

NFLPA 2024 Case Competition

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I. Introduction

The NFL is a league of stars. Teams are increasingly defined by their best players and marquee talents. Think of Patrick Mahomes and the Chiefs, Lamar Jackson and the Ravens, Nick Bosa and the 49ers — these are the names that sell jerseys and grace TV commercials. Yet beneath the spotlight of multimillion-dollar contracts and franchise players lies the vast majority of NFL athletes. Though their contributions are just as essential to team success, these players often go unnoticed. These are the middle-class players of the NFL: the dependable starters, supporting role players, and skilled specialists who help set their stars up for success. While the spotlight shines brightest on the superstars, it is the responsibility of the NFLPA to ensure that all players, superstar or not, are fairly compensated for their role in a team's success.

AIMS AND GOALS

This paper will create an operational definition for the middle class of NFL players, explore the factors contributing to the success and stability of the NFL's "blue-collar" players, and offer recommendations for how the NFLPA can best advocate for and support this crucial group moving forward.

The goal of this paper is to create key and actionable insights by analyzing compensation trends within the middle class of NFL players through simple, straightforward, and transparent statistical methods. Any statistical methods applied should be easily explainable to coaches or other football personnel who may not have in-depth backgrounds in statistics or data science. As a result, we attempt to avoid black box models such as neural networks and stick to fundamental and interpretable statistical concepts.

SUMMARY OF KEY INSIGHTS

- The middle class's share of revenue has **declined 9.2%** since 2010
- From 2010-2020, the middle class was **increasingly undercompensated** relative to their performance on the field
- The 2020 CBA led to an **8.7% decrease** in the revenue share gap between middle and upper-class players in the immediately following season
- To increase the middle class, we propose strengthening existing policies implemented in the 2020 CBA, such as **performance-based pay** and **minimum salaries**
- We also propose instituting **maximum contract limits** to help balance league revenue share

II. Defining the Middle Class

Before we can study the middle class of NFL players, we must first define what constitutes a "middle-class" player. We propose two definitions for this category. The first is idealistic and based on a player's performance. The second is more pragmatic, relying solely on historical player compensation and current salary data.

PERFORMANCE-BASED DEFINITION

Our first definition is based on a player's performance. We choose a suitable metric for each position to measure their performance on the field. For example, wide receiver performance is measured by total receiving yards, while running back performance is measured by total scrimmage yards.

We then separate the players in each position into quintiles based on their chosen metric. For example, a wide receiver in the 76th percentile of receiving yards would land in the fourth quintile (60th- 79th percentile). We then take the central three quintiles —quintiles 2, 3, and 4— as the middle class of players at that position based on performance. Quintiles and percentile scores are calculated on a season-by-season basis.

SALARY-BASED DEFINITION

Our second definition is based on a player's compensation. Analogous to the first definition, we separate players by their position group, then further subdivide into quintiles, this time using a player's cap hit number as the differentiating metric. Again, we take the central three quintiles to be the middle class of players at that position based on compensation.

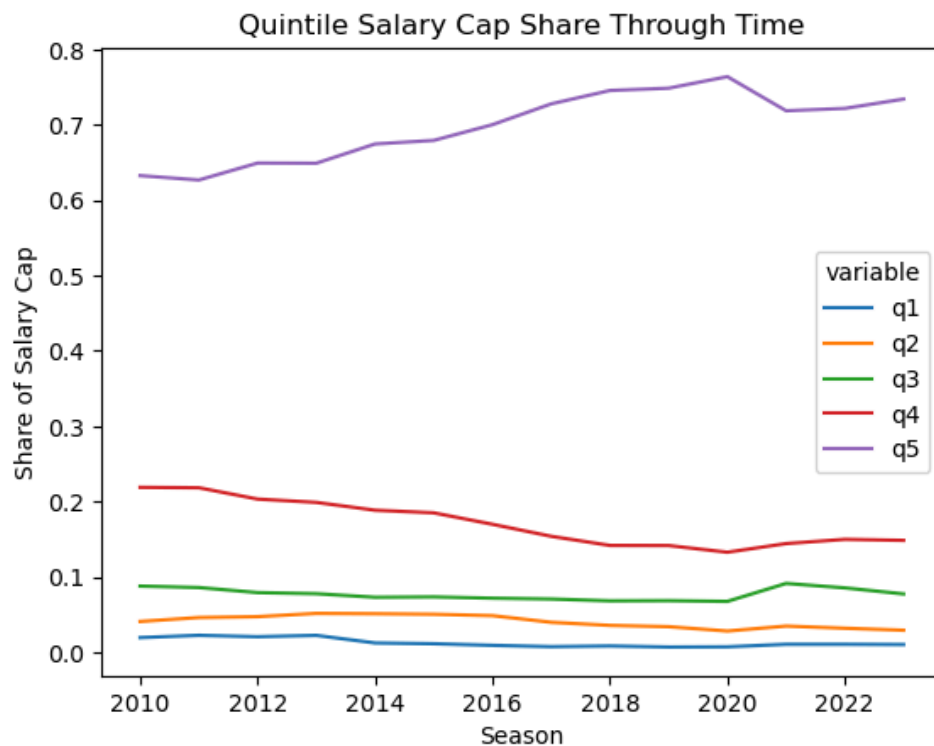
In a perfect world, where players are paid exactly for how they perform, each quintile's share of the total performance or salary should be equal. For example, if the first quantile of wide receivers accounts for 10% of the total receiving yards that season, then the first quantile of wide receivers should also be paid around 10% of the total cap that season. In the real world, the total performance share and compensation share of each quintile differ significantly. By studying the differences between these two distributions, we can identify areas of disparity.

A quick note on our criteria: Both definitions utilize the concept of "quintiles," where each quintile is a group representing one-fifth of the players. It would have been possible to conduct this study without grouping the data (quantizing) into quintiles beforehand.

However, we chose to study the wide spectrum of NFL players through quintiles because of their ease of interpretability, and quintiles have an established role as a principled tool in economics, where they are frequently employed in the study of income distributions.¹

III. The Shrinking Middle Class

One side-effect of defining the middle class through the central three quintiles is that the percentage of players that lie within our definition of the middle class is always 60 percent. Instead of measuring changes in the middle class by the total increase or decrease of individuals, we can instead define the growth of the middle class as the increase or decrease of the total salary share allotted to the central three quintiles.



Figures 3.1: Changes in Inflated APY for quintiles over time.

As seen in Figure 3.1, the total share of the salary cap paid to the top 20% richest players (5th quintile) has generally grown over time, while the total share paid to the middle class of NFL players (2nd, 3rd, and 4th quintiles) has generally declined over time. This trend has remained

¹Easterly, William. "The Middle Class Consensus and Economic Development - Journal of Economic Growth." SpringerLink, December 2001. <https://link.springer.com/article/10.1023/A:1012786330095>.

true except in 2020 when the new Collective Bargaining Agreement (CBA) introduced new pay-balancing provisions such as performance-based pay and increased salary minimums (discussed further in sections IV and V). In the immediate year following the implementation of the new CBA, the revenue share gap between middle and upper-class players declined by 8.7%.

Following this immediate drop, however, the historical trend quickly continued, and the pay disparity between the middle and upper class of NFL players continued to grow through 2021-2023. In total, from 2010 to 2023, the middle class's share of revenue declined by 9.2%. As teams have increasingly focused on paying their stars, the middle class of NFL players has suffered, and their total share of the salary cap has gradually declined over the past decade.

EVALUATING FAIRNESS

One question that arises is whether the increasing pay gap between the league's middle-class and upper-class players is "fair". For example, if the richest 20% of quarterbacks have also produced an increasing share of the total passing yards, then their increase in salary cap share might be justified. Similarly, if the performance of the middle class has declined over time, it makes sense that their share of the total revenue should also decrease. To look at the full picture, we turn to our performance-based definition and look at each quintile's total share of produced yards each season.

To determine whether the compensation for a given position group is fairly distributed, we can take each quintile's share of the total salary cap and subtract it from each quintile's total share of yards produced. If this difference is larger than 0, we can say that the players in that quintile are being overpaid because their share of salary is greater than their share of yards. If this difference is smaller than 0, we can say that the players in that quintile are being underpaid. Ideally, each quintile's share of pay would be equivalent to its share of total yards, and this value would be 0 across the board.

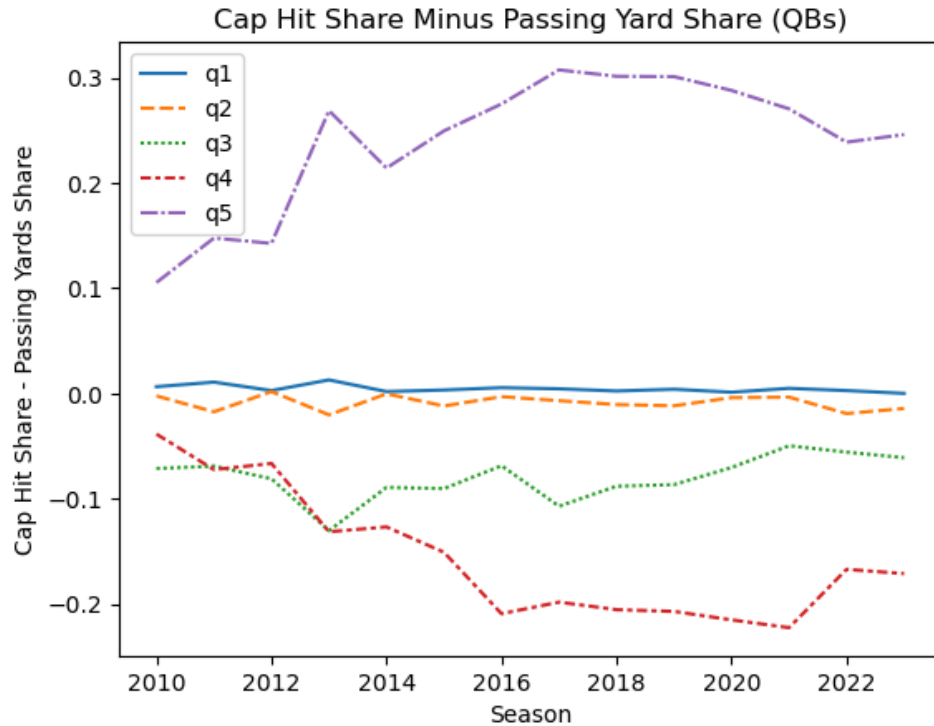


Figure 3.2: Pay vs. performance disparity over time for quarterbacks.

However, we see that for most position groups, this is not true. For example, Figure 3.2 calculates the differential for quarterbacks, showing each quintile's share of the salary cap minus its share of the total passing yardage each season. We quickly see that the upper-middle class of NFL quarterbacks (Q3 and Q4) are being underpaid relative to their performance, while the upper class (Q5) is being overpaid. Not only is the disparity readily apparent, but it seems to be increasing through time. This trend, where Q3 and Q4 are underpaid while Q5 is overpaid, holds for every position group we evaluated. In short, the middle class of NFL players is being undercompensated for their performance on the field while star players are seeing an unjustified proportion of the profits.

SOCIOECONOMIC BACKGROUND ANALYSIS

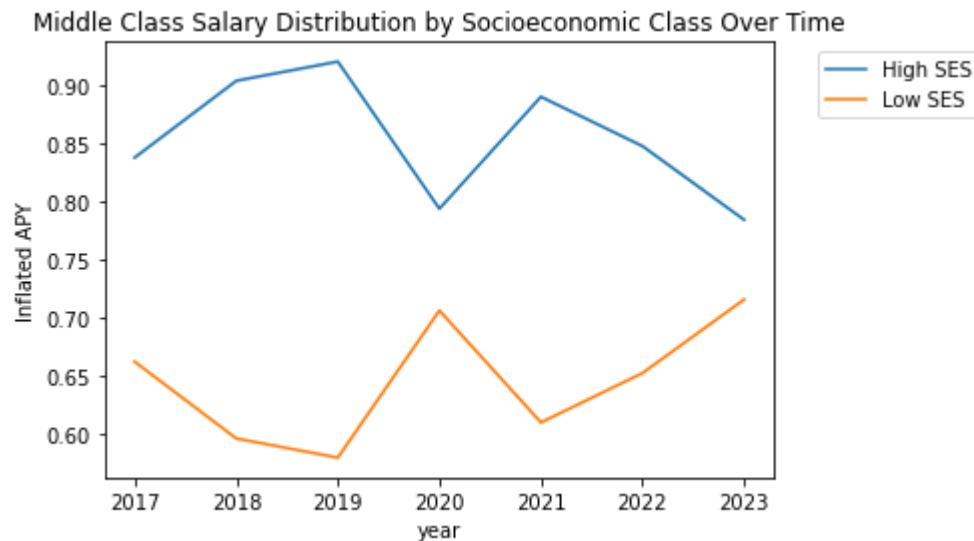


Figure 3.3: Middle-Class Pay Disparity over Time for Running Backs

Figure 3.3 reveals the patterns of pay distribution for running backs, extending the broader analysis of how race and socioeconomic backgrounds shape professional football careers. As displayed in the previous graphs, there is an evident disparity in pay versus performance for the middle class. Within the middle class, Figure 3.3 captures the evolving compensation landscape, highlighting how players experience markedly different pay trajectories. Essentially, the players within the middle class are classified as coming from either a low or a high socioeconomic status. This information is retrieved based on their birth city's poverty status, median household income, and the race of the players. Following this division, each socioeconomic group's inflated APY is graphed in the figure above over the years. In this analysis, it is demonstrated that black-drafted players typically emerge from more socioeconomically disadvantaged and predominantly black hometowns, while white-drafted players come from less disadvantaged and predominantly white communities. This visualization exposes how these structural inequities exist within the running back position. For running backs, those from a more privileged background consistently experienced greater inflated APYs throughout the years. Although there is a decrease in the gap between both subgroups, this metric must be closely monitored to ensure fairness for all.

In addition, understanding the pay disparity among running backs requires looking beyond the surface numbers. In communities with fewer economic opportunities, football often emerges as a lifeline—a seemingly golden ticket out of challenging circumstances. Racial barriers and limited social mobility transform the sport into more than just a game; it

becomes a critical pathway to economic advancement for many athletes. By diving into the middle-class pay segments, we start to uncover the complex economic challenges that players from different backgrounds must navigate, revealing a story far richer and more nuanced than simple salary statistics. The data suggests that player compensation is not merely a function of individual performance but is deeply intertwined with the complex interplay of race, social class, hometown resources, and systemic barriers in athletic career progression. In looking at the bigger picture of the disadvantages the middle class faces, it is imperative to look through the context of race and socioeconomic background, as it is a clear differentiating factor for athletes' pay. Not only does there need to be change within the pay distribution to uplift the middle class, but there also need to be solutions that bridge the racial divide plaguing the middle class. Doing so will lead to true fairness for all of the middle class.

IV. Provision - Performance-Based Pay Distribution

In the 2002 season, the NFL implemented the Performance-Based Pay program, which aims to ensure that under-compensated players receive an additional payment for their performance. Compensation is awarded based on his play-by-play (PBP) time related to the rest of his team and his current PBP compensation². By nature, the program should compensate players who are putting more time in on the field and receiving disproportionate pay. From an external fund, the NFL issued \$393.8 million through this program in 2023³. While all players are eligible for additional performance compensation, its main goal is to benefit under-compensated players, which we showed in section III to be primarily middle-class players.

The San Francisco 49ers' total salary cap was \$199,512,464 for the 2023 season. Graph 4.1 depicts the salary distribution split between five quantiles of the 75 actively rostered players on the team⁴. The average salaries of the 1st, 2nd, 3rd, 4th, and 5th quantiles were \$0.311 million, \$0.773 million, \$1.067 million, \$2.372 million, and \$8.267 million, respectively. Highlighted in red are quantiles 3 and 4, which make up the middle and upper sections of this paper's defined middle class. The top class, comprising the top 15 contracts, clearly demonstrates an unmatched breakaway from the rest of the salaries.

² *Performance-Based Pay Distributions*, nflcommunications.com/Pages/2023-Performance-Based-Pay-Distributions-Announced.aspx. Accessed 12 Dec. 2024.

³ "NFL: 2023 Performance-Based Pay Distributions Announced." *American Football International - Bringing You the Latest News and Updates about American Football Outside the United States!*, www.americanfootballinternational.com/nfl-2023-performance-based-pay-distributions-announced/. Accessed 12 Dec. 2024.

⁴ Spotrac. "San Francisco 49ers 2023 Financial Summary." *Spotrac.Com*, www.spotrac.com/nfl/san-francisco-49ers/overview/_/year/2023/sort/cap_total. Accessed 12 Dec. 2024.

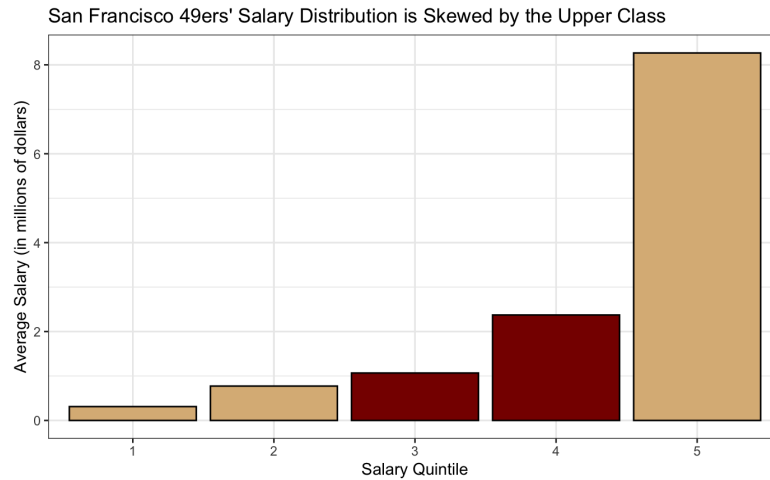


Figure 4.1: San Francisco 49ers' Salary Distribution is Skewed by the Upper Class

Using the performance-based pay compensation formula and snap count⁵, Figure 4.2 demonstrates the average bonus awarded to each quantile group. The average bonuses awarded to each group (starting at the 1st quantile) were \$35,378, \$155,154, \$303,735, \$256,000, and \$70,149. Most notably, the highest average compensations were calculated to be awarded to the middle class.

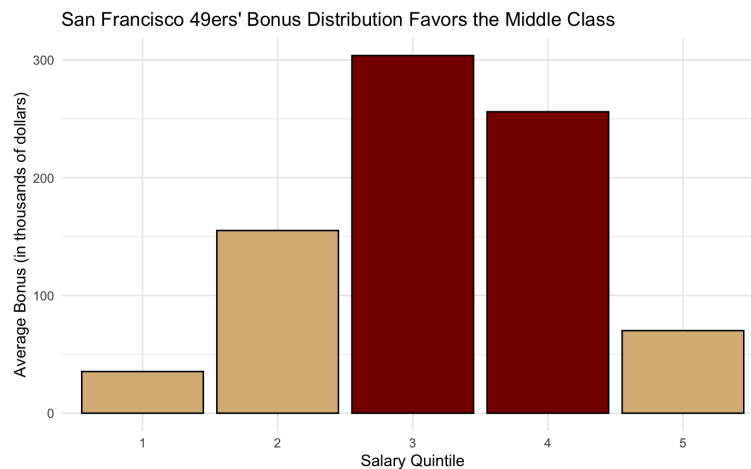


Figure 4.2: San Francisco 49ers' Bonus Distribution Favors the Middle Class

Cornerback Deommodore Lenoir's rookie contract with the 49ers was worth \$3,764,872 for 4 years⁶. In the 2023 season, his salary was \$1,011,218 (floor salary of \$1,165,000), placing him in the third quartile. With 48 solo tackles, 10 passes defended, 3 interceptions, and participation in 92.64% of the snaps, he earned the 49ers' highest calculated

⁵ "San Francisco 49ers 2023 Snap Counts." *Pro*, www.pro-football-reference.com/teams/sfo/2023-snap-counts.htm. Accessed 12 Dec. 2024.

⁶ Spotrac. "Deommodore Lenoir: NFL Contracts & Salaries." *Spotrac.Com*, www.spotrac.com/nfl/player/_id/72556/deommodore-lenoir/contract/summary. Accessed 12 Dec. 2024.

performance-based compensation of \$797,152⁷. This increased his annual salary by 78.8%. The average income increases for players in the 2nd, 3rd, and 4th quartiles were 20.06%, 28.46%, and 6.54%. From this base case analysis of the 49ers, we clearly see that the performance-based compensation is directing funds primarily to under-compensated players. This program is vital in rewarding middle-class players who were getting wiped away by the growing compensation inequality in the league.

The performance-based compensation also provides additional mobility for players who were initially underestimated by their draft selection. Lenoir was a fifth-round pick, receiving practically the bare minimum contract. He proved himself during his first four years at the 49ers and earned himself a 5-year, \$88,884,000 contract extension in 2024. The financial growth of Lenoir’s contract revealed just how underpaid he was on his rookie contract. If Lenoir had been injured and unable to extend his new contract, at least he would have been able to receive some of the additional compensation that he deserved. Lucky for him, he received performance-based compensation along with the new contract.

V. Provision - Increased Minimum Salaries and the Veteran Salary Benefit

The 2020 CBA significantly changed minimum salaries. In addition to increasing the minimum salary for players of all accrued seasons, the Minimum Salary Benefit (MSB) was replaced with the Veteran Salary Benefit (VSB).

Element	MSB	VSB
Cap hit for veterans	Set to a second-year player's minimum salary	Set to a second-year player's minimum salary
Bonus	No bonus allowed	Bonus of up to \$137,500 allowed
Number of veterans eligible per team	2	No limit

Figure 5.1: Differences between Minimum Salary Benefit (2011 CBA) and Veteran Salary Benefit (2020 CBA).

⁷ “Official Site of the National Football League.” *NFL.Com*, www.nfl.com/players/deommodore-lenoir/stats/. Accessed 12 Dec. 2024.

Figure 5.1 demonstrates how the VSB helps more veteran players secure roster spots. The cap hit for veteran minimums is set to a second-year player's minimum salary, even though their actual salary is higher than the actual cap hit. In addition, removing the limit on the number of veterans eligible per team entices NFL teams to roster more veterans without worrying about their cap hit being too high.

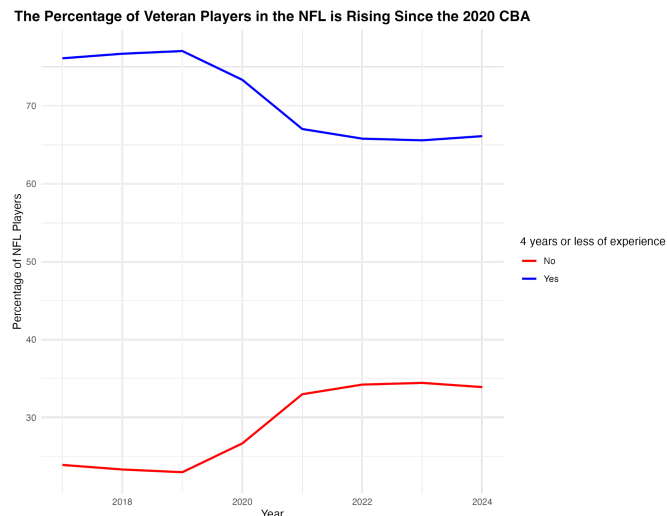


Figure 5.2: Percentage of veterans in the NFL

Since rookie contracts are 4 years (plus a 5th-year team option for first-round picks), we defined veterans as players with more than 4 accrued seasons. We can see a clear trend of an increased percentage of veterans in the NFL since the introduction of the 2020 CBA. We suspect that the changes to the minimum salaries have played a large role in this change, as NFL teams can roster veterans for cheap cap hits while still paying them more money than less-tenured players on minimum contracts.

In a study conducted by the Associated Press, the average amount of playing experience of the NFL's opening day roster declined from 4.6 years in 2005 to 4.3 years by 2018⁸. This experience shift varies even more position by position, highlighting how “replaceable” a position may be considered. Before 2019, the average experience for quarterbacks—an “irreplaceable” position—was getting higher. Meanwhile, for positions like running back, interior lineman, linebacker, and wide receiver that are normally considered more “replaceable,” the average experience in the league was getting shorter.

⁸ “AP Analysis: The NFL Keeps Going Younger and Cheaper.” *USA Today*, Gannett Satellite Information Network, 27 Jan. 2019, www.usatoday.com/story/sports/nfl/2019/01/27/ap-analysis-the-nfl-keeps-going-younger-and-cheaper/38961877/. Accessed 12 Dec. 2024.

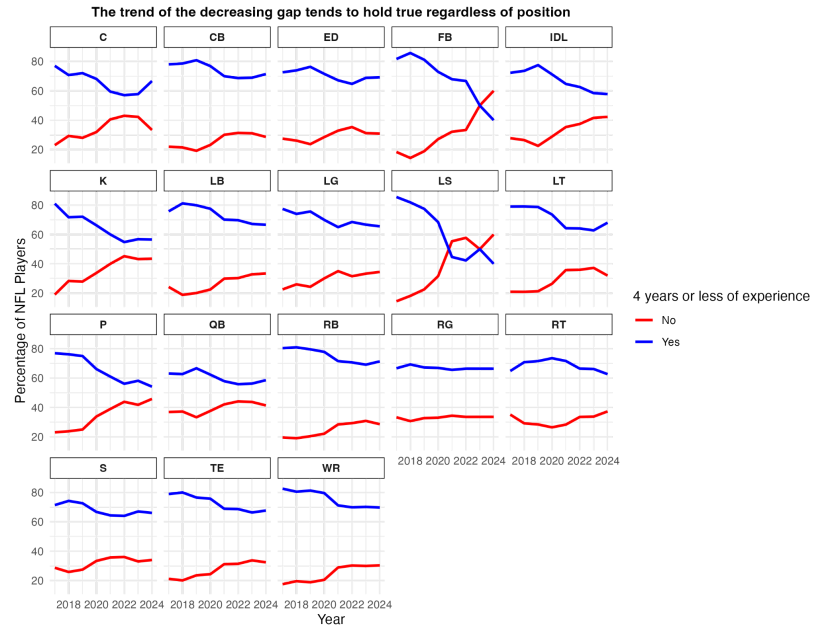


Figure 5.3: Percentage of veterans in the NFL by position

Similar to Figure 5.2, the red lines represent our definition of veteran players, and the blue lines represent non-veteran players. In 2018, the non-veterans comprised the majority of the spots. The previous decline in the middle class has been partially attributed to the growing scarcity of veteran contracts. If the Veteran Salary Benefit contracts were encouraging teams to continue signing more experienced players, then we should see a shrinking in the gap between the blue and red lines in our graphs. For the majority of the positions above, we do find that the levels of experience are beginning to converge to a slightly more equivalent level.

Below, we have highlighted 5 notable positions. The quarterback (QB) graph shows that when the Veteran Benefit provision was initially put in place, teams did begin taking on more veterans. QBs have historically been the longest-lasting players in the league. For starters, Aaron Rodgers is in his 20th season, so we were not surprised to see that these lines seem to be some of the most converged compared to other positions.

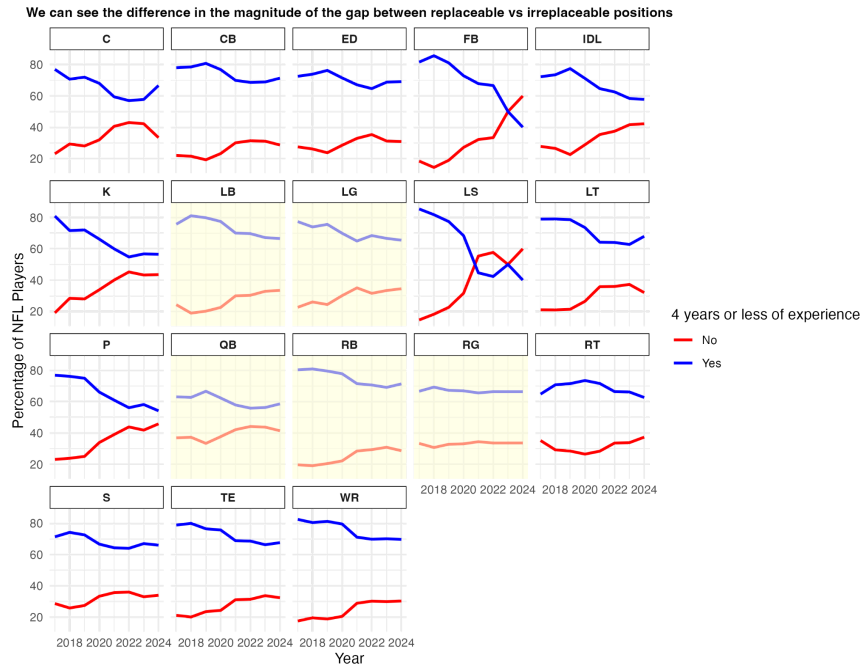


Figure 5.4: Percentage of veterans at replaceable positions compared to QBs

As previously mentioned, one of the most vulnerable positions to being replaced is running back (RB). The RB graph above demonstrates how the separation between less and more experienced is one of the largest compared to other positions. Additionally, while these lines begin to inch closer together with the revision to the veteran contracts in 2020, they still demonstrate immense separation. RBs inherently have shorter spans in the league due to their heightened physical load. RBs normally have their biggest seasons between 24 and 26 years of age, but their contracts are up for renewal four years after they join the league⁹. Teams are encouraged to look at rookies for replacements, so RBs start with their rookie contracts and then must settle for undercompensating renewals if they are even offered them. Provisions like Performance-Based Pay compensation ensure that RBs are properly compensated for their contribution to their team's success, even if they are unable to earn a fairly paid contract.

⁹ Pennington, Will. "Bankrupt Ballcarriers? How NFL Policy Limits Running Back Earnings." *Chicago Policy Review*, 29 Apr. 2024, chicagopolicyreview.org/2024/04/29/bankrupt-ballcarriers-how-nfl-policy-limits-running-back-earnings/#:~:text=While%20it's%20difficult%20to%20pinpoint,more%20than%20league%20average%20play. Accessed 12 Dec. 2024.

VI. Provision - Max Contracts

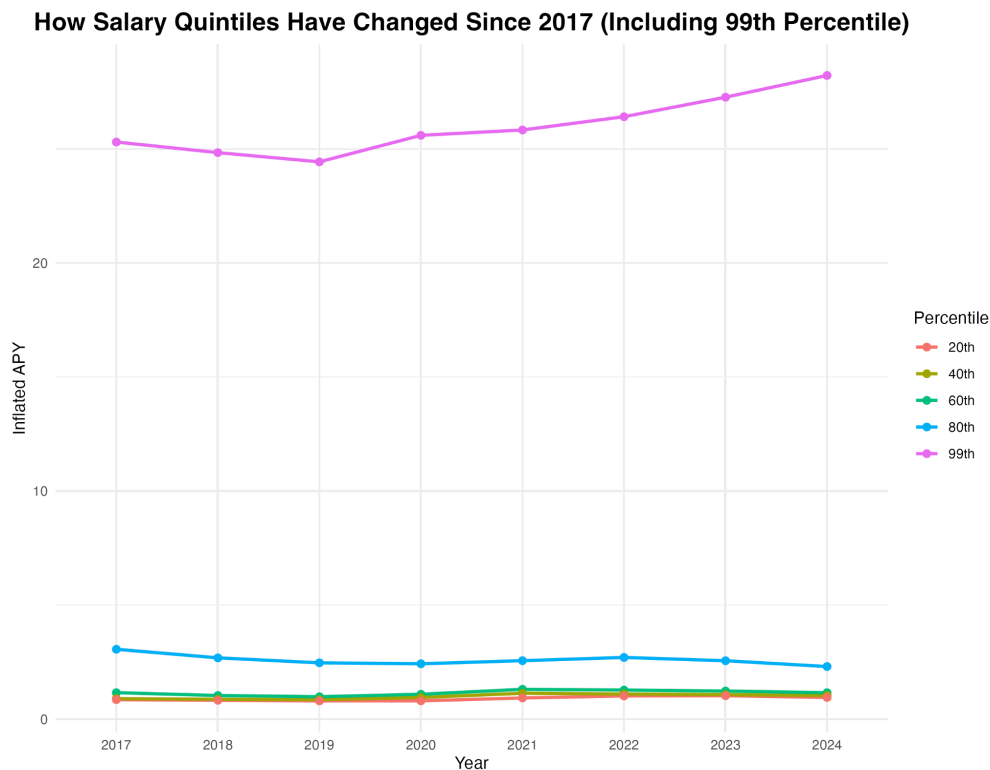


Figure 6.1: 99th Percentile NFL Contracts have seen a massive spike in recent years

As shown in Figure 6.1, over the last few seasons, the absolute upper class of the NFL has experienced a substantial gain in their salaries. Teams are spending more than ever to lock up their superstars, resulting in a decreased share of the salary cap for the vast majority of players. A potential solution to this problem would be to institute a max contract system similar to the NBA.

In the NBA, max contracts are set to a percentage of the salary cap, as players with 6 or fewer accrued seasons are eligible for a contract worth 25% of the salary cap, players with 7-9 accrued seasons can receive 30%, and players with 10 or more accrued seasons' max contracts are worth 35% of the salary cap¹⁰.

Our recommendation for implementing this concept for the NFL is to consider positional value in addition to accrued seasons. To determine the baseline percentage of the salary cap that a player's max contract is worth, we can perform a similar calculation used to calculate

¹⁰ Greer, Jordan. "NBA Salary Cap, Explained: Max Contracts, Mid-Level Exception, Qualifying Offers and More for 2023 Free Agency." Sporting News, June 30, 2023. <https://www.sportingnews.com/us/nba/news/nba-free-agency-2023-salary-cap-explained-contracts-offers/cm8nw7mw3ts0fecsnjjewjvq>.

the franchise tag. The franchise tag is worth the average of the top five salaries over the last five years at a player's specific position, or 120% of the player's salary from the previous salary, whichever is greater. Looking at quarterbacks specifically, the value of the franchise tag for the 2024 season was \$38.301 million, and the average total salary cap over the last five years is \$213.82 million¹¹, equaling 17.9% of the salary cap.

Since on average, NBA careers are ~35% longer than NFL careers¹², we also have to adjust the bounds for the levels of accrued seasons. If we set the levels to 0-4 accrued seasons, 5-7 accrued seasons, and 8+ accrued seasons with an arbitrary 1.5% increase in each level, the max contract bounds for a QB would look like this:

- 17.9% for a QB with 0-4 accrued seasons
- 19.4% for a QB with 5-7 accrued seasons
- 20.9% for a QB with 8+ accrued seasons

While this provision would hurt the upper echelon of NFL stars in terms of overall compensation, it could lower the risk of losing guarantees on second contracts for these stars. Many of the NFL's premier stars are drafted in the first round, whose contracts can reach 5 years if their 5th-year option is picked up. If this max contract clause were instituted, NFL teams could have more of an incentive to extend their star first-round draft picks as early as possible, with the intent to lock a player into a first-tier max contract before a player decides to wait an extra year to receive the second-tier max. This may result in smaller contracts for the top 1% of NFL players, but if teams hand these max contracts out as early as possible, stars can still have access to generational wealth while minimizing the risk of a career-altering injury by signing a max extension as early as possible in their careers.

The NBA also uses accolades to determine eligibility and the value of its maximum contracts. For example, Orlando Magic star forward Franz Wagner recently signed a max extension worth \$224 million over 5 seasons, which is the 25% NBA max. However, if Wagner makes an All-NBA team during the 2024-25 season, his contract will be worth \$269 million, a 30% max¹³. NFL teams can use All-Pro teams or other accolades, such as MVP, Offensive or Defensive Player of the Year, etc, to give the NFL's premier players access to max contracts worth more than the baseline amount.

¹¹ The 2021 NFL salary cap decreased 7.92% from 2020 due to the ramifications of COVID-19. Per Spotrac, this is the only time the salary cap has experienced a decrease since its implementation. This calculation could be adjusted to better represent the overall trend of the salary cap, but the baseline idea holds.

¹² May, Jeffrey. "How Long Is the Average Career of an NFL Player?" AS USA, April 25, 2024. <https://en.as.com/nfl/how-long-is-the-average-career-of-an-nfl-player-n-2/>.

¹³ Herbert, James. "Magic, Franz Wagner Agree to Five-Year Maximum Contract Extension Worth at Least \$224 Million, per Reports." CBSSports.com, July 5, 2024. <https://www.cbssports.com/nba/news/magic-franz-wagner-agree-to-five-year-maximum-contract-extension-worth-at-least-224-million-per-reports/>.

If developed correctly, max contracts can decrease the overall economic inequality between the NFL's top stars and the rest of the league while also giving opportunities for superstars to earn their fair value of money supported by their accolades. In addition, stars could potentially guarantee a massive max extension directly after their 3rd season¹⁴, minimizing the risk of losing tens of millions of guaranteed money due to an injury or a failed holdout.

VII. Conclusion

Income inequality has been a problem in professional sports for many decades, as teams pay premier stars hundreds of millions of dollars. In a league with a hard salary cap, such as the NFL, this creates a problem for the league's middle class. Serviceable starters and key reserves are often significantly underpaid, and since the average NFL career is so short, this problem deserves the NFLPA's attention.

We found that some of the clauses that the NFLPA has fought for in past CBAs have helped the NFL's middle class, and these provisions should be expanded upon. The Performance-Based Pay bonus system benefits the third and fourth salary quintiles of NFL players the most, which are the class of players that we found are the most underpaid. In the 2020 CBA, the Veteran Salary Benefit replaced the Minimum Salary Benefit, and we observed a dramatic positive shift in the percentage of veterans rostered in the NFL. Expanding these programs will help the middle class of NFL players even more and can lead to lower income inequality in the NFL.

We also suggest that the NFL implement a maximum contract system similar to the NBA. The top 1% of NFL players account for a disproportionate amount of the salary cap, and instituting a maximum contract system would leave more money for the middle class. In addition, if instituted right, superstars would still have the opportunity to make more than the baseline maximum contracts, allowing teams to adequately reward their production.

In addition, we found that within the middle class, there is a disparity between the salaries of players from high socioeconomic classes compared to those of lower classes. We implore that the NFL and NFLPA work together to find a way to combat this trend and help reduce income inequality even within the NFL's middle class.

¹⁴ NFL Players become extension eligible after their 3rd accrued season

