBR is a good determinant because it doesn't only account for one or two things but rather multiple factors that go into winning or losing a game. QBR incorporates how a QB impacts the game in terms of passes, rushes, penalties, turnovers, touchdowns, and total yards. The QBR also accounts for a team's success or failure level on each play so that the QB isn't affected in an overly positive or negative way. Stat lines can be deceptive in the way that they do not account for sacks taken, penalty yards, or total fumbles. Therefore, looking at the number on the QBR is the only full proof way of determining whether or not a QB has performed well. So, in a basic sense QBR is the true determinant of how well a QB has played.

This whole paper is to talk about how certain QBs are overpaid based on performance considering we are looking for their true value to their given team. So, the best way to explain QB rating is to take three QBs and compare them. These QBs will fall into the three tiers of elite, good, and mediocre. This will help to show the level they perform at in comparison to their salaries. The three QBs I will be using are Tom Brady (Elite, 25mil salary), Kirk Cousins (Good, 33mil salary), and Jared Goff (Mediocre, 33.5mil salary). Now you can already see that based of the categories I have them in (considering my judgement is correct) the salary of the worse QBs is more than the better one; this may be a rare case because Brady is known for taking pay cuts but for this example with QBR its best to use him anyway. Starting with the 2021 season the

QBRs of the three QBs are as follows: Tom Brady 102.1, Kirk Cousins 103.1, and Jared Goff 91.5. This is their overall performance for the whole regular season of 2021. Some may say that Goff has a significantly worse team, but QBR does account for that and make adjustments so the argument saying his is low because of that is invalid.

So why are QBs with low QBRs still getting paid so much money. The truth is they have experience and recently many of the younger QBs who have been drafted have not translated well into the NFL. The last two years have only really brought us Joe Burrow, Justin Herbert, and Mac Jones. So, teams would rather overpay a guy with a lower rating that has experience than not have another option and have to solely rely on the QB they drafted who may not play to their standards in the NFL. This however still does not explain why there are QBs like Tom Brady making less than guys he is outperforming by a large margin. Obviously, there is the age factor, but he has constantly shut that superstition down. So, is there a way to use QBR to determine how much a QB is actually worth to their team? I would say there is and the way to do this is to determine how the difference in their QBR throughout the years fluctuated with the salary they earned or whether it was even taken into account. By doing this we will be able to see the relation between their QBR and salary and how it fluctuated throughout the years.

For the purpose of this analysis, I will be using the years between 2016-2021 and comparing the Quarterbacks QBR to the salary for each season. After I will illustrate how many

wins each QBR resulted in from year to year. These statistics have been taken from Salary Sport and Stat Muse.

<u>Goff</u>	<u>Goff</u>	<u>Goff</u>
Year	QBR	Salary
2016	63.6	450k
2017	100.5	1.7mil
2018	101.1	3mil
2019	86.5	26mil
2020	90	31mil
2021	91.5	25.6mil

<u>Cousins</u>	<u>Cousins</u>	<u>Cousins</u>
Year	QBR	Salary
2016	97.2	19.9mil
2017	93.9	23.9mil
2018	99.7	26mil
2019	107.4	28mil
2020	105	21mil
2021	103.1	31mil
<u>Brady</u>	<u>Brady</u>	<u>Brady</u>
Year	QBR	Salary
2016	112.2	14.7mil
2017	102.8	15mil
2018	97.7	15mil
2019	88	23mil
2020	102.2	28.3mil
2021	102.1	29.4mil

The following three tables illustrate each given QBs Salary per year in relation to their QBR per year. For the purpose of this group, we are going to consider Jared Goff first three years as outliers considering he was on his rookie contract and not making fulltime QB wages yet like the other two QBs. This still does not explain how he has consistently made over 25mil for the past three seasons and once even hitting 30 mil for only putting up QBRs of barely over 90.

While Brady posting QBRs of 102 for the past two years is only making 2 mil more than him on average in the last two seasons. On the other hand, Cousins might be the most accurate representation of what a QBR to salary comparison should look like because every year his QBR is positively reflected by his salary. There are definitely many other things that come into play when a player is getting paid don't get me wrong; but a QB should not be making over 25mil for QBRs under 95 that doesn't reflect correctly, and the given team is wasting money that could be allocated to another position. These are just three examples I am sure if I did this for a larger group of QBs there would be even more outliers to make comparison with of how their QBR doesn't positively reflect with their salary but for now this is the three I have chosen to use.

The aspect of Marginal Productivity is a main topic in the field of economics, and it pertains to football also, as previously mentioned. This area of research expands on the marginal productivity of QBs by using their QBR as the main factor rather than wins. The following tables are the marginal productivity for each QB that was previously listed in the salary in relation to QBR tables. These stats are being used from the seasons of 2016 to 2021.

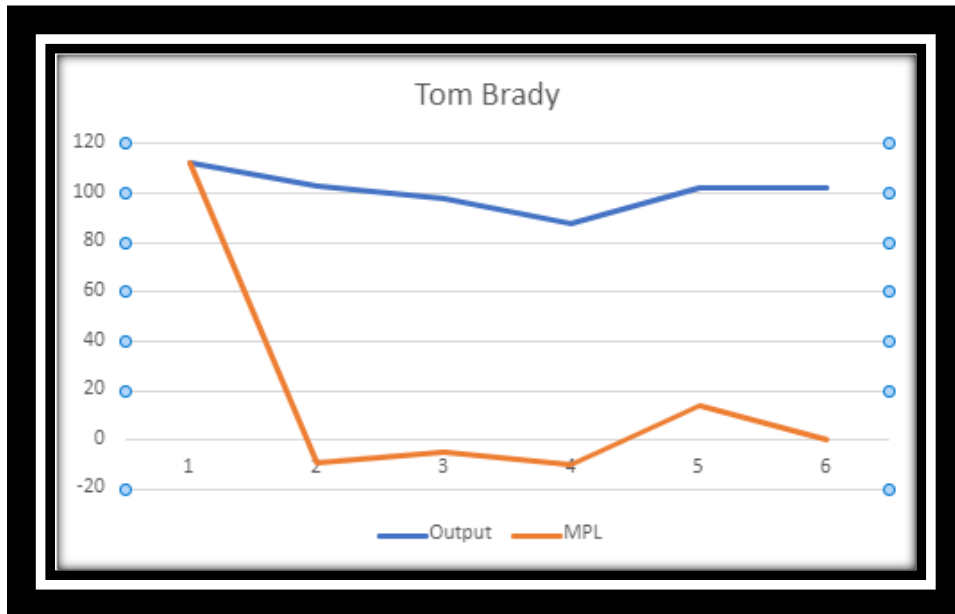
<u>Jared Goff</u>		
Labor per Season	Output	MPL
2016	63.6	63.6
2017	100.5	36.9
2018	101.1	0.6
2019	86.5	-14.6
2020	90	3.5
2021	91.5	1.5

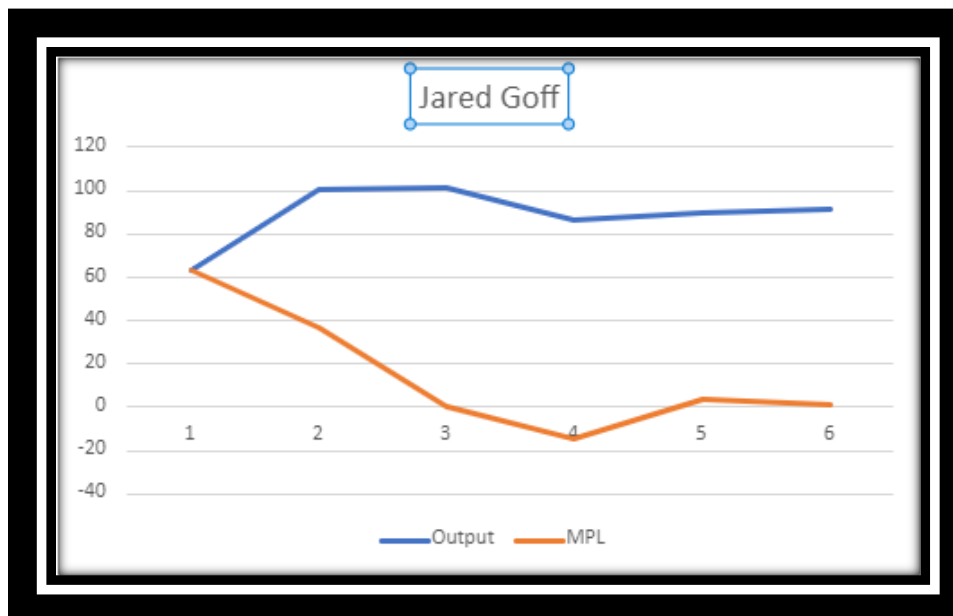
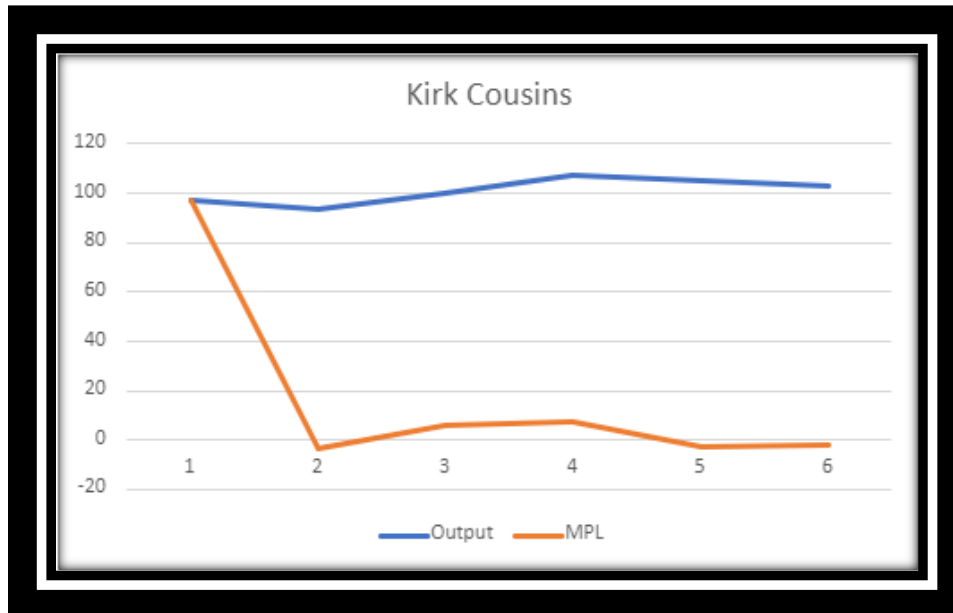
<u>Kirk Cousins</u>		
Labor per Season	Output	MPL
2016	97.2	97.2
2017	93.9	-3.3
2018	99.7	5.8
2019	107.4	7.7
2020	105	-2.4
2021	103.1	-1.9

<u>Tom Brady</u>		
Labor per Season	Output	MPL
2016	112.2	112.2
2017	102.8	-9.4
2018	97.7	-5.1
2019	88	-9.7
2020	102.2	14.2
2021	102.1	-0.1

These tables illustrate the marginal productivity of these quarterbacks from season to season. Although it is important to point out a few things. One might think by looking at these table that Goff is the best QB because he had the most seasons with a positive marginal

productivity but that is far from true. This can actually be used to highlight the better QBs by the bar they set for themselves in the first season listed. For example, Brady and Cousins MPL both started out super high that there wasn't a lot of room to improve from there so mild losses in their MPL as long as it wasn't significant were still better than Goff considering he started with such a low bar for his MPL. Analyzing these tables shows us that Brady really only had one bad season and that's when his MPL dropped by almost -10 after 2 less significant drops before it. And these tables show that Cousins MPL was always very solid considering it started high and his output grew almost every season.





The graphs highlight this idea because the output level for Goff started significantly lower than that of Brady and Cousins. So, his MPL decreased at a significantly slower rate because he had room to greatly improve his output from 2016 to 2017 while the others already set the bar for their output so high it was hard to do this. You can also notice the other QBs besides Goff stayed

over 100 output or very close to it for the whole span of 2016-2021 while Goff had multiple years below this level of output. So, although MPL does matter in a sense the output from season to season needs to be considered in order to determine if the MPL of that QB is an accurate representation of how well they perform or if it just looks good because their output isn't very good.

Another thing that must be taken into consideration is not only a QBs value when already in the NFL but what their value was coming out of college prior to the draft. It is important for coaches and general managers (GMs) to know this in order for them to draft the right guy for the job. The science of drafting is extremely imperfect so the focus of this section will be to analyze and point out a more perfect way of going about the value determination part of the drafting process. It is important to point out there will never be a 100% perfect way of drafting. If this was the case, there would be no point of having a draft in the first place because everyone would know exactly how it would go before even starting. But there definitely is a better way of determining which QBs are better out of the draft and what statistics hold the most importance out of college.

There are many things that also come into play before a QB is drafted. Although determining the value of QB is primarily taken into consideration when resigning or making a trade there is other times this must be considered. Before the draft, a team evaluates players in college very critically as they don't want to waste a draft pick on a player that will end up being a bust in the first round. Draft picks are valued very highly by NFL teams and often General Managers who are known for drafting busts will lose their job so they must be very critical of every player they are considering drafting. So, the real question is where do so many teams go

wrong when drafting players. The answer may seem simple, but the truth is that it is almost impossible to properly draft a player that will translate well to the NFL every time. There are however some things that can be done to avoid making drafting mistakes when it comes the QB position.

The first major mistake that many NFL teams make is they try to base the next QB they are drafting on the style and measurables of their previous QB. No matter how similar this QB might play often times when taking this approach teams avoid analyzing just hardcore college statistics. Yes, college is a much different playing field than the NFL but there are many similarities when looking at D1 schools. If a team were to evaluate how well their prospect played against the top tier D1 teams, they would have more success. The reason for this is that those top tier teams such as Alabama, LSU, Ohio State, Georgia, and Notre Dame produce the most NFL players. Therefore, evaluating a player's performance against these teams is ideal because most of the players they are up against will also be getting drafted to the NFL. This will allow a team to decrease their margin of error when drafting players.

For example, if a team is drafting a QB they should be looking at his statistics in the games he played against the best college defenses because these games will relate most closely to the skill level he will be playing in the NFL. Obviously as mentioned there isn't a perfect way of drafting a player; but if I had to consider one of the best ways this would be it. Take into consideration three successful QBs and their colleges in recent years and three unsuccessful QBs and their colleges. Before I get into this analysis it is important to point out there will always be outliers from random colleges that are successful, but I am diagnosing the least risky way to draft a successful starting QB. So, starting with successful, you can look at Joe Burrow, Mac Jones,

and Justin Herbert who attended big name schools like LSU, Alabama, and Oregon. These three QBs primarily played against the top tier D1 competitors. This shows that they had the most experience against high level competition and it translated well into the NFL. This won't be the case for every QB from those colleges, but these draft choices presented the least risk to the teams that picked them, and it paid off. Another thing these QBs all have in common is that they all won college championships and 2 won national championships.

Now we take a look at three QBs that didn't translate well into the NFL. Daniel Jones, Sam Darnold, and Zach Wilson who attended Duke, USC, and BYU. None of these schools are known for their football programs and although they are still D1 schools they play lower tier D1 competition. These three QBs have all had less than impressive starts to their NFL career and although some of that can be attributed to the teams they play for, much of it is personal error. These QBs were all selected in the first 6 picks of the NFL draft and none of them have lived up to that early of a draft pick. There are obviously QBs from big name schools that have been drafted early and been less than impressive, but it is lower risk statistically to draft these players anyway. Experience matters when it comes to drafting college players and in Sam Darnold's case, he had only had one year of college experience before entering the NFL which is not ideal. It is definitely better to consider how much experience the player has had in college and how many years they have held the job of starting QB.

The NFL has a history of not evaluating statistics out of college but rather evaluating accomplishments such as Heisman trophies, Championships, and other awards for cumulative stats. Although stats do matter cumulative stats by year are probably one of the least important stats to attribute to a college QB. College is full of flashy plays and high scores so games where a

team like Alabama wins by anywhere between 40-60 points (yes it happens) shouldn't not be considered in stats because that QB was going up against a mediocre team. Rather game by game stats against good competition with close scores should 100% be taken into consideration when evaluating a college quarterback. These games hold more importance than any award or achievement based of overall stats. If a GM was to be drafting an Alabama QB, they should be evaluating the games he played against the teams ranked in the top 10-15 and no further; because these schools are the cream of the crop and evaluating these stats will get them the best results.

Now there are obviously other things NFL GMs must be conscious of besides stats such as injuries in college and other important things such as mobility that attributes to the type of offense their team runs. I would like to argue though that this can be done in conjunction with single game stat evaluation from college games to get better results when selecting the QB they believe is necessary to improve their franchise. There is also something every NFL GM has access to before drafting a quarterback, that is PFF grades. PFF grades evaluate every player on every play of a football game. So, a QBs PFF grade won't be affected by a lot if the receiver makes the mistakes therefore this is a more accurate statistic to go by. PFF grades could be a key in drafting better QBs out of college.

Taking PFF grades into account I have done a comparison on two QBs PFF grades vs the same team in college and then vs the same team in the NFL. The two quarterbacks I have chosen are Mac Jones and Trevor Lawrence who were selected at 16 and 1 in the first round of the NFL draft. The first game we will look at is how well they both played against Ohio State in a playoff game in their last year of their college career. In the Sugar Bowl of Clemson vs Ohio State, Trevor Lawrence posted a stat line of 33/48 completions, 400yds, 2TDs, and 1 interception along

with a rushing touchdown and negative rushing yards; Clemson lost this game 49-28. In the College Football Playoff of Alabama vs Ohio State, Mac Jones posted a stat line of 36/45 completions, 464yds, 5TDs, and no interceptions along with 11 rushing yards; Alabama won this game 52-24. Although both these QBs played well by a college standard Mac Jones had a more efficient passing percentage, more touchdowns, and no interceptions which is the difference between a win and loss. This comparison is good because they are playing the exact same team within 10 days of each other. Also, something to note is that Mac Jones has had the highest college PFF grade since 2014.

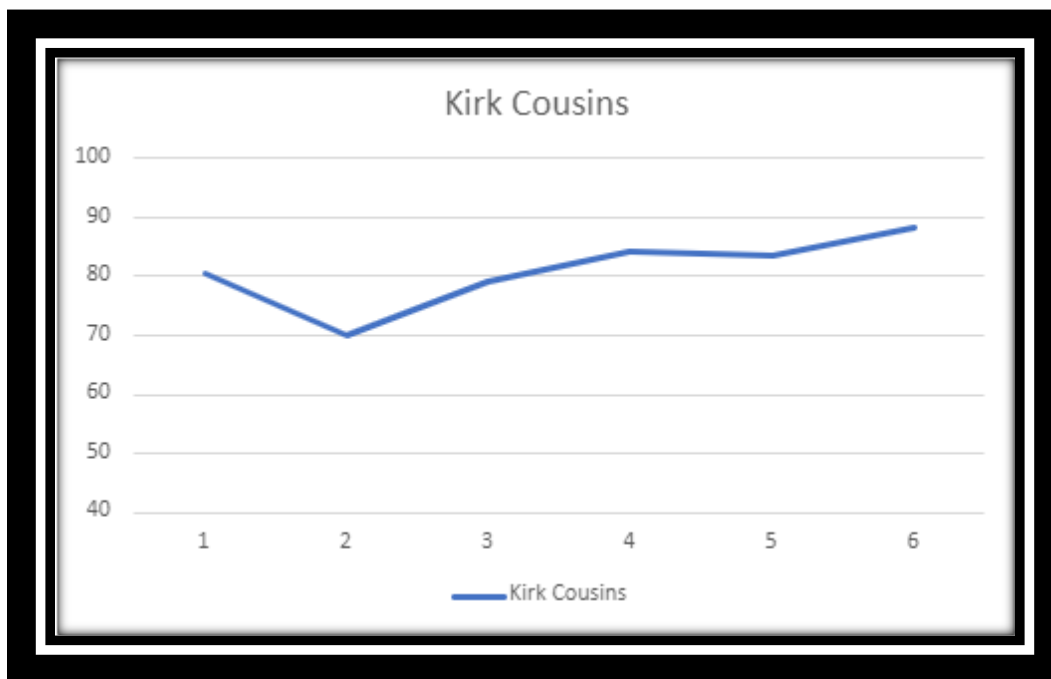
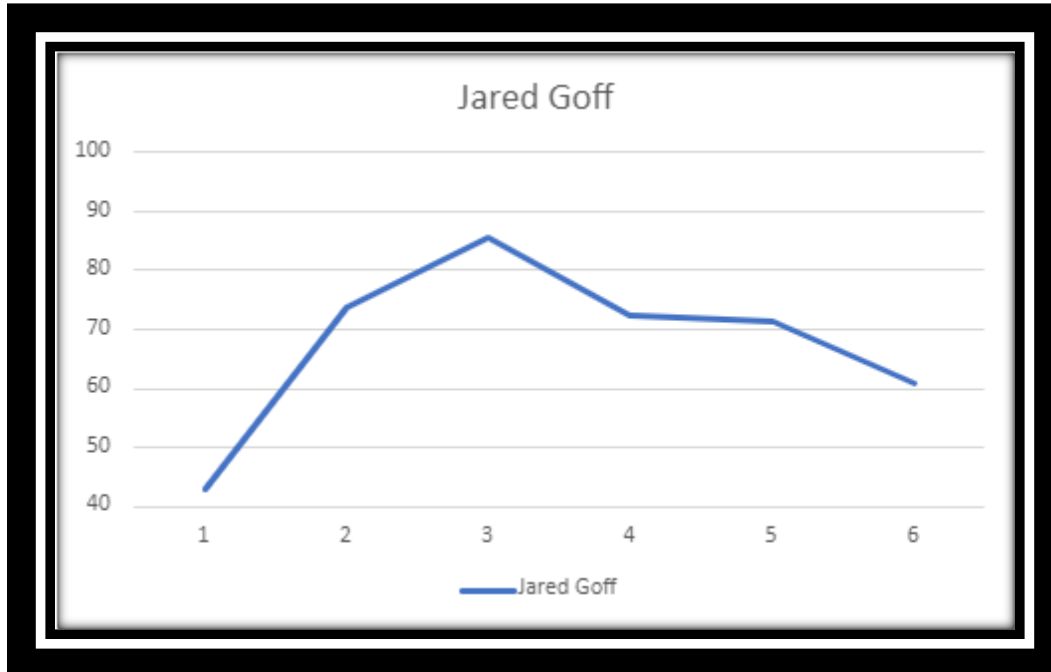
Sticking with that same comparison we can translate to NFL. In this situation we are looking at what these QBs value was out of the draft and how it translated to the NFL considering they are both still on rookie contracts and their value in the NFL doesn't have enough stats available to determine it yet. For this example, we are going to look at how both these QBs played against the Titans one week apart in 2021. Trevor Lawrence posted a stat line of 24/40 completions, 221yds, 0TDs, and 4 interceptions in a 20-0 loss to the Titans. Mac Jones posted a stat line of 23/32 completions, 310yds, 2TDs, and no interceptions in a 36-13 win over the Titans. These games were just one week apart from each other against the same team and as you can see Jones played significantly better than Lawrence. The QBs PFF grades were a 51.9 for Jones and a 40.9 for Lawrence. These grades take into account everything down to tee where it solely reflects the QBs deserved grade not affected by his teammates. So, with that taken into consideration 11 points higher against the same team is significantly better for Jones even though still not an amazing overall grade.

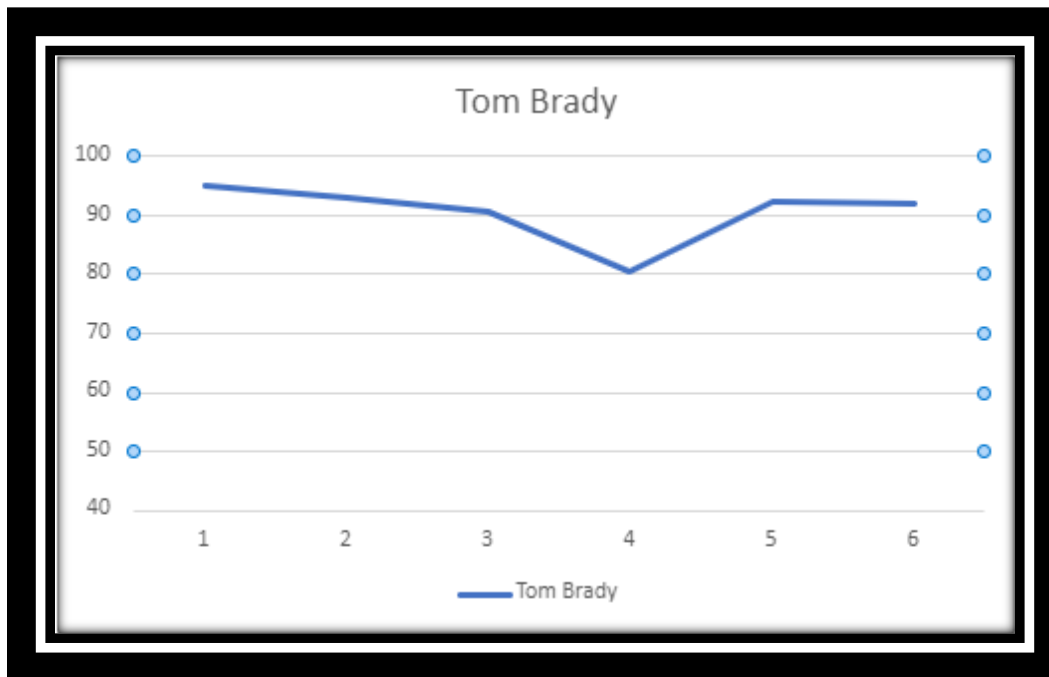
Based off this analysis we can see that the method of single game analysis actually works. If this same single game college analysis were to be done the teams would always get the safer option out of college. That's not to say there isn't benefit in taking the risk of selecting the less safe option, but we are looking at a way to perfect the drafting system without risks in this specific analysis. There are also many other things NFL teams choose to look at rather than stats when evaluating the better QB such as combine rating, measurables, and many other things. The main focus of this research however is to highlight the importance of taking the statistical approach in determining the value of a QB. After all they don't produce stats for nothing, they are there for a reason and should be used to their fullest extent.

Now that an analysis on college QBs before the draft and how they translate to the NFL in relation to PFF grades has been done it is time to bring us back to the PFF grades of seasoned NFL QBs. For the purpose of this we will use the same three QBs we had previously used of Jared Goff, Tom Brady, and Kirk Cousins. These tables and graphs will reflect the years 2016-2021 and will show salary in relation to PFF grade.

<u>Jared Goff</u>	<u>Jared Goff</u>	<u>Jared Goff</u>
Year	PFF	Salary
2016	42.9	450k
2017	73.7	1.7mil
2018	85.5	3mil
2019	72.4	26mil
2020	71.4	31mil
2021	60.7	25.6mil
<u>Kirk Cousins</u>	<u>Kirk Cousins</u>	<u>Kirk Cousins</u>
Year	PFF	Salary
2016	80.6	19.9mil
2017	70	23.9mil
2018	79.3	26mil
2019	84.4	28mil
2020	83.4	21mil
2021	88.2	31mil
<u>Tom Brady</u>	<u>Tom Brady</u>	<u>Tom Brady</u>
Year	PFF	Salary
2016	95.2	14.7mil
2017	92.9	15mil
2018	90.7	15mil
2019	80.5	23mil
2020	92.4	28.3mil
2021	92	29.4mil

As you can see from the tables the PFF grades of Brady and Cousins are much better reflected by their salaries while Goffs PFF grade is lacking in comparison to his salaries in recent years. This table also highlights just how accurate PFF grades are as Brady's is top tier every season which is consistent with the skill level of QB that he is.





These three graphs show the players PFF grades from year to year. The vertical axis goes from 40-100 for each of these graphs. As you can see the PFF grade of Tom Brady stays the most consistent throughout these five seasons which highlights why he is considered the top tier QB in this example. Kirk Cousins makes a slightly higher salary and produces lower PFF grades than Brady but is still super consistent based on this graph which is why he is considered to be the average QB in this example. Then looking at Goff who makes around the same salary as Cousins his PFF grades are all over the place and not in an effective way. His slope is the least consistent in comparison to Brady and Cousins which is why he is considered the mediocre QB.

This analysis highlights how important PFF grades can be towards QB comparisons. PFF grades need to be utilized more by NFL scholars when determining the value of a QB. And on top of this more teams need to adopt statisticians to examine PFF grades in order to perfect their

drafting process. This is just 3 quarterbacks of the 32 starting QBs in the league and the comparison of this small group proved the importance of PFF grades, now imagine them being used on an even larger scale. PFF grades are imperative in strengthening the QB drafting process and making the salary determination of seasoned NFL QBs better.

Conclusion

The goal of this paper was to highlight the errors in the process of determining the value of an NFL QB. As mentioned throughout the paper there are many imperfections to studies such as this because in the NFL other non-statistical factors come into play. There will never be a perfect way to determine an NFL QBs value but there is always a better way, and this theme will continue as new systems and methods are developed over the years. As of right now taking the statistical approach is the safest way to prevent NFL QBs from being overpaid and undervalued. With the presence of PFF grades and QBR stats there are two great forms of statistics to use when breaking down a QBs performance of their years. These statistical systems can most definitely be used more effectively to prevent QBs from receiving high paychecks they don't deserve.

In this paper I have found that the best two possible ways of evaluating a QBs performance are PFF grades and QBR. The QB is not solely responsible for wins. The whole team value is generally more correlated than positional value, and success in the NFL is more team based (Vu 2015). The reason for this is because these are statistics that will always be concrete and can be directly attributed to the QB as a singular player and not in a team model. The QB will always be surrounded by his team so the fact that there are two statistics to single him out makes them the best to use in evaluation of him as a player outside of the system. These

stats can be universally found for every QB in the league and can be examined in relation to salary to determine if the QB is playing to the tone of the money he is making. PFF grades allow you to evaluate the QB on a play-to-play basis not taking into account any teammate errors, so it is solely an examination of his own performance. QBR allows you to determine how well any given QB stacks up against the best and worst defenses in the league based on his performance. For these reasons, the statistics of QBR and PFF grades are the best ways to evaluate the skill of a QB statistically.

It is important to highlight that there will always be overpaid QBs as long as the market availability for top tier QBs is low. The reason for this is that those mid-tier QBs will be able to sneak into that higher paid QB section due to lack of availability causing a ripple effect. So, in order to truly embrace and improve the issue between overpaid QBs that are being paid more than their value something needs to be done to highlight or make the undervalued QBs stand out. Because after all as we have seen in many past years of the NFL there are backup QBs that are very talented they just need to be noticed and receive their shot from the team. In fact, who knows how long Tom Brady (one of the greatest QBs of all time) would have been on the bench had Drew Bledsoe not gotten injured in that game 20+ years ago. This is beside the point and is just to show the fact that the market at the moment doesn't have enough access to high level QBs to allow for perfect salary determination. There are however definitely still ways to improve QB value determination to improve on salary related to value.

Overall, this paper acts to highlight ways in which teams can better critically analyze the QB position in order to make fewer drafting errors and save more cap space to improve their teams in other ways. Some of these ways include: Examining the statistics of QBR and PFF

before making a QB contract, offering shorter contracts to QBs who haven't proven themselves statistically to prevent overpayment, looking at stats of college QBs against highest level D1 teams before drafting them, and evaluating QB performance in relation to previous salaries earned. Another way to reduce issues is to give more incentive pay rather than guaranteed money. Incentive pays acts to motivate players to increase performance without increasing the teams cap and teams who offer this generally have better results (Mondello and Maxcy 2009). Whether the majority of the NFL adopts these techniques or whether some of the more successful teams have these techniques already in place is yet to be discovered. Determining the value of an NFL QB is a hard science considering how much comes into play in this multibillion-dollar league; but it 100% can be done and the first step to doing is adopting the statistical aspect of the game more in depth. QBR and PFF grades absolutely need to play a more critical role in analysis of a QBs skills before they are paid. As long as teams are giving out 30-million-dollar contracts to guys like Jared Goff the window for much worse QBs to make more than they deserve will stay open. With salary cap always increasing determining the value of an NFL QB becomes ever the more important in preventing teams from reaching the 45–50-million-dollar salary threshold that seems to be growing ever closer.

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[NFL Football Teams, Scores, Stats, News, Standings, Rumors - National Football League - ESPN](#)

[Pro Football Statistics and History | Pro-Football-Reference.com](#)

[PFF Player Grades | PFF](#)