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Salary Cap Efficiency: A Study of the Relationship between a NFL Quarterback's Salary and their Team's Performance

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Abstract

For years, sports economists have attempted to understand the impact of salary caps in sports leagues, as they can have an impact on a team's favored personnel approach. In the National Football League (NFL), one of the more important positions is the team's quarterback, who has the ability to command large contracts. This paper examines the work of past researchers, and attempts to add to the literature by analyzing data from the past ten NFL seasons. I find inconclusive results relating to the relationship between a NFL team's winning percentage and the amount of salary cap space allocated for their starting quarterback.

Introduction

In the field of economics, measuring the efficiency of allocative decisions is important, as it is usually not possible to make decisions that will be able to equally benefit every member of a given society. Allocative efficiency is an important property to consider, as it can play a role in determining the quality of life available to individuals, based on the quality of decisions made. This idea is especially important when one considers economic efficiency as a term that is used "in order to denote the state of best possible operation of a product or service market" (Petrou, 2014, p. 1). The notion of allocative efficiency could be expanded to realms outside the traditional format of a market economy, as it is always intriguing to consider how optimal the distribution of given resources truly is. One such instance could be professional sports, where sports teams are often under the confines of a salary cap that dictates and limits the amount of money that they are able to spend during a particular season. A prominent example in the United States is the National Football League (NFL), which is amongst the country's most famous sports leagues, and is the highest format of professional football in North America. Like many other sports leagues, the NFL adheres to a revenue-sharing system which strives to make the most of the billions of dollars they make every year. For instance, during the 2018-2019 NFL season, the league totaled $8.78 billion in shared revenue, with each of the 32 NFL teams receiving an equal cut of $274.3 million (Rovell, 2021).

Figure 1: San Francisco 49ers' 2021-2022 Positional Spending, courtesy of The Athletic

With that thought in mind, it might be interesting to consider how a given NFL team adhered to the salary cap during the league's most recent season. Figure 1 gives a breakdown of the San Francisco 49ers' spending decisions during the 2021-2022 season and indicates that the team chose to spend the most money on their defensive linemen (DL), quarterbacks (QB), and defensive backs (DB), respectively.

The quarterback position is undoubtedly one of the most important in all of American team sports, as NFL teams can spend decades looking for the 'franchise' player that is capable of helping them achieve sustained success. However, due to the salary cap, teams may value quarterbacks differently, and can choose to allot more money and resources to other parts of the team. This leads me to my research question, which is – ***Is it possible to determine a correlation between a NFL team's winning percentage and the percentage of their salary cap dedicated to their starting quarterback?*** My ability to answer this question relies heavily on the work of economists who have delved into this topic in the past. I will also utilize data from the past NFL seasons in order to see if it is possible to utilize regressions to determine a positive or negative effect, with control variables also playing a key part.

Why is this important?

The importance of this topic is paramount for many Americans, as sports are a very large part of our society in the United States, due to the wide prevalence of sports teams and leagues across the country. Whether or not you are an avid sports fan, events that occur in the sporting world do tend to impact your life, due to the massive fan followings for American team sports. This topic may not directly impact someone's life, but it is becoming an interesting case study in the NFL, due to the widely increasing contracts that have been given to quarterbacks in recent years. When teams are guaranteeing vast amounts of money to quarterbacks, shouldn't the fans of these teams know if there is a correlation between this and the team's success or failure?

How have researchers approached this question?

In his article, "Allocation of Scarce Resources: Insight from the NFL Salary Cap", Richard Borghesi attempts to correlate the relationship between pay and performance, which he believes to be heavily important in fields such as economics and finance. He mentions that in most fields, "when pay is distributed evenly among employees, cooperation increases and firm efficiency improves" (Borghesi, 2008, p. 537). He believes that sports leagues such as the NFL contain an obvious performance metric, which is the number of wins a team obtains in a given season. Hence, it is his belief that professional sports leagues present a good opportunity to properly quantify the cost-benefit analysis of choosing to hire and pay extremely talented players. Borghesi notes that having strict caps for a team's salary and player composition may lead to franchises receiving disproportionate returns to investment for rostering certain players. For instance, he mentions that certain teams may be willing to accrue large rents for talented players, because the notion of having one talented quarterback is better than having multiple

average ones. This can lead to a conundrum for teams, as they must figure out the optimal distribution scheme that simultaneously ensures on-field success and appeases the financial desires of their star players. In this vein, he does mention that "the relationship between wage inequality and team performance is potentially important because large disparities in player pay may disrupt team cohesion" (Borghesi, 2008, p. 537). Adding to this, he also mentions that previous studies in American team sports have shown that franchises which opt for relatively low amounts of salary dispersion could perform better than their competitors, even though there is not a proven connection between the 'fairness' of a contract and team performance (Borghesi, 2008, p. 537). Borghesi's study utilizes two different team-building approaches seen in the NFL. The first option entails prioritizing the utilization of resources on a number of highly talented and expensive star players, such as a quarterback, while supplementing them with a wide range of affordable teammates. The second approach involves distributing a team's money more evenly, with more 'mid-level' talent and a focus on ensuring team cohesion. Borghesi mentions that in most cases, the dispersion present between highly paid star players (such as quarterbacks) can be justified by superior performance, which he tries to justify by analyzing player productivity (Borghesi, 2008, p. 538). This productivity analysis splits the standard NFL team into the two main units present on the field – offense and defense. Borghesi's research finds that teams which follow a 'superstar' approach on offense, which is often the case with tenured quarterbacks, may perform poorly on the field, due to the potential of damaged morale. This can happen when a highly paid quarterback's teammates do not believe that their performance is deserving of a hefty contract (Borghesi, 2008, p. 548). Damaged morale could play a role in producing inferior performance, but it is important to note that quarterbacks also require the presence of talented supporting casts, which could be hindered by the superstar approach. Furthermore, when teams

gamble on the ability of highly paid quarterbacks to stay healthy, they may be unable to supplement their offensive lineup with extremely talented playmakers. This becomes increasingly evident when the expensive starter gets injured, leaving his backup to play with subpar players who are not capable of elevating the team to elite performance. He finds that "teams win more games on average when unjustified pay and unjustified dispersions in pay are lower than league averages" (Borghesi, 2008, p. 548). Borghesi adds to this idea by mentioning that even though superstar quarterbacks may be deserving of their large contracts, their mere presence on the team's roster could lead to disruption for their on-field performance. Hence, he suggests focusing on hiring talented coaches, due to the lack of a salary cap for coaching hires, and the ability of intelligent coaches to bring the best out of average players (Borghesi, 2008, p. 549).

In their paper, "Optimizing the Allocation of Funds of an NFL Team Under the Salary Cap", Jason Mulholland and Shane Jensen, the two authors approach the 'issue' of managing the NFL's strict salary cap by comparing the situation to the league's main peers in the domain of American sports. For instance, they mention that "unlike some other professional sports leagues, the NFL has a strict team salary cap, meaning that teams cannot pay a luxury tax to obtain permission to have a higher player salary total" (Mulholland and Jensen, 2018, p. 767). The authors believe that the NFL is a classic example of an 'allocation of a scarce resource' decision, which is common in situations of uncertainty. To address this situation, they structured their research to encompass all position groups present in the NFL, in order to see "the position group that maximizes the total expected win contributions across all positions (expected wins) with the restriction of the salary cap" (Mulholland and Jensen, 2018, p. 767). Mulholland and Jensen specifically make mention of the allure of having a star quarterback, which is the crown jewel of

most team executives and owners. They note that even though it is a common belief amongst league observers that the teams with the best quarterbacks are the most successful, it may not be optimal from a team performance standpoint to have the highest-paid quarterback (Mulholland and Jensen, 2018, p. 767). They also mention that once player performance was considered, they found that the optimal allocation strategy is highly uniform. Furthermore, this approach does "allocate a relatively high salary to quarterbacks, though not as high as the top NFL quarterbacks actually receive" (Mulholland and Jensen, 2018, p. 768). They acknowledge that there are multiple ways for a team to link the importance of their quarterback to their salary cap management. For instance, it is noted that there are three main ways for a team to manage the quarterback; the team can opt to pay them 'big money', they could pay a young quarterback based on the pre-negotiated rookie contract scale or choose to pursue neither option. In most cases, the ideal option for a team would be to have a good quarterback on their rookie contract, where the team can "enjoy good production at quarterback and extra money to spend on other positions" (Mulholland and Jensen, 2018, p. 768). The primary example given to exemplify this claim is the two-year stretch of dominance in the mid-2010s by the Seattle Seahawks, who were able to masterfully utilize the rookie contract years of their star QB Russell Wilson, by surrounding him with talented players who were not earning 'superstar' contracts at the time. This carefully constructed roster led Seattle to two consecutive Super Bowl appearances, including a victory in 2013's Super Bowl XLVIII. Mulholland and Jensen approach their work with the caveat that complete information clearly does not exist, as it is not feasible for teams to correctly predict how a given player will perform in the future. Their model focuses on the notion of 'uncompensated wins', which compares a player's actual contributions to victories to their initially projected number based on their contract (Mulholland and Jensen, 2018, p. 769).

Using the example of the Seahawks, the two authors emphasize the idea that teams with a higher upside of uncompensated wins are in a better position to achieve success in a given time period. Even though they mention that quarterbacks can lead the league in uncompensated wins, this does not always translate to sustained success for a team. The Seahawks' quarterback Russell Wilson had one of the highest uncompensated win totals in the league, but he was aided by several other star players on his team, such as cornerback Richard Sherman, who led the list of non-quarterbacks in the same category. Hence, Mulholland and Jensen are of the opinion that teams like the Seahawks of the 2010s were successful when they had "many successful draft picks and had productive players playing on low rookie-contract salaries" (Mulholland and Jensen, 2018, p. 774).

In their article, "Winner Take All in the NFL", Michael Leeds and Sandra Kowalewski attempt to discover if it is possible to directly compare positional performance in the NFL, which is not easily done, due to the different statistics produced by players such as quarterbacks (who are measured by passing yards and touchdowns) and defensive lineman (who are measured by tackles and sacks). In order to determine salary cap efficiency, the two authors chose to run regressions for 'skill position' players, which include quarterbacks, running backs, wide receivers, and tight end. These players are under consideration, as they primarily operate with the football in their hands, which makes a measure of direct impact on team performance slightly easier than positions such as cornerback, where it is often a good thing for the player to have a lower volume of statistics (Leeds and Kowalewski, 2001, p. 245). In a similar fashion to other observers, they found that "players who were underpaid for the level of their performance had greater returns to performance than highly paid players" (Leeds and Kowalewski, 2001, p. 245). Another major focus of their investigation is the impact of free agency, where players are free to

leave their team to be highly compensated elsewhere. Specifically for quarterbacks, the advent of free agency led to an increase in the position's median salary, due to the high value placed on the position by decisionmakers in the NFL. In the lenses of Leeds and Kowalewski's research, high performance by quarterbacks appears to have done more for an individual's earning potential than the ability of teams to win more on the field. This is due to salary cap restrictions, which often force teams to make difficult personnel decisions. (Leeds and Kowalewski, 2001, p. 255).

In their article, "NFL Salary Cap Allocation: Matching Theory with Observed Behavior", Chris Jeffords and Todd Potts attempt to determine the optimality of certain salary cap allocation decisions, as NFL teams have the flexibility and the wherewithal to take vastly different approaches. The two authors draw upon previous researchers who mention that spending more than the league average on positions such as quarterback and offensive line may lead to poorer overall performance (Jeffords and Potts, 2019, p. 270). Their model attempts to predict behavior by NFL teams and has found that teams will tend to overspend on offensive positions, such as quarterback. All in all, they do not believe that it is inefficient for teams to be close to the salary cap limit, as having a "greater 'distance' from the cap is associated with reduced team success" (Jeffords and Potts, 2019, p. 274). In the case of teams who are owned by 'cash-poor' owners, they may not have the ability to routinely spend up to the salary cap, which could put the team at a competitive disadvantage in certain situations.

In their article, "Positional WAR in the National Football League", Andrew Hughes, Cory Keodal, and Joshua Price attempt to decipher the value of NFL players in terms of position, through the usage of 'wins above replacement' (WAR). Their work is similar to that of other researchers, but deviates through the usage of WAR, which tries to utilize the impact of player injuries to see how valuable a given player truly is to their team. Hughes et al., find that

"quarterbacks are the most valuable position by a wide margin", ahead of other skill positions such as wide receiver and tight end (Hughes et al., 2016, p. 600). This idea is also reinforced by the relative scarcity of talent at the quarterback position, which often causes teams to be willing to dedicate more resources to solidify their team's standing in the league. Hence, in the views propagated by the authors, it is fair to say that dedicating more salary cap space to quarterbacks is warranted, as having a subpar replacement would likely lead to unideal performance on the field (Hughes et al., 2016, p. 608).

In his article, "The Sunk-Cost Fallacy in the National Football League: Salary Cap Value and Playing Time", Quinn Keefer analyzes the emphasis that NFL teams seem to place on first-round draft selections, which are thought to be amongst the most important assets in a franchise's arsenal. Even though his research does not directly focus on the value of quarterbacks, it is quite relevant, due to the fact that many NFL teams choose to invest in their future by drafting quarterbacks in the first round of the league's draft. These decisions could be seen as inefficient and 'sunk costs', if it is evident that the player selected was not an efficient utilization of resources. In Keefer's words, "if sunk costs are significant determinants of playing time, teams may be operating inefficiently" (Keefer, 2017, p. 283). Due to the pre-negotiated rookie contract scales that exist in the NFL, first round draft picks take up a larger portion of the salary cap than their peers drafted in later rounds. This may not always be beneficial, as Keefer mentions that "quarterbacks selected early in the NFL draft are not more productive than their later round counterparts" (Keefer, 2017, p. 286). He finds that the sunk-cost fallacy is present in the NFL, as first round draft choices tend to start in more games than draft choices from later rounds (Keefer, 2017, p. 293-94). Hence, from this viewpoint, if NFL teams are making personnel decisions based on the draft capital and money allotted for certain individuals, such as a quarterback, and

are failing to succeed on the field, the sunk cost fallacy could be seen as an explanation as to why quarterbacks are not always worth the salary cap premium that teams appear to attach to them.

In their article, "The Impact of Free Agency and the Salary Cap on Competitive Balance in the National Football League", Andrew Larsen and Aju Fenn analyze how the introduction of free agency and the salary cap prior to the 1993 NFL season may have played a role in shaping how teams view the competitive environment of the league. They note that instances such as this, along with prior expansion drafts may have helped to promote competitive balance, due to a greater dispersion of talent across the league (Larsen and Fenn, 2006, p. 382). They also mention that when teams choose to pay their 'top talent' such as quarterbacks, in order to prevent them from entering the free market, it could make them less capable of "fielding teams that are up to the par with the rest of the league" (Larsen and Fenn, 2006, p. 382). Their investigation includes data that summarizes the number of points scored by NFL teams, which can often be aided by strong talent on defense and special teams. This is a good summary as to why football is a 'team game', wherein it is very difficult for individual units to win the games by themselves without some semblance of support from the other units on the team. Even though they state that "higher concentrations of offensive talent go hand in hand with lower levels of competitive balance", it may be fair to state that being unable to field competent defensive and special-teams players could lead to weakened results for the offense, due to a reduced ability to start drives in advantageous situations (Larsen and Fenn, 2006, p. 383).

In his article, "A Resource-Based Look at Compensation Strategy: Application and Implementation of Competitive Advantage", James Carey focuses on how NFL teams can choose to approach the league's salary cap in a variety of ways. He mentions that due to the league's desire for parity and the presence of a revenue-sharing system, NFL teams in small

markets do not have to be worried about competitors from larger markets spending much more money than them (Carey, 2008, p. 134). As quarterbacks are usually amongst the highest paid individuals on a given team, the structure of the league's financial systems will often force teams to make concessions in other facets of their personnel groups. This common idea which is shared amongst many economists may serve to show individuals why merely choosing to spend more money on a star position like quarterback does not guarantee any sort of on-field success. However, Carey deviates from other researchers by shedding light on the ways in which successful teams have chosen to manipulate the salary cap. He mentions that "even though the salary cap creates a hypothetical ceiling on the amount of money that teams can spend in a given year, the ceiling is frequently exceeded from a cashflow standpoint, depending upon a team's orientation towards risk" (Carey, 2008, p. 134). In circumstances such as this, NFL teams 'borrow' money from the salary caps of future seasons in order to pay out more cash in the present that enables them to fund substantial salaries. From this viewpoint, it could be fair to argue for the importance of signing quarterbacks to large contracts if the team is able and willing to structure contracts in a manner that has minimal consequences in the short-term, but could lead to financial drawbacks in the long run. Carey mentions that one way to do this is to utilize signing bonuses, which are prorated over the course of the contract's lifetime, even though they are paid immediately to the player. Hence, the team's desire to spend more money in the short run could help them justify the presence of a large contract on their roster (Carey, 2008, p. 135). All in all, Carey does mention that "if it can be shown that a relationship exists between some (or all) salary cap components and team performance, then the presumption of resource heterogeneity is also affirmed" (Carey, 2008, p. 137). When it is clear that certain players are just more talented than their peers, spending as far as possible to the league's limits could be a

justified approach because Carey believes that player productivity is a key factor towards a difference in wins (Carey, 2008, p. 142). Certain teams may be more prone to success when they choose to construct their roster around a highly paid quarterback if they know what they are looking for in supplemental players and have a well-defined strategy that can be implemented in a manner that maximizes their available resources (Carey, 2008, p. 147). As the NFL can be seen as an 'imitation league', where teams try to emulate successful formulas propagated by winning teams, this approach has both worked and failed, but choosing to go about doing so in a unique and well-thought manner could help "raise the barriers to imitation" (Carey, 2008, p. 142).

What is my answer to this question?

I entered this investigation with the belief that there is a strong correlation between the salary cap space allotted to a NFL team's quarterback and the team's ability to produce positive results on the field. I have had this belief due to the notion that money is finite in salary-capped leagues such as the NFL, as teams simply cannot afford to pay every player a 'top of the market' contract. As numerous researchers have stated, there is evidence in the NFL to suggest that teams who have carefully constructed their rosters around young and/or lesser paid quarterbacks may have set themselves up for longer bursts of sustained success. At the same time, I do agree with the notion that teams who are unwilling and unable to spend close to the salary cap may be doing themselves and their fans a disservice, as they may be showing that they are not truly committed to doing everything required to achieve on-field success. I believe that there is a negative correlation between the large share of a starting quarterback's salary cap allocation and the resulting on-field success for their team.

Data and Methodology

In order to answer my question, it is paramount for me to be able to prove my statements with data from the past decade of the NFL. Hence, I ran regressions utilizing data ranging from 2011 to 2020, with the dependent variable of the observation being Winning Percentage (WP) for each of the NFL's 32 teams, which was obtained using the archives on the NFL's website. These regressions were performed in two phases, with the first portion incorporating one separate regression for each season, and the second part utilizing the aggregated data to account for potential variations in certain seasons. As has been discussed several times already, the primary independent variable under consideration is the Fraction of Salary Cap (F) dedicated to the 32 starting quarterbacks in the NFL during the designated time period. This data was obtained using information from Over The Cap, a website that primarily focuses on exhibiting and analyzing the publicly available information regarding contract terms and information. In order to see if there would be any fluctuation with the primary relationship being examined, I also utilized two control variables, which were Interconference Winning Percentage (IWP), and Strength of Schedule (SOS), as both of these factors can give an interesting insight into the relative potency of a given NFL team. With these variables, the first part of my investigation utlized four separate regressions for each of the 10 NFL seasons under consideration. All four variables under consideration can be seen in Figure 2, which exhibits information from the 2011-12 NFL season.

Team	Team WP	Strength of Schedule	Fraction of Salary Cap	Interconference WP
ARI	0.5	0.441	0.033	0.25
ATL	0.625	0.492	0.09375	0.75
BAL	0.75	0.457	0.048	0.75
BUF	0.375	0.535	0.047	0.5
CAR	0.375	0.555	0.033	0.75
CHI	0.5	0.488	0.079	0.25
CIN	0.5625	0.473	0.008	0.75
CLE	0.25	0.492	0.005	0.25
DAL	0.5	0.504	0.053	0.5
DEN	0.5	0.52	0.017	0.5
DET	0.625	0.52	0.051	1
GB	0.9375	0.508	0.064	0.75
HOU	0.625	0.516	0.075	0.75
IND	0.125	0.52	0.133	0
JAX	0.3125	0.52	0.018	0.25
KC	0.438	0.52	0.059	0.75
LV/OAK	0.5	0.492	0.021	0.5
LAC/SD	0.5	0.52	0.112	0.25
LAR/STL	0.125	0.477	0.104	0.25
MIA	0.375	0.516	0.023	0.25
MIN	0.188	0.516	0.015	0
NE	0.813	0.504	0.11	0.75
NO	0.813	0.508	0.124	1
NYG	0.562	0.492	0.117	1
NYJ	0.5	0.52	0.143	0.5
PHI	0.5	0.504	0.12	0.5
PIT	0.75	0.473	0.094	0.75
SF	0.813	0.465	0.041	0.75
SEA	0.438	0.488	0.033	0.25
TB	0.25	0.496	0.019	0.25
TEN	0.563	0.488	0.042	0.5
WAS	0.313	0.473	0.01	0

Figure 2: Data from the 2011-12 NFL season

Results

Part 1: Utilizing the data across 10 separate seasons

SUMMARY OUTPUT	Fraction							
Regression Statistics								
Multiple R	0.239193217							
R Square	0.057213395							
Adjusted R Square	0.025787175							
Standard Error	0.201905321							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	0.074216608	0.074216608	1.820562403	0.187342215			
Residual	30	1.22297276	0.040765759					
Total	31	1.297189367						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.429471097	0.063361762	6.7780801	1.62173E-07	0.300069116	0.55887308	0.30006912	0.55887308
Fraction of Salary Cap	1.162321581	0.86143699	1.349282181	0.187342215	-0.596967458	2.92161062	-0.5969675	2.92161062

Figure 3: Regression Output for 2011 Season, reflecting Fraction of Salary Cap

Figure 3 represents the output for the first regression of the 2011 NFL season, where the relationship between the two key variables is exhibited. My hypothesis about a strong correlation between winning percentage and the fraction of salary cap space allotted for quarterbacks is not off to a strong start with a R-Squared value of 0.057, which indicates that a mere 5.7% of the variance in winning percentage can be explained by how much money NFL teams choose to spend at the quarterback position. Furthermore, the *Significance* F value of 0.187 would appear to make this model statistically insignificant, due to the value being much higher than the appropriate values at the 95% and 99% confidence levels, respectively. Even more importantly, as the P-value for the fraction of salary cap space is equivalent to the *Significance* F value of 0.187, it is another blow to the potential statistical significance of this investigation. At the same time, the Coefficient value for the fraction of salary cap space is a positive value of 1.16, which would suggest a positive correlation between the two variables. Either way, this would indicate that my null hypothesis should not be rejected, due to a lack of statistical support. These ideas hold for the regressions done for the next nine seasons under consideration, with there only being a handful of years where the potential relationship between winning percentage and the fraction of salary cap space allotted for quarterbacks appears to be even more insignificant.

SUMMARY OUTPUT	**Fraction & IWP**							
Regression Statistics								
Multiple R	0.762644431							
R Square	0.581626528							
Adjusted R Square	0.552773185							
Standard Error	0.136799579							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.754479748	0.377239874	20.15802917	3.25597E-06			
Residual	29	0.54270962	0.018714125					
Total	31	1.297189367						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.223172111	0.054898309	4.065191012	0.000335065	0.110892463	0.33545176	0.11089246	0.33545176
Fraction of Salary Cap	0.19564608	0.605282631	0.323230951	0.748839634	-1.042295898	1.43358806	-1.0422959	1.43358806
Interconference WP	0.521939061	0.086569736	6.02911696	1.47055E-06	0.344884072	0.69899405	0.34488407	0.69899405

Figure 4: Regression Output for 2011 Season, reflecting Fraction of Salary Cap and Interconference Winning Percentage

Figure 4 represents the output for the second regression of the 2011 NFL season, where the relationship between the two key variables is exhibited, with the addition of Interconference Winning Percentage as a control variable. It is shown that the fraction of salary cap space allotted for quarterbacks and interconference winning percentage combine to explain around 58.2% of the variation for winning percentage, due to the R Square value of 0.5816. In addition, the *Significance* F value in this case would appear to be more statistically significant, due to the value being lower than the appropriate values at the 95% and 99% confidence levels, respectively. The coefficient values for fraction of salary cap space and interconference winning percentage are both positive, which still indicates a positive correlation. However, they are much lower than the coefficient value produced in the first regression. Once again, it is crucial that the P-value for fraction of salary cap space is well above 0.05, which would indicate a lack of statistical significance once again. On the other hand, interconference winning percentage does not suffer from this flaw, as its P-value could be interpreted as one of statistical significance. As with the first regression, these results largely hold amongst all the ten seasons under consideration.

SUMMARY OUTPUT	**Fraction & SOS**							
Regression Statistics								
Multiple R	0.351552894							
R Square	0.123589438							
Adjusted R Square	0.06314733							
Standard Error	0.197996035							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.160318904	0.080159452	2.044757243	0.147659109			
Residual	29	1.136870463	0.03920243					
Total	31	1.297189367						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1.523441998	0.740777933	2.056543439	0.048826437	0.008381011	3.03850299	0.00838101	3.03850299
Strength of Schedule	-2.209980485	1.491205727	-1.482009118	0.149123582	-5.259838642	0.83987767	-5.2598386	0.83987767
Fraction of Salary Cap	1.335685281	0.852818797	1.566200564	0.128149891	-0.408525003	3.07989556	-0.408525	3.07989556

Figure 5: Regression Output for 2011 Season, reflecting Fraction of Salary Cap and Strength of Schedule

Figure 5 represents the output for the third regression of the 2011 NFL season, where the relationship between the two key variables is exhibited, with the addition of Strength of Schedule as a control variable. Fraction of salary cap space and strength of schedule combine to explain a mere 12.4% of the variance, due to the R Square value of 0.124. The *Significance* F value in this case would appear to make this model statistically insignificant, due to the value being much higher than the appropriate values at the 95% and 99% confidence levels, respectively. The coefficients for both fraction of salary cap and strength of schedule vary in this regression, as the fraction of salary cap remains at a positive value, which suggests a positive correlation between it and the dependent variable of winning percentage. On the other hand, strength of schedule is negative, which would suggest a negative relationship between it and the dependent variable. Once again, the P-value for fraction of salary would suggest that there is no statistical significance to the investigation, as it easily surpasses the threshold of 0.05. This is also true for strength of schedule, as its' corresponding p-value is greater than 0.05. Other than some variation with the resultant coefficients, the results of the third regression largely hold constant for the remaining nine seasons under consideration.

SUMMARY OUTPUT	**All 3 variables**							
Regression Statistics								
Multiple R	0.809321							
R Square	0.655000481							
Adjusted R Square	0.618036246							
Standard Error	0.126424696							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	3	0.849659659	0.283219886	17.71984445	1.20754E-06			
Residual	28	0.447529708	0.015983204					
Total	31	1.297189367						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1.372150611	0.4735632	2.897502615	0.007226922	0.402100369	2.34220085	0.40210037	2.34220085
Strength of Schedule	-2.323944934	0.952324823	-2.440286001	0.021260772	-4.274693903	-0.373196	-4.2746939	-0.373196
Fraction of Salary Cap	0.371359801	0.563993355	0.658447121	0.51562901	-0.783928216	1.52664782	-0.7839282	1.52664782
Interconference WP	0.52549722	0.080017571	6.567272818	4.03374E-07	0.361588656	0.68940578	0.36158866	0.68940578

Figure 6: Regression Output for 2011 Season, reflecting Fraction of Salary Cap, Interconference Winning Percentage, and Strength of Schedule

Figure 6 represents the output for the fourth regression of the 2011 NFL season, where the relationship between the two key variables is exhibited, with the addition of Strength of Schedule and Interconference Winning Percentage as control variables. After utilizing all the variables under consideration, the R Squared value is 0.655, which indicates that 65.5% of the variance in winning percentage could be explained by explained by fraction of salary cap space, interconference winning percentage, and strength of schedule. In this case, the *Significance* F value could be interpreted as being statistically significant, as the value is lower than the appropriate values at the 95% and 99% confidence levels, respectively. Once again, the coefficients in this regression vary, as strength of schedule is a negative value, which would indicate a negative correlation between it and winning percentage. On the other hand, interconference winning percentage is negative, which would suggest a negative relationship between it and the dependent variable. The fraction of salary cap space allocated to a team's starting quarterback is once again positive, which suggests a positive correlation between it and the dependent variable of winning percentage. Both strength of schedule and interconference winning percentage appear to be statistically significant, as their respective p-values are well below the threshold of 0.05. On the other hand, the P-value for fraction of salary would once again suggest that there is no statistical significance to the investigation, as it easily surpasses the threshold of 0.05. This finding was fairly consistent across the remaining nine seasons under consideration.

Part 2: Utilizing aggregated data

SUMMARY OUTPUT		Fraction						
Regression Statistics								
Multiple R	0.161987571							
R Square	0.026239973							
Adjusted R Square	0.023177835							
Standard Error	0.192875979							
Observations	320							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	0.318782779	0.318782779	8.569166163	0.00366555			
Residual	318	11.8299636	0.037201143					
Total	319	12.14874637						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.451790009	0.019805748	22.8110555	6.52946E-69	0.41282315	0.49075687	0.41282315	0.49075687
Fraction of Salary Cap	0.675412988	0.230727907	2.927313814	0.003665546	0.22146692	1.12935906	0.22146692	1.12935906

Figure 7: Regression Output for all ten seasons, reflecting Fraction of Salary Cap

Figure 7 represents the output for the first regression of the aggregated data, where the relationship between the two key variables is exhibited. In this case, there does not appear to be a strong correlation, as the R Square value of 0.026 indicates that the fraction of salary cap space only accounts for 2.6% of the variation present for winning percentage. The *Significance* F value could be interpreted as being statistically significant, as the value is lower than the appropriate value at the 95% confidence level. As the coefficient value for salary cap space is positive, this is indicative of a positive relationship between the two variables. This would suggest that my null hypothesis should not be rejected, due to a lack of statistical support. The statistical significance of the investigation is strengthened by the P-value of 0.004, which is below the threshold of 0.05.

SUMMARY OUTPUT	Fraction and IWP							
Regression Statistics								
Multiple R	0.701721695							
R Square	0.492413337							
Adjusted R Square	0.489210897							
Standard Error	0.139473341							
Observations	320							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	5.982204737	2.991102368	153.7619474	2.1056E-47			
Residual	317	6.166541637	0.019452813					
Total	319	12.14874637						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.244362724	0.018785818	13.0078301	2.72248E-31	0.20740209	0.28132336	0.20740209	0.28132336
Fraction of Salary Cap	0.238284369	0.168800421	1.411633737	0.159038612	-0.0938264	0.57039509	-0.0938264	0.57039509
Interconference WP	0.480056134	0.028134796	17.06271973	9.18934E-47	0.42470161	0.53541066	0.42470161	0.53541066

Figure 8: Regression Output for all 10 seasons, reflecting Fraction of Salary Cap and Interconference Winning Percentage

Figure 8 represents the output for the second regression of the aggregated data, where the relationship between the two key variables is exhibited, with the addition of Interconference Winning Percentage as a control variable. Fraction of salary cap space and interconference winning percentage combine to explain 49.2% of the variation in winning percentage, due to a R Square value of 0.492. The *Significance* F value could be interpreted as being statistically significant, as the value is considerably lower than the appropriate values at the 95% and 99% confidence levels, respectively. Both salary cap space and interconference winning percentage are shown to be positive coefficients, which indicates a positive correlation between both variables and the dependent variable. Interconference winning percentage by itself is shown to be a statistically significant value, as its P-value falls well below the threshold of 0.05. On the other hand, fraction of salary cap space may not be statistically significant, as its P-value is greater than 0.05.

SUMMARY OUTPUT	**Fraction and SOS**							
Regression Statistics								
Multiple R	0.166563657							
R Square	0.027743452							
Adjusted R Square	0.021609341							
Standard Error	0.193030769							
Observations	320							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.337048162	0.168524081	4.52281566	0.01156828			
Residual	317	11.81169821	0.037260878					
Total	319	12.14874637						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.56464178	0.162397697	3.476907553	0.000578028	0.24512826	0.8841553	0.24512826	0.8841553
Strength of Schedule	-0.225581758	0.322193021	-0.700144769	0.484350408	-0.8594887	0.40832517	-0.8594887	0.40832517
Fraction of Salary Cap	0.674675024	0.230915479	2.921740139	0.003730806	0.22035444	1.12899561	0.22035444	1.12899561

Figure 9: Regression Output for all ten seasons, reflecting Fraction of Salary Cap and Strength of Schedule

Figure 9 represents the output for the third regression of the aggregated data, where the relationship between the two key variables is exhibited, with the addition of Strength of Schedule as a control variable. Fraction of salary cap space and strength of schedule combine to explain only 2.8% of the variation in winning percentage, due to the R Square value of 0.028. The *Significance* F value could be interpreted as being statistically insignificant in this case, due to the value being considerably higher than the appropriate values at the 95% and 99% confidence levels, respectively. Strength of schedule is shown to be a negative coefficient, which indicates a negative correlation between it and winning percentage. On the other hand, fraction of salary cap space is once again positive, showing that it has a positive relationship with winning percentage. Strength of schedule is shown to be statistically insignificant to the investigation, as its P-value is well above the threshold of 0.05. On the other hand, fraction of salary cap space is statistically significant, as it has a P-value of 0.004.

SUMMARY OUTPUT	All 3 variables							
Regression Statistics								
Multiple R	0.701721807							
R Square	0.492413494							
Adjusted R Square	0.487594635							
Standard Error	0.13969383							
Observations	320							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	3	5.982206653	1.994068884	102.1846604	2.9578E-46			
Residual	316	6.166539722	0.019514366					
Total	319	12.14874637						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.243198125	0.119034974	2.04308127	0.041873671	0.00899687	0.47739938	0.00899687	0.47739938
Strength of Schedule	0.002314084	0.233551532	0.009908236	0.992100753	-0.4571984	0.46182661	-0.4571984	0.46182661
Fraction of Salary Cap	0.238277329	0.169068766	1.409351561	0.159714573	-0.0943654	0.57092004	-0.0943654	0.57092004
Interconference WP	0.480072179	0.028225763	17.00829753	1.62856E-46	0.424538	0.53560635	0.424538	0.53560635

Figure 10: Regression Output for all ten seasons, reflecting Fraction of Salary Cap, Interconference Winning Percentage, and Strength of Schedule

Figure 10 represents the output for the fourth regression of the aggregated data, where the relationship between the two key variables is exhibited, with the addition of Strength of Schedule and Interconference Winning Percentage as control variables. Fraction of salary cap space, strength of schedule and interconference winning percentage combine to explain 49.2% of the variation in winning percentage, due to the R Square value of 0.492. The *Significance* F value for all 3 variables could be interpreted as being statistically significant in this case, as the value is significantly lower than the appropriate values at the 95% and 99% confidence levels, respectively. All 3 variables are shown to be positive coefficients in this instance, which would indicate a positive correlation between them and winning percentage. Interconference winning percentage by itself is shown to be statistically significant to the investigation, as its P-value falls below the 0.05 threshold, which contrasts with strength of schedule, due to its P-value being greater than 0.05. Yet again, fraction of salary cap space is shown to be statistically insignificant, as its P-value of 0.16 easily surpasses 0.05.

Conclusion

This paper attempted to examine the potential correlations between a NFL team's winning percentage and the amount of salary cap space allocated to their quarterback, which has become a topic of public discussion recently due to the astronomical rise in quarterback contracts over the past few years. Due to the increased availability of information surrounding salary cap mechanics and contract figures in the NFL, it has become easier for individuals to utilize theories from subject areas such as economics to figure out if they can determine an ideal answer to the question being considered.

With that being said, it was disappointing that the investigation undertaken in this paper was unable to determine a true correlation between the two main variables under consideration. Utilizing separate regressions for each of the ten seasons showed that there may be some uniformity amongst the NFL's usual happenings, but at the same time, there is no doubt that specific seasons could be seen as outliers. Hence, it was interesting to see the results produced by the aggregated data, as it proved that there can be statistical significance to the relationship between winning percentage and the fraction of salary cap space dedicated to a team's starting quarterback. However, I believed that there would be a negative correlation, and the aggregated data appeared to produce results that indicated a positive correlation between these two crucial variables. Even though the hypothesis at the crux of my argument was voided by the resulting regression data, it may be fair to say that it proves that there are multiple variables that have the ability to impact an NFL team's capacity to achieve sustained success. As covered by the researchers mentioned in this paper, this could include the ability to recruit and maintain talented individuals in the team's front office and coaching staffs. Running these two units efficiently would enable NFL teams to constantly infuse their rosters with young talent as the years go on.

However, it is clear that my work on this subject matter was also very limited. I did not have the requisite experience or credentials to undertake a project of a grander scale with econometrics or regression analyses that could have done a better job of figuring out the crucial components of the data I utilized. Furthermore, without being able to consider more mathematically complex variables, it is hard to definitively say that my analysis is not flawed in certain aspects because I took the data at face value.

Future investigations on this topic will certainly be quite interesting, as the NFL salary cap expands due to expected revenue from their new television and gambling partner deals. As approaches to NFL team building evolve, there is no doubt that economic investigations will evolve to better explain how and why variables behave in certain manners!

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Appendix A Table 1: Data from the 2012 NFL Season

Team	Team WP	Strength of Schedule	Fraction of Salary Cap	Interconference WP
ARI	0.313	0.559	0.003	0.5
ATL	0.813	0.422	0.112	1
BAL	0.625	0.496	0.066	0.5
BUF	0.375	0.48	0.05	0.25
CAR	0.438	0.516	0.042	0.5
CHI	0.625	0.512	0.08	0.75
CIN	0.625	0.438	0.01	0.75
CLE	0.313	0.508	0.012	0
DAL	0.5	0.523	0.067	0.75
DEN	0.813	0.457	0.149	0.75
DET	0.25	0.566	0.074	0.25
GB	0.688	0.508	0.07	0.75
HOU	0.75	0.496	0.097	0.5
IND	0.688	0.441	0.033	0.75
JAX	0.125	0.539	0.023	0
KC	0.125	0.516	0.063	0.5
LV/OAK	0.25	0.469	0.026	0
LAC/SD	0.438	0.457	0.127	0
LAR/STL	0.469	0.539	0.129	0.25
MIA	0.438	0.5	0.019	0.5
MIN	0.625	0.52	0.019	0.75
NE	0.75	0.496	0.066	0.25
NO	0.438	0.521	0.086	0.5
NYG	0.563	0.521	0.08	0.25
NYJ	0.375	0.512	0.065	0.5
PHI	0.25	0.508	0.115	0.5
PIT	0.5	0.465	0.074	0.75
SF	0.719	0.504	0.077	1
SEA	0.688	0.504	0.005	0.75
TB	0.438	0.502	0.066	0.75
TEN	0.375	0.512	0.024	0.25
WAS	0.625	0.494	0.032	0.5

Appendix A Table 2: Data from the 2013 NFL Season

Team	Team WP	Strength of Schedule	Fraction of Salary Cap	Interconference WP
ARI	0.625	0.52	0.032	1
ATL	0.25	0.504	0.078	0.25
BAL	0.5	0.535	0.055	0.5
BUF	0.375	0.473	0.012	0.25
CAR	0.75	0.543	0.048	0.75
CHI	0.5	0.502	0.081	1
CIN	0.688	0.508	0.011	0.75
CLE	0.25	0.492	0.013	0.25
DAL	0.5	0.475	0.099	0.25
DEN	0.813	0.43	0.125	1
DET	0.438	0.539	0.147	0.25
GB	0.531	0.533	0.091	0.5
HOU	0.125	0.472	0.086	0
IND	0.688	0.461	0.04	0.5
JAX	0.25	0.508	0.022	0
KC	0.688	0.473	0.062	1
LV/OAK	0.25	0.469	0.006	0
LAC/SD	0.563	0.457	0.112	0.25
LAR/STL	0.438	0.539	0.103	0.75
MIA	0.5	0.52	0.022	0.25
MIN	0.344	0.516	0.021	0.25
NE	0.75	0.508	0.108	0.75
NO	0.688	0.539	0.14	0.5
NYG	0.438	0.48	0.169	0.25
NYJ	0.5	0.496	0.103	0.75
PHI	0.625	0.496	0.084	0.25
PIT	0.5	0.492	0.109	0.5
SF	0.75	0.52	0.011	0.75
SEA	0.813	0.516	0.005	0.75
TB	0.25	0.5	0.004	0.5
TEN	0.438	0.488	0.025	0.25
WAS	0.188	0.498	0.044	0.5

Appendix A Table 3: Data from the 2014 NFL Season

Team	Team WP	Strength of Schedule	Fraction of Salary Cap	Interconference WP
ARI	0.688	0.547	0.094	0.75
ATL	0.375	0.512	0.129	0
BAL	0.625	0.461	0.113	1
BUF	0.563	0.5	0.013	1
CAR	0.469	0.473	0.051	0.375
CHI	0.313	0.496	0.139	0.25
CIN	0.656	0.469	0.065	0.875
CLE	0.438	0.465	0.008	0.75
DAL	0.75	0.488	0.088	1
DEN	0.75	0.57	0.123	0.5
DET	0.688	0.492	0.12	0.5
GB	0.75	0.504	0.124	0.75
HOU	0.563	0.441	0.025	0.25
IND	0.688	0.43	0.046	0.5
JAX	0.188	0.453	0.026	0.25
KC	0.563	0.559	0.034	0.5
LV/OAK	0.188	0.578	0.007	0.25
LAC/SD	0.563	0.563	0.123	0.75
LAR/STL	0.375	0.564	0.133	0.5
MIA	0.5	0.508	0.023	0.5
MIN	0.438	0.477	0.024	0.25
NE	0.75	0.516	0.106	0.75
NO	0.438	0.469	0.138	0.25
NYG	0.375	0.465	0.154	0.5
NYJ	0.25	0.52	0.009	0
PHI	0.625	0.479	0.005	1
PIT	0.688	0.469	0.142	0.5
SF	0.5	0.563	0.028	0.25
SEA	0.75	0.561	0.006	0.5
TB	0.125	0.484	0.005	0.25
TEN	0.125	0.438	0.029	0
WAS	0.25	0.49	0.044	0.5

Appendix A Table 4: Data from the 2015 NFL Season

Team	Team WP	Strength of Schedule	Fraction of Salary Cap	Interconference WP
ARI	0.813	0.557	0.05	0.75
ATL	0.5	0.41	0.134	0.75
BAL	0.313	0.539	0.101	0.25
BUF	0.5	0.486	0.006	0.25
CAR	0.938	0.434	0.087	1
CHI	0.375	0.531	0.114	0.75
CIN	0.75	0.563	0.063	0.75
CLE	0.188	0.543	0.012	0.25
DAL	0.25	0.467	0.101	0.25
DEN	0.75	0.541	0.117	1
DET	0.438	0.527	0.123	0.25
GB	0.625	0.529	0.121	0.75
HOU	0.563	0.418	0.036	0.5
IND	0.5	0.416	0.047	0.5
JAX	0.313	0.463	0.028	0
KC	0.688	0.545	0.108	0.25
LV/OAK	0.438	0.545	0.008	0
LAC/SD	0.25	0.518	0.149	0.25
LAR/STL	0.438	0.553	0.028	0.25
MIA	0.375	0.492	0.032	0.5
MIN	0.688	0.539	0.01	0.75
NE	0.75	0.477	0.098	0.75
NO	0.438	0.43	0.164	0.5
NYG	0.375	0.479	0.101	0.5
NYJ	0.625	0.488	0.009	0.75
PHI	0.438	0.475	0.081	0.75
PIT	0.625	0.578	0.12	0.75
SF	0.313	0.561	0.102	0.25
SEA	0.625	0.559	0.047	0.25
TB	0.375	0.426	0.032	0.25
TEN	0.188	0.436	0.029	0.5
WAS	0.563	0.479	0.005	0.25

Appendix A Table 5: Data from the 2016 NFL Season

Team	Team WP	Strength of Schedule	Fraction of Salary Cap	Interconference WP
ARI	0.469	0.531	0.115	0.25
ATL	0.688	0.555	0.15	0.5
BAL	0.5	0.484	0.147	0.25
BUF	0.438	0.52	0.044	0.75
CAR	0.375	0.512	0.127	0.25
CHI	0.188	0.461	0.108	0
CIN	0.406	0.465	0.08	0.375
CLE	0.063	0.48	0.028	0
DAL	0.813	0.465	0.132	1
DEN	0.625	0.504	0.003	0.75
DET	0.563	0.465	0.144	0.5
GB	0.625	0.457	0.118	0.5
HOU	0.563	0.484	0.077	0.5
IND	0.5	0.477	0.114	0.75
JAX	0.188	0.473	0.03	0.25
KC	0.75	0.496	0.113	0.75
LV/OAK	0.75	0.5	0.009	0.75
LAC/SD	0.313	0.508	0.105	0.25
LAR/STL	0.25	0.551	0.023	0.25
MIA	0.625	0.516	0.071	0.75
MIN	0.5	0.488	0.045	0.75
NE	0.875	0.523	0.086	0.75
NO	0.438	0.547	0.111	0.25
NYG	0.688	0.461	0.148	0.75
NYJ	0.313	0.531	0.044	0.25
PHI	0.438	0.469	0.03	0.5
PIT	0.688	0.473	0.153	0.5
SF	0.125	0.555	0.114	0
SEA	0.656	0.543	0.12	1
TB	0.563	0.543	0.036	0.5
TEN	0.563	0.473	0.031	0.75
WAS	0.531	0.492	0.123	0.625

Appendix A Table 6: Data from the 2017 NFL Season

Team	Team WP	Strength of Schedule	Fraction of Salary Cap	Interconference WP
ARI	0.5	0.467	0.14	0.75
ATL	0.625	0.521	0.141	0.25
BAL	0.563	0.461	0.15	0.5
BUF	0.563	0.561	0.058	0.5
CAR	0.688	0.504	0.112	1
CHI	0.313	0.479	0.081	1
CIN	0.438	0.449	0.091	0.25
CLE	0	0.469	0.004	0
DAL	0.563	0.531	0.004	0.5
DEN	0.313	0.578	0.004	0.25
DET	0.563	0.469	0.098	0.25
GB	0.438	0.48	0.116	0.5
HOU	0.25	0.455	0.015	0.25
IND	0.25	0.424	0.111	0.25
JAX	0.625	0.439	0.032	0.25
KC	0.625	0.576	0.099	0.5
LV/OAK	0.375	0.564	0.09	0.25
LAC/SD	0.563	0.568	0.11	0.75
LAR/STL	0.688	0.482	0.039	1
MIA	0.375	0.547	0.118	0.25
MIN	0.813	0.453	0.106	0.75
NE	0.813	0.527	0.083	0.75
NO	0.688	0.51	0.116	0.75
NYG	0.188	0.535	0.117	0.5
NYJ	0.313	0.535	0.039	0
PHI	0.813	0.531	0.034	0.75
PIT	0.813	0.453	0.108	0.75
SF	0.375	0.475	0.002	0.75
SEA	0.563	0.455	0.086	0.5
TB	0.313	0.518	0.04	0.5
TEN	0.563	0.439	0.035	0.25
WAS	0.438	0.543	0.135	0.5

Appendix A Table 7: Data from the 2018 NFL Season

Team	Team WP	Strength of Schedule	Fraction of Salary Cap	Interconference WP
ARI	0.188	0.52	0.018	0
ATL	0.438	0.508	0.1	0
BAL	0.625	0.488	0.141	0.5
BUF	0.375	0.496	0.02	0.5
CAR	0.438	0.512	0.117	0.5
CHI	0.75	0.52	0.036	0.5
CIN	0.375	0.473	0.086	0.5
CLE	0.469	0.523	0.066	0.5
DAL	0.625	0.5	0.004	0.25
DEN	0.375	0.477	0.079	0.5
DET	0.375	0.535	0.146	0.5
GB	0.406	0.539	0.113	0.75
HOU	0.688	0.453	0.016	0.5
IND	0.625	0.484	0.126	0.75
JAX	0.313	0.477	0.047	0.25
KC	0.75	0.492	0.021	0.5
LV/OAK	0.25	0.473	0.137	0.25
LAC/SD	0.75	0.48	0.123	0.75
LAR/STL	0.813	0.523	0.042	1
MIA	0.438	0.5	0.049	0.25
MIN	0.531	0.52	0.126	0.5
NE	0.688	0.484	0.122	0.75
NO	0.813	0.535	0.134	1
NYG	0.313	0.52	0.125	0.25
NYJ	0.25	0.477	0.028	0.25
PHI	0.563	0.492	0.041	0.75
PIT	0.594	0.477	0.128	0.75
SF	0.25	0.5	0.156	0.5
SEA	0.625	0.523	0.134	0.5
TB	0.313	0.531	0.041	0.25
TEN	0.563	0.465	0.037	1
WAS	0.438	0.504	0.103	0.25

Appendix A Table 8: Data from the 2019 NFL Season

Team	Team WP	Strength of Schedule	Fraction of Salary Cap	Interconference WP
ARI	0.344	0.508	0.033	0.5
ATL	0.438	0.518	0.084	0.25
BAL	0.875	0.496	0.011	1
BUF	0.625	0.48	0.024	0.75
CAR	0.313	0.502	0.121	0.75
CHI	0.5	0.52	0.041	0.25
CIN	0.125	0.473	0.083	0
CLE	0.375	0.484	0.03	0
DAL	0.5	0.504	0.011	0.25
DEN	0.438	0.537	0.025	0.25
DET	0.219	0.496	0.158	0.25
GB	0.813	0.504	0.149	0.75
HOU	0.625	0.527	0.018	0.5
IND	0.438	0.518	0.036	0.5
JAX	0.375	0.531	0.06	0
KC	0.75	0.52	0.024	0.75
LV/OAK	0.438	0.539	0.116	0.5
LAC/SD	0.313	0.502	0.123	0.5
LAR/STL	0.563	0.473	0.056	0.5
MIA	0.313	0.5	0.028	0.25
MIN	0.625	0.512	0.151	0.75
NE	0.75	0.473	0.109	1
NO	0.813	0.488	0.119	1
NYG	0.25	0.473	0.119	0.25
NYJ	0.438	0.473	0.034	0.75
PHI	0.563	0.477	0.042	0.5
PIT	0.5	0.496	0.127	0.5
SF	0.813	0.51	0.086	0.75
SEA	0.688	0.479	0.138	0.75
TB	0.438	0.508	0.108	0.5
TEN	0.563	0.514	0.01	0.5
WAS	0.188	0.469	0.104	0.25

Appendix A Table 9: Data from the 2020 NFL Season

Team	Team WP	Strength of Schedule	Fraction of Salary Cap	Interconference WP
ARI	0.5	0.518	0.041	0.5
ATL	0.25	0.525	0.094	0.5
BAL	0.688	0.438	0.013	1
BUF	0.813	0.525	0.027	0.75
CAR	0.313	0.5	0.067	0.25
CHI	0.5	0.509	0.043	0.5
CIN	0.281	0.477	0.032	0.125
CLE	0.688	0.461	0.039	1
DAL	0.375	0.459	0.144	0.25
DEN	0.313	0.512	0.007	0.25
DET	0.313	0.525	0.099	0.25
GB	0.813	0.504	0.106	0.75
HOU	0.25	0.518	0.045	0.25
IND	0.688	0.502	0.104	1
JAX	0.063	0.494	0.003	0
KC	0.875	0.5	0.024	1
LV/OAK	0.5	0.496	0.098	0.5
LAC/SD	0.438	0.492	0.024	0.25
LAR/STL	0.625	0.516	0.141	0.25
MIA	0.625	0.529	0.037	0.75
MIN	0.438	0.516	0.106	0.5
NE	0.438	0.537	0.008	0.25
NO	0.75	0.49	0.119	0.5
NYG	0.375	0.482	0.03	0.25
NYJ	0.125	0.533	0.04	0.25
PHI	0.281	0.486	0.084	0.125
PIT	0.75	0.457	0.118	0.75
SF	0.375	0.527	0.129	0.5
SEA	0.75	0.509	0.155	0.75
TB	0.688	0.502	0.122	0.75
TEN	0.688	0.498	0.102	0.75
WAS	0.438	0.465	0.097	0.5

Appendix B Table 1: Regressions from the 2012 NFL Season

SUMMARY OUTPUT	**Fraction**							
Regression Statistics								
Multiple R	0.25205292							
R Square	0.063530674							
Adjusted R Square	0.03231503							
Standard Error	0.190516497							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	0.073871402	0.073871402	2.035219075	0.164017119			
Residual	30	1.088896067	0.036296536					
Total	31	1.162767469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.423278569	0.063584133	6.656984159	2.25883E-07	0.293422445	0.55313469	0.29342244	0.55313469
Fraction of Salary Cap	1.255525644	0.880075651	1.426611045	0.164017119	-0.541828617	3.0528799	-0.5418286	3.0528799

SUMMARY OUTPUT	**Fraction and IWP**							
Regression Statistics								
Multiple R	0.645699025							
R Square	0.41692723							
Adjusted R Square	0.376715315							
Standard Error	0.152900469							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.48478942	0.24239471	10.36825102	0.000400848			
Residual	29	0.677978048	0.023378553					
Total	31	1.162767469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.239578059	0.067260494	3.561943179	0.001294866	0.102014902	0.37714122	0.1020149	0.37714122
Fraction of Salary Cap	0.924730531	0.710704882	1.3011456	0.203451988	-0.528824162	2.37828522	-0.5288242	2.37828522
Interconference WP	0.407944096	0.097304265	4.19245853	0.000236685	0.208934529	0.60695366	0.20893453	0.60695366

SUMMARY OUTPUT	**Fraction and SOS**							
Regression Statistics								
Multiple R	0.519508895							
R Square	0.269889492							
Adjusted R Square	0.219537043							
Standard Error	0.171096741							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.313818722	0.156909361	5.360007278	0.010450443			
Residual	29	0.848948747	0.029274095					
Total	31	1.162767469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1.800930642	0.484573774	3.716525201	0.000858737	0.809865996	2.79199529	0.809866	2.79199529
Strength of Schedule	-2.70841022	0.94601545	-2.862966161	0.007717375	-4.643229059	-0.7735914	-4.6432291	-0.7735914
Fraction of Salary Cap	0.874294436	0.80150638	1.09081407	0.28433534	-0.764970171	2.51355904	-0.7649702	2.51355904

SUMMARY OUTPUT	**All 3 variables**							
Regression Statistics								
Multiple R	0.712239497							
R Square	0.507285102							
Adjusted R Square	0.45449422							
Standard Error	0.143042558							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	3	0.589854613	0.196618204	9.609331811	0.000158235			
Residual	28	0.572912855	0.020461173					
Total	31	1.162767469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1.215682836	0.435328574	2.792563845	0.009320542	0.323952676	2.107413	0.32395268	2.107413
Strength of Schedule	-1.86602896	0.8234822	-2.266022217	0.031373095	-3.552855779	-0.1792021	-3.5528558	-0.1792021
Fraction of Salary Cap	0.710575786	0.671566839	1.058086471	0.299059378	-0.665066522	2.0862181	-0.6650665	2.0862181
Interconference WP	0.348127469	0.09478089	3.672971087	0.001002466	0.153977617	0.54227732	0.15397762	0.54227732

Appendix B Table 2: Regressions from the 2013 NFL Season

SUMMARY OUTPUT	**Fraction**							
Regression Statistics								
Multiple R	0.156613381							
R Square	0.024527751							
Adjusted R Square	-0.007987991							
Standard Error	0.194780211							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	0.028618952	0.028618952	0.754334662	0.392002601			
Residual	30	1.138179923	0.037939331					
Total	31	1.166798875						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.459052083	0.05855598	7.839542258	9.50914E-09	0.339464817	0.57863935	0.33946482	0.57863935
Fraction of Salary Cap	0.636524835	0.732880761	0.868524417	0.392002601	-0.860217356	2.13326703	-0.8602174	2.13326703

SUMMARY OUTPUT	**Fraction and IWP**							
Regression Statistics								
Multiple R	0.689192012							
R Square	0.474985629							
Adjusted R Square	0.438777741							
Standard Error	0.145339813							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.554212698	0.277106349	13.11829161	8.75956E-05			
Residual	29	0.612586177	0.021123661					
Total	31	1.166798875						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.261910518	0.058915623	4.445518955	0.000118021	0.14141454	0.3824065	0.14141454	0.3824065
Fraction of Salary Cap	0.472190385	0.547847601	0.861900981	0.395813291	-0.648283769	1.59266454	-0.6482838	1.59266454
Interconference WP	0.428927337	0.085989065	4.988161392	2.6215E-05	0.253059951	0.60479472	0.25305995	0.60479472

SUMMARY OUTPUT	**Fraction and SOS**							
Regression Statistics								
Multiple R	0.180890355							
R Square	0.03272132							
Adjusted R Square	-0.033987554							
Standard Error	0.197276253							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.0381792	0.0190896	0.490509257	0.617303049			
Residual	29	1.128619675	0.03891792					
Total	31	1.166798875						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.137949982	0.650572143	0.212044096	0.833555936	-1.192619449	1.46851941	-1.1926194	1.46851941
Strength of Schedule	0.639439867	1.290149234	0.495632482	0.623888959	-1.999211588	3.27809132	-1.9992116	3.27809132
Fraction of Salary Cap	0.657293923	0.743454263	0.884108083	0.383909221	-0.863240773	2.17782862	-0.8632408	2.17782862

SUMMARY OUTPUT	**All 3 variables**							
Regression Statistics								
Multiple R	0.689204059							
R Square	0.475002236							
Adjusted R Square	0.418752475							
Standard Error	0.14791006							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	3	0.554232074	0.184744025	8.444520146	0.000373817			
Residual	28	0.612566801	0.021877386					
Total	31	1.166798875						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.276341759	0.488605263	0.565572621	0.576188938	-0.72452075	1.27720427	-0.7245208	1.27720427
Strength of Schedule	-0.02907744	0.977048029	-0.029760502	0.976469177	-2.0304696	1.97231472	-2.0304696	1.97231472
Fraction of Salary Cap	0.471103961	0.558729806	0.843169554	0.406279165	-0.673402163	1.61561009	-0.6734022	1.61561009
Interconference WP	0.429297929	0.088391276	4.856790701	4.10263E-05	0.248236607	0.61035925	0.24823661	0.61035925

Appendix B Table 3: Regressions from the 2014 NFL Season

SUMMARY OUTPUT	**Fraction**							
Regression Statistics								
Multiple R	0.301266314							
R Square	0.090761392							
Adjusted R Square	0.060453439							
Standard Error	0.192338857							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	0.110784396	0.110784396	2.994639407	0.093816432			
Residual	30	1.109827073	0.036994236					
Total	31	1.220611469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.423116038	0.056046645	7.549355298	2.03834E-08	0.308653519	0.53757856	0.30865352	0.53757856
Fraction of Salary Cap	1.134906517	0.65582478	1.730502646	0.093816432	-0.204466368	2.4742794	-0.2044664	2.4742794

SUMMARY OUTPUT	**Fraction and IWP**							
Regression Statistics								
Multiple R	0.696430171							
R Square	0.485014983							
Adjusted R Square	0.449498775							
Standard Error	0.14722685							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.59201485	0.296007425	13.65615894	6.62249E-05			
Residual	29	0.628596618	0.021675745					
Total	31	1.220611469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.231141089	0.059165209	3.906706189	0.000515102	0.110134649	0.35214753	0.11013465	0.35214753
Fraction of Salary Cap	0.840388329	0.505881182	1.66123659	0.107440849	-0.194254859	1.87503152	-0.1942549	1.87503152
Interconference WP	0.423967558	0.0899794	4.711829105	5.64764E-05	0.239939021	0.60799609	0.23993902	0.60799609

SUMMARY OUTPUT	**Fraction and SOS**							
Regression Statistics								
Multiple R	0.32084496							
R Square	0.102941488							
Adjusted R Square	0.041075384							
Standard Error	0.194312218							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.125651561	0.062825781	1.663940048	0.206967038			
Residual	29	1.094959907	0.037757238					
Total	31	1.220611469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.16865154	0.409454762	0.411892976	0.683446571	-0.668777476	1.00608056	-0.6687775	1.00608056
Strength of Schedule	0.512191367	0.816240764	0.627500352	0.535241371	-1.157208439	2.18159117	-1.1572084	2.18159117
Fraction of Salary Cap	1.109954034	0.663745648	1.672258096	0.105230282	-0.24755824	2.46746631	-0.2475582	2.46746631

SUMMARY OUTPUT	**All 3 variables**							
Regression Statistics								
Multiple R	0.704786063							
R Square	0.496723394							
Adjusted R Square	0.442800901							
Standard Error	0.148119787							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	3	0.606306272	0.202102091	9.211803129	0.000210982			
Residual	28	0.614305197	0.021939471					
Total	31	1.220611469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.018235316	0.31466158	-0.057952153	0.95419835	-0.662790344	0.62631971	-0.6627903	0.62631971
Strength of Schedule	0.502178887	0.622205458	0.807094957	0.426414884	-0.772351216	1.77670899	-0.7723512	1.77670899
Fraction of Salary Cap	0.816098119	0.509838428	1.600699504	0.120667425	-0.228258559	1.8604548	-0.2282586	1.8604548
Interconference WP	0.423716369	0.090525664	4.68062149	6.6393E-05	0.238282952	0.60914979	0.23828295	0.60914979

Appendix B Table 4: Regressions from the 2015 NFL Season

SUMMARY OUTPUT	**Fraction**							
Regression Statistics								
Multiple R	0.021778465							
R Square	0.000474302							
Adjusted R Square	-0.032843222							
Standard Error	0.193581897							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	0.000533472	0.000533472	0.014235798	0.905822111			
Residual	30	1.124218528	0.037473951					
Total	31	1.124752						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.494135751	0.061620773	8.018980089	5.96543E-09	0.368289344	0.61998216	0.36828934	0.61998216
Fraction of Salary Cap	0.08645867	0.724632216	0.119313865	0.905822111	-1.393437744	1.56635509	-1.3934377	1.56635509

SUMMARY OUTPUT	**Fraction and IWP**							
Regression Statistics								
Multiple R	0.652280717							
R Square	0.425470133							
Adjusted R Square	0.385847384							
Standard Error	0.149274523							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.478548384	0.239274192	10.7380265	0.000323618			
Residual	29	0.646203616	0.022282883					
Total	31	1.124752						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.3210442	0.060452351	5.310698362	1.06972E-05	0.197405261	0.44468314	0.19740526	0.44468314
Fraction of Salary Cap	-0.673901694	0.582393733	-1.157123876	0.256664299	-1.86503062	0.51722723	-1.8650306	0.51722723
Interconference WP	0.468362911	0.101122423	4.631642488	7.05359E-05	0.261544334	0.67518149	0.26154433	0.67518149

SUMMARY OUTPUT	**Fraction and SOS**							
Regression Statistics								
Multiple R	0.143565375							
R Square	0.020611017							
Adjusted R Square	-0.046933051							
Standard Error	0.194897826							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.023182282	0.011591141	0.30514918	0.739350906			
Residual	29	1.101569718	0.037985163					
Total	31	1.124752						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.233108109	0.343687913	0.678255186	0.502986515	-0.469812598	0.93602882	-0.4698126	0.93602882
Strength of Schedule	0.524580546	0.679354527	0.772174947	0.446258345	-0.864855469	1.91401656	-0.8648555	1.91401656
Fraction of Salary Cap	0.067677177	0.729963452	0.092713103	0.926769026	-1.425265712	1.56062007	-1.4252657	1.56062007

SUMMARY OUTPUT	**All 3 variables**							
Regression Statistics								
Multiple R	0.681033774							
R Square	0.463807001							
Adjusted R Square	0.406357751							
Standard Error	0.146760756							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	3	0.521667852	0.173889284	8.073334327	0.000497092			
Residual	28	0.603084148	0.02153872					
Total	31	1.124752						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.044586884	0.265160955	-0.16815026	0.867673781	-0.587744478	0.49857071	-0.5877445	0.49857071
Strength of Schedule	0.72623854	0.513277862	1.414903299	0.168122554	-0.325163498	1.77764058	-0.3251635	1.77764058
Fraction of Salary Cap	-0.718615766	0.573457716	-1.25312773	0.220523242	-1.893290648	0.45605912	-1.8932906	0.45605912
Interconference WP	0.47988943	0.099752739	4.8107895	4.65239E-05	0.275555207	0.68422365	0.27555521	0.68422365

Appendix B Table 5: Regressions from the 2016 NFL Season

SUMMARY OUTPUT	**Fraction**							
Regression Statistics								
Multiple R	0.263206841							
R Square	0.069277841							
Adjusted R Square	0.038253769							
Standard Error	0.197178112							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	0.086818636	0.086818636	2.233035093	0.145533215			
Residual	30	1.166376239	0.038879208					
Total	31	1.253194875						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.404734297	0.073945845	5.473387908	6.12106E-06	0.253716733	0.55575186	0.25371673	0.55575186
Fraction of Salary Cap	1.122167151	0.750947848	1.494334331	0.145533215	-0.411472956	2.65580726	-0.411473	2.65580726

SUMMARY OUTPUT	**Fraction and IWP**							
Regression Statistics								
Multiple R	0.865994164							
R Square	0.749945892							
Adjusted R Square	0.732700781							
Standard Error	0.103950672							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.939828348	0.469914174	43.48744959	1.8685E-09			
Residual	29	0.313366527	0.010805742					
Total	31	1.253194875						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.104683309	0.051577245	2.02964135	0.051657676	-0.000804001	0.21017062	-0.000804	0.21017062
Fraction of Salary Cap	1.149155204	0.395905157	2.902602262	0.007001328	0.339438242	1.95887217	0.33943824	1.95887217
Interconference WP	0.595414487	0.067014644	8.884841501	8.98525E-10	0.458354152	0.73247482	0.45835415	0.73247482

SUMMARY OUTPUT	**Fraction and SOS**							
Regression Statistics								
Multiple R	0.27017797							
R Square	0.072996135							
Adjusted R Square	0.009064834							
Standard Error	0.200147919							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.091478383	0.045739191	1.141790238	0.333182665			
Residual	29	1.161716492	0.040059189					
Total	31	1.253194875						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.600645284	0.579302157	1.036842823	0.308377787	-0.584160659	1.78545123	-0.5841607	1.78545123
Strength of Schedule	-0.387647772	1.136598826	-0.341059451	0.735517565	-2.712253381	1.93695784	-2.7122534	1.93695784
Fraction of Salary Cap	1.0984133	0.765433489	1.435021221	0.161978929	-0.46707396	2.66390056	-0.467074	2.66390056

SUMMARY OUTPUT	**All 3 variables**							
Regression Statistics								
Multiple R	0.867260332							
R Square	0.752140483							
Adjusted R Square	0.725584106							
Standard Error	0.105325393							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	3	0.942578599	0.314192866	28.32240591	1.2549E-08			
Residual	28	0.310616276	0.011093438					
Total	31	1.253194875						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.049355958	0.313752954	-0.157308346	0.876130742	-0.69204975	0.59333783	-0.6920498	0.59333783
Strength of Schedule	0.300369213	0.603256976	0.497912539	0.622433947	-0.935346685	1.53608511	-0.9353467	1.53608511
Fraction of Salary Cap	1.167762145	0.402877811	2.898551652	0.007208433	0.342504359	1.99301993	0.34250436	1.99301993
Interconference WP	0.59985447	0.068483924	8.759055166	1.64679E-09	0.45957151	0.74013743	0.45957151	0.74013743

Appendix B Table 6: Regressions from the 2017 NFL Season

SUMMARY OUTPUT	**Fraction**							
Regression Statistics								
Multiple R	0.255616258							
R Square	0.065339671							
Adjusted R Square	0.034184327							
Standard Error	0.196804441							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	0.081229575	0.081229575	2.097221925	0.157938574			
Residual	30	1.161959644	0.038731988					
Total	31	1.243189219						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.412794844	0.069750408	5.918170997	1.75298E-06	0.270345506	0.55524418	0.27034551	0.55524418
Fraction of Salary Cap	1.114385443	0.769508171	1.448178831	0.157938574	-0.457159899	2.68593078	-0.4571599	2.68593078

SUMMARY OUTPUT	**Fraction and IWP**							
Regression Statistics								
Multiple R	0.563821794							
R Square	0.317895015							
Adjusted R Square	0.270853292							
Standard Error	0.170999653							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.395203656	0.197601828	6.757724733	0.003898008			
Residual	29	0.847985563	0.029240881					
Total	31	1.243189219						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.264812949	0.075580398	3.503725261	0.00150959	0.110233679	0.41939222	0.11023368	0.41939222
Fraction of Salary Cap	0.627525042	0.684920452	0.916201349	0.367117786	-0.773294569	2.02834465	-0.7732946	2.02834465
Interconference WP	0.37246173	0.113665846	3.276813083	0.002725036	0.139988973	0.60493449	0.13998897	0.60493449

SUMMARY OUTPUT	**Fraction and SOS**							
Regression Statistics								
Multiple R	0.255898283							
R Square	0.065483931							
Adjusted R Square	0.001034547							
Standard Error	0.200153415							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.081408917	0.040704459	1.016052084	0.374548632			
Residual	29	1.161780302	0.04006139					
Total	31	1.243189219						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.439057907	0.398883137	1.100718147	0.28007224	-0.376749708	1.25486552	-0.3767497	1.25486552
Strength of Schedule	-0.052547607	0.785370454	-0.066908051	0.947114066	-1.658810539	1.55371533	-1.6588105	1.55371533
Fraction of Salary Cap	1.114480339	0.782603992	1.42406677	0.165099107	-0.486124544	2.71508522	-0.4861245	2.71508522

SUMMARY OUTPUT	**All 3 variables**							
Regression Statistics								
Multiple R	0.564131537							
R Square	0.318244391							
Adjusted R Square	0.245199147							
Standard Error	0.173981857							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	3	0.395637996	0.131879332	4.356811953	0.012228283			
Residual	28	0.847551223	0.030269687					
Total	31	1.243189219						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.305614755	0.349191063	0.875207836	0.388906946	-0.409670713	1.02090022	-0.4096707	1.02090022
Strength of Schedule	-0.081783355	0.682737684	-0.119787375	0.905506959	-1.480308103	1.31674139	-1.4803081	1.31674139
Fraction of Salary Cap	0.62743205	0.696865775	0.900362842	0.375606227	-0.80003278	2.05489688	-0.8000328	2.05489688
Interconference WP	0.372645862	0.115658373	3.221953176	0.003220918	0.135730425	0.6095613	0.13573042	0.6095613

Appendix B Table 7: Regressions from the 2018 NFL Season

SUMMARY OUTPUT	**Fraction**							
Regression Statistics								
Multiple R	0.021053546							
R Square	0.000443252							
Adjusted R Square	-0.032875306							
Standard Error	0.183606009							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	0.000448475	0.000448475	0.01330345	0.908943749			
Residual	30	1.011334994	0.033711166					
Total	31	1.011783469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.506773916	0.065448288	7.743119476	1.2237E-08	0.37311068	0.64043715	0.37311068	0.64043715
Fraction of Salary Cap	-0.078799894	0.68319313	-0.115340583	0.908943749	-1.474066406	1.31646662	-1.4740664	1.31646662

SUMMARY OUTPUT	**Fraction and IWP**							
Regression Statistics								
Multiple R	0.667517565							
R Square	0.445579699							
Adjusted R Square	0.407343816							
Standard Error	0.139079895							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.450830174	0.225415087	11.65344348	0.000193049			
Residual	29	0.560953295	0.019343217					
Total	31	1.011783469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.313759186	0.063701342	4.925472187	3.12047E-05	0.183475314	0.44404306	0.18347531	0.44404306
Fraction of Salary Cap	-0.581066481	0.527876892	-1.10076135	0.280053745	-1.660695949	0.49856299	-1.6606959	0.49856299
Interconference WP	0.469594064	0.097318764	4.825318833	4.12156E-05	0.270554843	0.66863328	0.27055484	0.66863328

SUMMARY OUTPUT	**Fraction and SOS**							
Regression Statistics								
Multiple R	0.028956413							
R Square	0.000838474							
Adjusted R Square	-0.068069218							
Standard Error	0.186707878							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.000848354	0.000424177	0.012168074	0.987910699			
Residual	29	1.010935115	0.034859832					
Total	31	1.011783469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.584704568	0.730660659	0.800240934	0.430078312	-0.90966427	2.07907341	-0.9096643	2.07907341
Strength of Schedule	-0.158193408	1.477020862	-0.107103029	0.915444768	-3.179040258	2.86265344	-3.1790403	2.86265344
Fraction of Salary Cap	-0.064723312	0.707057836	-0.091538922	0.927693779	-1.510818956	1.38137233	-1.510819	1.38137233

SUMMARY OUTPUT	**All 3 variables**							
Regression Statistics								
Multiple R	0.668649831							
R Square	0.447092597							
Adjusted R Square	0.387852518							
Standard Error	0.141348426							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	3	0.452360898	0.150786966	7.547130336	0.000751892			
Residual	28	0.55942257	0.019979378					
Total	31	1.011783469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.159701697	0.560329613	0.285013844	0.777731121	-0.988081483	1.30748488	-0.9880815	1.30748488
Strength of Schedule	0.310710307	1.122530375	0.276794565	0.783970975	-1.988688931	2.61010954	-1.9886889	2.61010954
Fraction of Salary Cap	-0.611297487	0.547491565	-1.116542291	0.273680325	-1.732783119	0.51018815	-1.7327831	0.51018815
Interconference WP	0.472008999	0.099290191	4.75383314	5.43595E-05	0.268622263	0.67539574	0.26862226	0.67539574

Appendix B Table 8: Regressions from the 2019 NFL Season

SUMMARY OUTPUT	**Fraction**							
Regression Statistics								
Multiple R	0.085554022							
R Square	0.007319491							
Adjusted R Square	-0.02576986							
Standard Error	0.200643736							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	0.008905203	0.008905203	0.221203822	0.641525615			
Residual	30	1.207737265	0.040257909					
Total	31	1.216642469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.526143872	0.065435889	8.040600969	5.64106E-09	0.392505958	0.65978179	0.39250596	0.65978179
Fraction of Salary Cap	-0.348025189	0.739970431	-0.470323104	0.641525615	-1.859246418	1.16319604	-1.8592464	1.16319604

SUMMARY OUTPUT	**Fraction and IWP**							
Regression Statistics								
Multiple R	0.796541483							
R Square	0.634478335							
Adjusted R Square	0.609269944							
Standard Error	0.123833757							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.771933287	0.385966644	25.16933118	4.59452E-07			
Residual	29	0.444709181	0.015334799					
Total	31	1.216642469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.286835493	0.052744293	5.438228069	7.50867E-06	0.178961302	0.39470968	0.1789613	0.39470968
Fraction of Salary Cap	-0.898797121	0.463323129	-1.939892625	0.062173776	-1.846399318	0.04880508	-1.8463993	0.04880508
Interconference WP	0.560475237	0.079455729	7.053931086	9.27644E-08	0.397970025	0.72298045	0.39797002	0.72298045

SUMMARY OUTPUT	**Fraction and SOS**							
Regression Statistics								
Multiple R	0.115714743							
R Square	0.013389902							
Adjusted R Square	-0.054652174							
Standard Error	0.203448862							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.016290723	0.008145362	0.196788554	0.82245201			
Residual	29	1.200351746	0.04139144					
Total	31	1.216642469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.139843622	0.916916474	0.152515116	0.879836866	-1.735461129	2.01514837	-1.7354611	2.01514837
Strength of Schedule	0.763975366	1.808606499	0.422411047	0.67584054	-2.935040256	4.46299099	-2.9350403	4.46299099
Fraction of Salary Cap	-0.291277402	0.762247698	-0.382129593	0.705151326	-1.850248988	1.26769418	-1.850249	1.26769418

SUMMARY OUTPUT	**All 3 variables**							
Regression Statistics								
Multiple R	0.813755169							
R Square	0.662197474							
Adjusted R Square	0.626004347							
Standard Error	0.121152929							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	3	0.80565757	0.268552523	18.29622129	9.03375E-07			
Residual	28	0.410984899	0.014678032					
Total	31	1.216642469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.54933177	0.554048242	-0.991487253	0.329939125	-1.684248147	0.58558461	-1.6842481	0.58558461
Strength of Schedule	1.642596519	1.083661025	1.515784439	0.140783061	-0.577182464	3.8623755	-0.5771825	3.8623755
Fraction of Salary Cap	-0.789666605	0.45897475	-1.720501192	0.096376515	-1.729833762	0.15050055	-1.7298338	0.15050055
Interconference WP	0.57358307	0.078215135	7.33340254	5.51425E-08	0.413366629	0.73379951	0.41336663	0.73379951

Appendix B Table 9: Regressions from the 2020 NFL Season

SUMMARY OUTPUT	**Fraction**							
Regression Statistics								
Multiple R	0.259744291							
R Square	0.067467097							
Adjusted R Square	0.036382667							
Standard Error	0.212427487							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	0.097942353	0.097942353	2.170446634	0.151101177			
Residual	30	1.353763115	0.045125437					
Total	31	1.451705469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.412906256	0.070161012	5.885124042	1.92301E-06	0.269618355	0.55619416	0.26961835	0.55619416
Fraction of Salary Cap	1.215839778	0.825280896	1.473243576	0.151101177	-0.469608664	2.90128822	-0.4696087	2.90128822

SUMMARY OUTPUT	**Fraction and IWP**							
Regression Statistics								
Multiple R	0.845298221							
R Square	0.714529083							
Adjusted R Square	0.694841433							
Standard Error	0.119542186							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	1.037285777	0.518642889	36.29326518	1.2754E-08			
Residual	29	0.414419692	0.014290334					
Total	31	1.451705469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.148642194	0.051198583	2.903248227	0.006990195	0.043929335	0.25335505	0.04392934	0.25335505
Fraction of Salary Cap	0.660369631	0.469447811	1.406694453	0.170144685	-0.299758946	1.62049821	-0.2997589	1.62049821
Interconference WP	0.608307523	0.075029522	8.107575599	6.10781E-09	0.45485492	0.76176013	0.45485492	0.76176013

SUMMARY OUTPUT	**Fraction and SOS**							
Regression Statistics								
Multiple R	0.314215816							
R Square	0.098731579							
Adjusted R Square	0.036575136							
Standard Error	0.212406271							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	0.143329173	0.071664586	1.588436761	0.22150587			
Residual	29	1.308376296	0.045116424					
Total	31	1.451705469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1.193178194	0.781100994	1.527559436	0.137456579	-0.404352713	2.7907091	-0.4043527	2.7907091
Strength of Schedule	-1.555703511	1.551062475	-1.002992165	0.324160696	-4.727982462	1.61657544	-4.7279825	1.61657544
Fraction of Salary Cap	1.183492331	0.825828458	1.433097055	0.162523578	-0.505516511	2.87250117	-0.5055165	2.87250117

SUMMARY OUTPUT	**All 3 variables**							
Regression Statistics								
Multiple R	0.845438575							
R Square	0.714766384							
Adjusted R Square	0.68420564							
Standard Error	0.121607565							
Observations	32							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	3	1.037630269	0.345876756	23.38838257	8.75879E-08			
Residual	28	0.4140752	0.0147884					
Total	31	1.451705469						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.219076293	0.464410855	0.471729485	0.640775289	-0.732226218	1.1703788	-0.7322262	1.1703788
Strength of Schedule	-0.138360324	0.906530682	-0.15262619	0.879787616	-1.995304247	1.7185836	-1.9953042	1.7185836
Fraction of Salary Cap	0.659676011	0.477580277	1.38128822	0.178115025	-0.31860284	1.63795486	-0.3186028	1.63795486
Interconference WP	0.605916565	0.077916877	7.77644827	1.80087E-08	0.446311078	0.76552205	0.44631108	0.76552205