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Developing a Metric to Evaluate the Performance of NFL Franchises in Free Agency

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Abstract

This research creates and offers a new metric called Free Agency Rating (FAR) that evaluates and compares franchises in the National Football League (NFL). FAR is a measure of how good a franchise is at signing unrestricted free agents relative to their talent level in the offseason. This is done by collecting and combining free agent and salary information from Spotrac and player overall ratings from Madden over the last six years. This research allowed us to validate our assumptions about which franchises are better in free agency, as we could compare them side to side. It also helped us understand whether certain factors that we assumed drove free agent success actually do. In the future, this research will help teams develop better strategies and help fans and analysts better project where free agents might go. The results of this research show that the single most significant factor of free agency success is a franchise's winning culture. Meanwhile, factors like market size and weather, do not correlate to a significant degree with FAR, like we might anticipate.

1 Motivation

NFL front offices are always looking to build balanced and complete rosters and prepare their team for success, but often times, that can't be done without succeeding in free agency and adding talented veteran players at the right value. This research will help teams gain a better understanding of how they compare with other franchises, when it comes to signing unrestricted free agents. Consequently, teams can better strategize, whether that means pursuing different players at the same position or become more cost effective by creating more suitable contracts for the ones they are currently targeting.

As fans and amateur analysts, we enjoy predicting and imagining the new places where free agents will go every offseason. Often times, however, our predictions are based on factors like a franchise's winning, its location, its market size, or its weather. This study will help us better identify and understand the correlation between those various factors and a team's free agency success. Fans and analysts will be able to use FAR to more accurately predict the decisions free agents make.

2 Data Sources

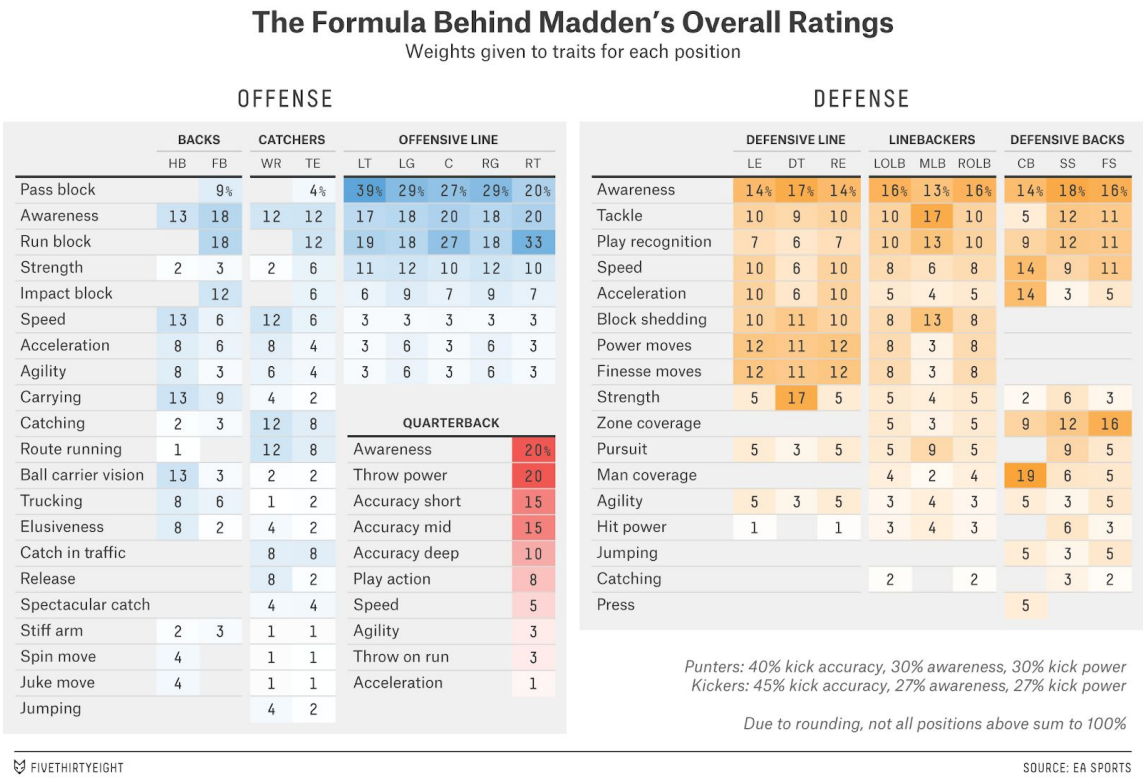
In this study, we used Spotrac to find specific information about players' salaries and free agent signings by year. We also used EA Sports Madden Player Ratings as our primary source of position rankings for this analysis. These sources were the best available sources that provided comprehensive information for the time frame that we wanted to study, 2011-2016. Although neither source offers much data past 2011, we felt that starting at this point in time was best, because that was when the new collective bargaining agreement (CBA) was agreed upon. In addition, we felt that a time span of six years would provide sufficient data to accurately estimate a team's FAR. With around 10-15 signings a year for each team, there should be a large enough sample size to reduce the chance for potential bias.

2.1 Spotrac

Spotrac is an online database, offering information about player contracts for all professional sports. From Spotrac, we were able to collect the average per year salary for each active NFL player from 2011 to 2016 to help calculate expected salaries for free agents during this time period. We also used Spotrac to find each team's free agent signings in the past six seasons from which we could base our estimation of a team's FAR.

2.2 Madden

We used Madden Overall Rating data for the seasons 2011 to 2016 (from the Madden 12, 13, 25, 15, 16, 17 games respectively) for our position rankings. We felt that Madden was an extremely good resource for this study because it holistically and accurately calculates the player's overall rating, depending on many factors relevant to the player's position including physical traits, football skills, and mental awareness. The chart below, from 538, shows the factors for each position that help to calculate the overall player rating, as well as the weights assigned to each of those factors. [5]



The Formula Behind Madden's Overall Ratings

Weights given to traits for each position

OFFENSE

	BACKS		CATCHERS		OFFENSIVE LINE				
	HB	FB	WR	TE	LT	LG	C	RG	RT
Pass block		9%		4%	39%	29%	27%	29%	20%
Awareness	13	18	12	12	17	18	20	18	20
Run block		18		12	19	18	27	18	33
Strength	2	3	2	6	11	12	10	12	10
Impact block		12		6	6	9	7	9	7
Speed	13	6	12	6	3	3	3	3	3
Acceleration	8	6	8	4	3	6	3	6	3
Agility	8	3	6	4	3	6	3	6	3
Carrying	13	9	4	2					
Catching	2	3	12	8					
Route running	1		12	8					
Ball carrier vision	13	3	2	2					
Trucking	8	6	1	2					
Elusiveness	8	2	4	2					
Catch in traffic			8	8					
Release			8	2					
Spectacular catch			4	4					
Stiff arm	2	3	1	1					
Spin move	4		1	1					
Juke move	4		1	1					
Jumping			4	2					

QUARTERBACK	
Awareness	20%
Throw power	20
Accuracy short	15
Accuracy mid	15
Accuracy deep	10
Play action	8
Speed	5
Agility	3
Throw on run	3
Acceleration	1

DEFENSE

	DEFENSIVE LINE			LINEBACKERS			DEFENSIVE BACKS		
	LE	DT	RE	LOLB	MLB	ROLB	CB	SS	FS
Awareness	14%	17%	14%	16%	13%	16%	14%	18%	16%
Tackle	10	9	10	10	17	10	5	12	11
Play recognition	7	6	7	10	13	10	9	12	11
Speed	10	6	10	8	6	8	14	9	11
Acceleration	10	6	10	5	4	5	14	3	5
Block shedding	10	11	10	8	13	8			
Power moves	12	11	12	8	3	8			
Finesse moves	12	11	12	8	3	8			
Strength	5	17	5	5	4	5	2	6	3
Zone coverage				5	3	5	9	12	16
Pursuit	5	3	5	5	9	5		9	5
Man coverage				4	2	4	19	6	5
Agility	5	3	5	3	4	3	5	3	5
Hit power	1		1	3	4	3		6	3
Jumping							5	3	5
Catching				2		2		3	2
Press							5		

Punters: 40% kick accuracy, 30% awareness, 30% kick power
Kickers: 45% kick accuracy, 27% awareness, 27% kick power

Due to rounding, not all positions above sum to 100%

FIVETHIRTYEIGHT SOURCE: EA SPORTS

Figure 1 - Factors and respective weights used to calculate overall ratings of players

Furthermore, for each year and each position in which we evaluated contracts, we calculated the correlation between Madden Overall Ratings and salary, displayed in the histogram below.

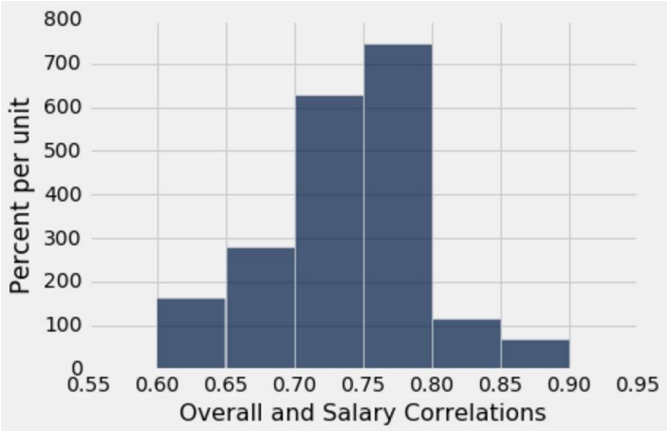


Figure 2 - Histogram of correlation coefficients between the overall ratings and salary for a position in a certain year

The Madden Ratings correlated well with with salaries, and provided a strong basis with which to value players and to estimate contracts.

3 Methodology

3.1 Overview

We used Spotrac and Madden Data to combine the salaries of players and their ratings and collect the relationship between player talent and salary for each year from 2011 to 2016. Then, for each free agent documented on Spotrac in that time frame, we determined the expected salary of the free agent given their overall rating, by averaging the salaries of all players of the same position with Madden overall ratings within 3 points of the free agent's overall rating (i.e. +/- 3). From there, we used the Percent Error formula to determine the percentage by which that free agent was underpaid or overpaid (negative percentage meaning player was overpaid, positive percentage meaning underpaid). This is the percent difference assigned to each player. To calculate the FAR per team, we simply took the average of all of the free agent percent differences belonging to each team over the six year span. Essentially, FAR is a cumulative average of the percent differences for free agents. This process is described below in a more detailed manner with an example, shown below.

Last Name	First Name	Position	Overall	Salary	Team
Kearse	Jermaine	WR	80	4500	SEA

Table 1 - Ratings and salary data for Jermaine Kearse in 2016. His salary is marked by the green band in Figure 3 below.

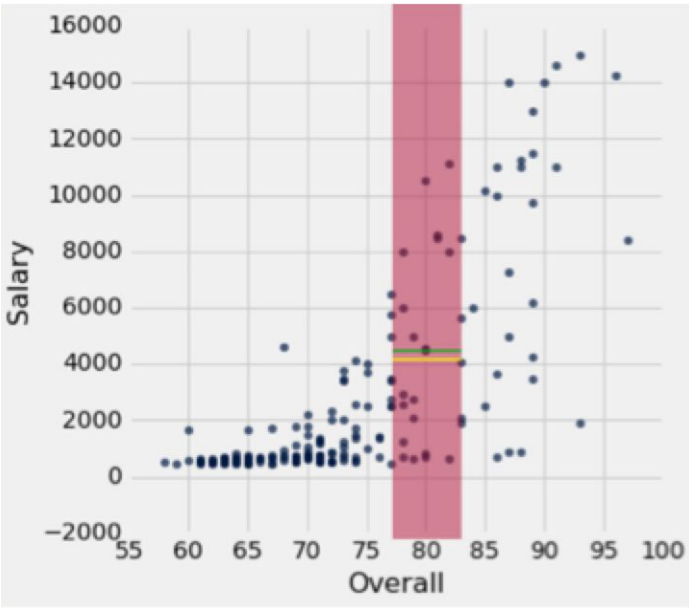


Figure 3 - Scatter plot of Madden Overall Rating vs. Salary for Wide Receivers in 2016. The range of salaries used to project the 2016 free agent signing of Jermaine Kearse is highlighted in red

Last Name	First Name	Position	Overall	Salary	Team
Parker	DeVante	WR	77	2719.14	MIA
Amendola	Danny	WR	83	4050	NE
Wallace	Mike	WR	77	5750	BAL
Aiken	Kamar	WR	78	2553	BAL
LaFell	Brandon	WR	77	2500	CIN
Coleman	Corey	WR	78	2913.75	CLE
Bryant	Martavis	WR	82	664.805	PIT
Moncrief	Donte	WR	78	702.13	IND
Matthews	Rishard	WR	79	5000	TEN
Wright	Kendall	WR	79	2054.61	TEN

Table 2 - Corresponding data table of all WRs within 3 points of Jermaine Kearse's overall rating (77-83). The "Salary" column is averaged to form the projection, marked by the yellow band in Figure 3 above.

$$\% \text{ Error} = \left| \frac{\text{Theoretical Value} - \text{Experimental Value}}{\text{Theoretical Value}} \right| \text{X } 100$$

Figure 4 - Percent Error Formula

Last Name	First Name	Position	Overall	Salary	Team	Age	Year	Projected Salary	Difference	Standard Difference	Percent Difference
Kearse	Jermaine	WR	80	4500	SEA	26	2016	4084.54	415.463	-0.139752	-0.101716

Table 3 - Completed projections and calculations for Jermaine Kearse.
Percent Difference indicates that he was overpaid by about 10%

3.2 Why not Regression?

We used salaries of similarly rated players in place of regression in order to accurately project salaries at the higher and lower ends of Madden overall ratings. A least-squares exponential regression line could potentially project salaries of the lowest rated players to be under the minimum salary, and salaries of the highest rated players to be abnormally large, due to a relatively lower amount of players rated at each extreme end and the inability of least-squares regression to account for contractual boundaries. By averaging salaries of similar players, our projections adhere to minimum salary requirements and avoid extrapolation at the extreme ends. Nevertheless, the method is unable to generate projections higher than the highest paid player at each position, due to the average. As a result, the percent difference will always be lower for those receiving record deals for their position.

3.3 Working with Spotrac and Madden Data

We first collected the name, position, base salary and team of all players for every team in the years 2011 to 2016. Figure 5 below shows information for a few Arizona Cardinals' players in 2016. This information was pulled from Spotrac's Salary Database.[1]

PLAYER	POS	TEAM	AGE	YRS	DOLLARS	AVERAGE
Calais Campbell (2012-2016)	DE	ARI	30	5	$55,000,000	$11,000,000
Larry Fitzgerald (2016-2017)	WR	ARI	33	1	$11,000,000	$11,000,000
Chandler Jones (2012-2016)	OLB	ARI Signed w/NE	26	4	$8,172,552	$2,043,138

Figure 5 - 2016 Salary information for three Arizona Cardinals' players includes name, position, average base salary

This yearly salary data was then joined with the corresponding Madden Rating tables based on players' first and last name and position, only collecting the overall rating from the Madden table. A small sample of the Madden Rating table and the joined result can be seen below in Table 4 and Table 5 respectively.

Team	Last Name	First Name	Position	Overall	Speed	Strength	Agility	Awareness
Cardinals	Fitzgerald	Larry	WR	91	86	74	84	88
Cardinals	Campbell	Calais	LE	88	71	87	80	80
Cardinals	Jones	Chandler	ROLB	82	79	81	81	86

Table 4 - Sample from Madden 17 Player Ratings Data [2]

Team	Last Name	First Name	Position	Overall	Average Salary
Cardinals	Fitzgerald	Larry	WR	91	11000000
Cardinals	Campbell	Calais	LE	88	11000000
Cardinals	Jones	Chandler	ROLB	82	2043138

Table 5 - Joined result of Spotrac Salary Data and Madden Player Ratings Data

We then collected the name, position, age, destination team, and signed salary for every free agent from 2011 to 2016 for each team. Figure 6 below shows information for a few Buffalo free agents in 2016. This information was pulled from Spotrac's free agent signings database. [3]

Figure 6 - 2016 Salary information for three Buffalo Bills' free agents includes name, position, signed salary and age

We then joined this data with the previous salary and ratings data, as described above to create a master list of all free agents, their information, and how much they got overpaid or underpaid. This master list was then used to calculate team FARs, which are cumulative averages of the percent differences, and to do other analysis, which is outlined in the Results section. Table 6 below is a small sample of free agent entries from the master list.

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Last Name	First Name	Position	Overall	Salary	Team	Age	Year	Projected Salary	Difference	Standard Difference (Z-Scores)	Percent Difference
Bush	Reggie	RB	74	1500	BUF	31	2016	870.73	629.26	-1.49	-.72
Brown	Zach	ILB	82	1250	BUF	27	2016	4509.62	-3259.62	1.37	.72
Velasco	Fernando	G	72	965	BUF	31	2016	1699.07	-734.07	0.47	.43

Table 6 - Master list data containing player information and percent differences. A negative percent and standard difference means the player was overpaid, positive means player was underpaid.

4 Results

4.1 FAR Results

In order to analyze the performance of each of the NFL franchises in Free Agency, we averaged the percent difference between predicted and actual contract values for free agents of each team from 2011-2016. Then, we reflected those results in the chart below:

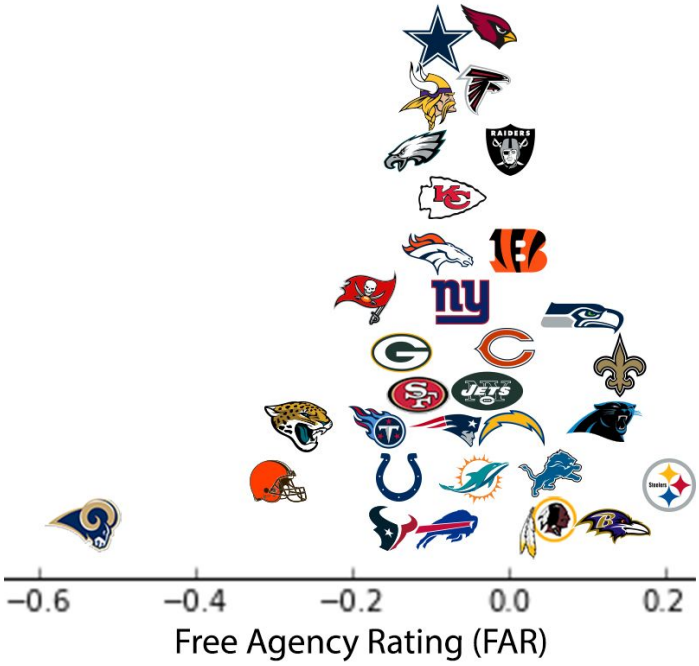

Figure 7 - The Free Agency Rating (FAR) of all 32 NFL franchises, visualized. Increasingly positive FARs indicate better performance in Free Agency.[1]

With these averages, we are able to rank the franchises from 1 to 32 in terms of their ability perform well in free agency over the past six years, as seen in Table 7.

[1] Spotrac documented only one year of data for the LA Rams (2016) so the Rams' FAR calculations are incomplete and can be ignored in this analysis

Rank	Team	FAR (2011-2016)	Rank	Team	FAR (2011-2016)
1	PIT	0.201844	17	MIN	-0.0769003
2	BAL	0.123736	18	NE	-0.0822277
3	NO	0.121181	19	KC	-0.084117
4	CAR	0.111137	20	BUF	-0.0896959
5	SEA	0.0773509	21	DAL	-0.102634
6	WAS	0.0448117	22	DEN	-0.104058
7	DET	0.0410341	23	SF	-0.107576
8	CIN	0.000190454	24	PHI	-0.116582
9	OAK	-0.00138709	25	GB	-0.143663
10	SD	-0.00263205	26	IND	-0.163244
11	CHI	-0.00653136	27	HOU	-0.177763
12	ARI	-0.0327826	28	TEN	-0.178889
13	NYJ	-0.0531295	29	TB	-0.186637
14	MIA	-0.0577398	30	JAC	-0.256067
15	ATL	-0.0682925	31	CLE	-0.296671
16	NYG	-0.0758819	32	LA	-0.572725

Table 7 - FAR and Rankings for all 32 NFL franchises

With this data in hand, a few trends stand out, as described in the next sections.

4.1.1 Bad Teams Overpay in Free Agency

The FAR for each of the 32 NFL teams indicate a strong relation between team success and performance in free agency. All four members of the AFC South, for many years widely considered the worst division in football, rank within the bottom seven in FAR. The Browns and Buccaneers, other teams at the bottom, have also had their recent share of struggles. Meanwhile, the top five teams (the Pittsburgh Steelers, Baltimore Ravens, New Orleans Saints, Carolina Panthers and Seattle Seahawks) have had stellar seasons over the past six years, with fifteen playoff appearances, four conference championships, and two Super Bowls between them. Nevertheless, successful franchises such as the Denver Broncos and the New England Patriots are in the middle of the pack in signing performance, while the Chicago Bears rank in the higher end. Thus, doing well in free agency does not necessarily always translate into success, but many of the most troubled franchises in the NFL are also the ones that consistently underperform in March and April.

4.1.2 The Colts' Conundrum

Following three straight 11-5 seasons and a conference championship appearance against the Patriots, the Indianapolis Colts made several headline-grabbing moves in an attempt to push the franchise over the top, overpaying their 2015 free agent class about 42% on average. Aging superstar receiver Andre Johnson and former All-Pro linebacker Trent Cole signed for $7 million annually each, and 5-time Pro-Bowl running back Frank Gore was brought on for $4 million a year. Within the first two days of free agency, the Colts tied more than 10% of their salary cap on veterans all over 32.

Team	Average Signing Age	2015 FAR
OAK	28.625	-0.445159
JAC	28.2857	-0.423529
IND	31.8	-0.418949
CLE	32	-0.372611
ARI	31.5	-0.321585
TB	28.4286	-0.283502
KC	29.75	-0.25128
SF	30	-0.226123
GB	29.5	-0.22193
TEN	28.8	-0.216493

Table 8 - The lowest FAR ranks in 2015. The Colts had the 3rd worst performance in terms of Percent Difference average, while also signing much older players than the Raiders and Jaguars.

Despite being named early contenders in 2015, their aggressive moves were massive failures, and the Colts have not had a winning season in the two years since then. In his two years with the Colts, Gore has run for his worst rushing averages in his career. Trent Cole has also had his lowest tackle and sack totals with the Colts. Andre Johnson, despite having signed for three years, is already out of the league. Though Andrew Luck's injury could be blamed for part of their troubles early on, the Colts were 4-5 when Luck was shut down for the season, and even now have yet to find their groove despite playing in the NFL's worst conference. The Colts now stand as a cautionary tale to those looking to overpay veterans, even former stars, in free agency.

4.2 How Winning Percentage Affects FAR

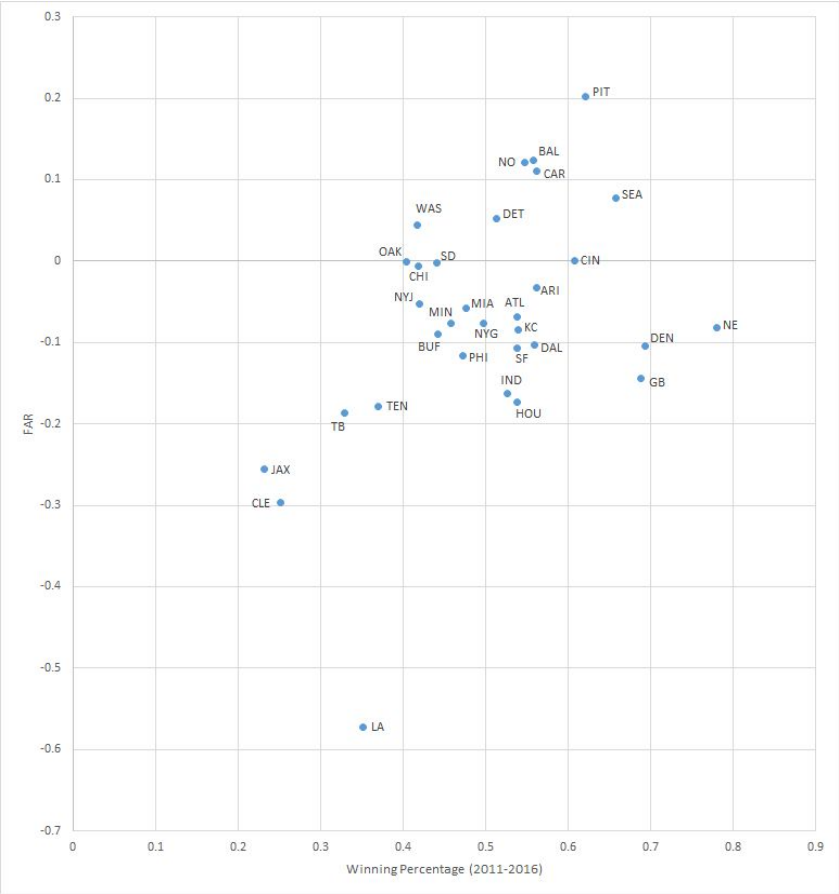

Figure 8 - Scatter plot of FAR vs Winning Percentage for each team from 2011-2016 [2]

If we take a look at how a team's FAR compares to their winning percentage over the last six years, there is a moderately strong correlation (correlation coefficient of 0.43). This confirms what was expected: that more successful franchises, in terms of winning, don't pay as much as less successful franchises do for similar level players. This correlation could be caused by the fact that winning percentage plays a role when free agents are choosing between possible destinations for next season. For example, a player might be willing to take less money to sign with a more successful team, resulting in a higher FAR for that team. This is usually the case for historically successful franchises, such as New England and Green Bay, even though their FAR might now show it. Similarly, it might require more money for franchises with bad reputations, such as Jacksonville and Cleveland, to land the same free agents. Additionally, however, it is possible that rather than winning percentage influencing FAR, teams could win more games as a result of having a better FAR, also resulting in a strong, positive correlation. For teams such as Carolina and Seattle, who have enjoyed recent success after periods of mediocrity beforehand, a higher

[2] Spotrac documented only one year of data for the LA Rams (2016) so the Rams' FAR calculations are incomplete and can be ignored when looking at Winning Percentage vs. FAR

FAR might actually be the reason for a upward trend in winning percentage as of late. Nevertheless, generally speaking, we can conclude that a team's FAR is somewhat indicative of their success as a franchise. The correlation coefficient comes out at around 0.43, but if we discount the top three teams in winning percentage in GB, DEN, and NE, we get a much stronger correlation coefficient of 0.66. A possible reason why Green Bay, Denver, and New England are outliers in that they have all had success despite having a negative FAR might be due to how they have all benefited from outstanding quarterback play (considered the most important position) during this time period, making up for the fact they might overpay players in other positions. These teams are also all located in cold climates, a factor that we will address shortly.

4.3 How Location Affects FAR

In addition to a franchise's winning percentage, it is often assumed that free agents prefer places with better weather and a larger market. These are other factors that probably help to make free agents' decisions. In the following sections, we look at how the average weather of franchises, population (market size) of franchises and region affect FAR.

4.3.1 Weather

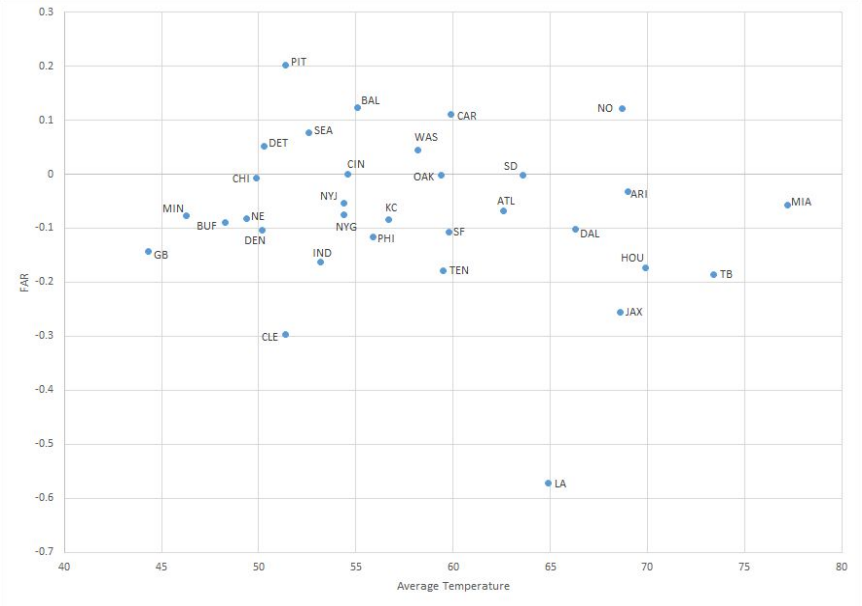

Figure 9 - Scatter plot comparing franchises' FAR and the average temperature of the city they are located in [3]

[3] Spotrac documented only one year of data for the LA Rams (2016) so the Rams' FAR calculations are incomplete and can be ignored when looking at Weather vs FAR

When free agents are faced with the decision of a destination for next season, not only are they choosing a team to play for, but also choosing their home for the near future. Although weather may not be on the top of a free agent's priority list, the year round sun of Miami might sound a little more appealing than the bitter cold temperatures that chill Green Bay all year long. Looking at the figure above, there doesn't seem to be much correlation; the correlation coefficient is in fact negative at -0.11. However, in some cases, it still seems that franchises at extremely cold locations have to pay more than others when signing free agents. Undesirable living conditions might be to blame for low FARs in teams such as Green Bay and New England, who shouldn't be having to overpay for free agents as franchises with a reputation for winning. However, once the average temperature gets above a certain threshold, around 50 degrees, it doesn't seem to influence a team's FAR at all. The team we evaluated at the highest, Pittsburgh, doesn't have the most tropical of climates, yet is still able to consistently land free agents for less than what they should be paid. Additionally, despite boasting ideal climates, all the Florida teams have subpar FARs, meaning warm temperatures isn't enough to attract free agents to these locations. It seems that weather can hurt a franchise's efforts to lure free agents, but still isn't enough to help struggling franchises.

4.3.2 Population

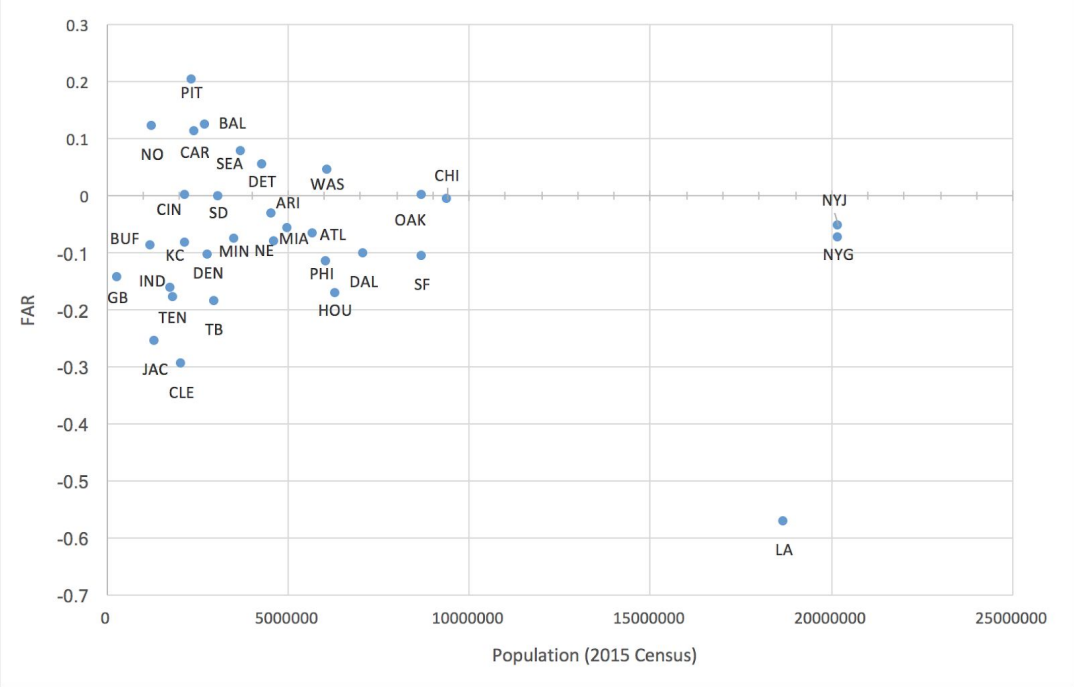

Figure 10 - Scatter plot comparing franchises' FAR and the population of the city they are located in [4]

[4] Spotrac documented only one year of data for the LA Rams (2016) so the Rams' FAR calculations are incomplete and can be ignored when looking at Population vs FAR

It has often been considered that in the NFL, free agents like to chase bigger markets, as they like having a larger fan base and thus, more opportunity to develop their brand through endorsements. They might also believe that with more fans, the twelfth man[5] will help to play a larger role in a team's success. Overall, however, there is no significant correlation between a team's FAR rating and the population of the nearest metropolitan area. This is depicted by the fact that the team with the highest FAR rating, the Pittsburgh Steelers, and the team with the second lowest FAR rating, the Cleveland Browns, have nearly identical populations. Thus, although a team's fan base plays a significant role in a team's success, the size of the local fan base has historically not played a major role in the team's ability to lure free agents at discount prices. As the fans of Kansas City and Seattle show, it isn't how many fans you have, it's the passion your fans have.

4.3.3 Region

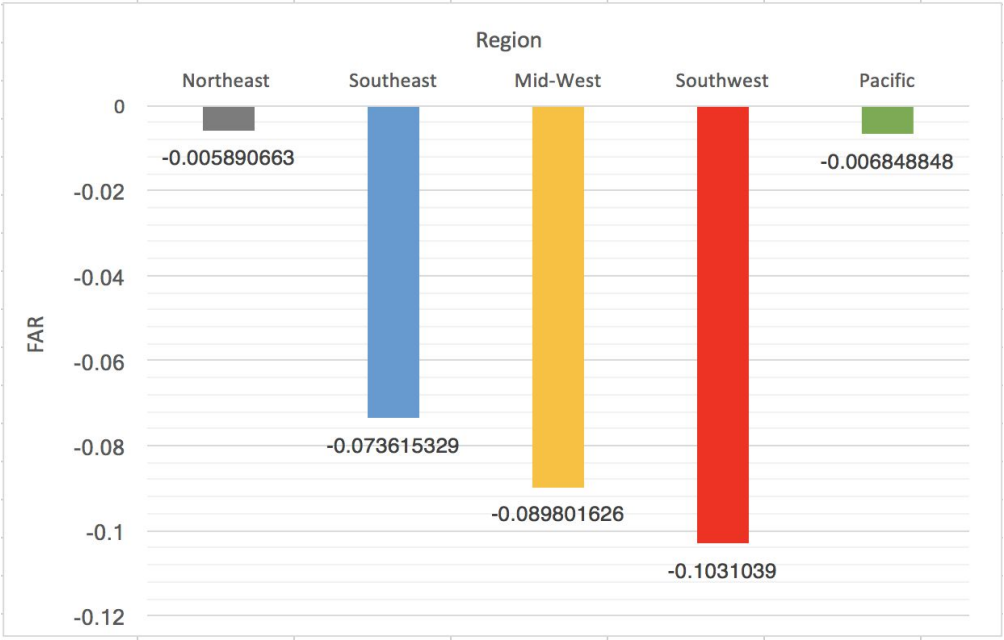

Figure 11 - Bar graph plotting the Average FAR rating of teams in each region of the United States [6]

Geography plays a significantly overlooked role in where free agents are willing to sign. As mentioned earlier, signing with a team implies a player will be moving his entire family to a brand new city. Lots of previously examined factors could play a role in this decision. However, the data shows that historically, things like weather, population, market size all are generally irrelevant to whether or not a player signs with a team. This is shown by the fact that large cities with large markets and populations are present both in the Northeast and in the Southwest. However, they have a large disparity in FAR rating. Similarly weather in the Northeast and the Midwest is very similar with cold snowy winters and brisk, warm

[5] A franchise's fan base
[6] Spotrac documented only one year of data for the LA Rams (2016) so the Rams' FAR calculations are incomplete and included in Geography vs FAR

summers. Again, however, the FAR disparity is significant. This goes to show that most off the field considerations are irrelevant barring individual situations. On the other hand, factors like team culture (winning percentage), and existing players under contract seem to have a more concrete correlation towards their ability to lure free agents. Teams like the New England Patriots and Pittsburgh Steelers have dominated their divisions and have won a Super Bowl this decade populate the Northeast region while cellar-dwellers like the Cleveland Browns and Chicago Bears populate the Mid-West. An interesting point to note is that the coasts seem to be more appealing than other regions, perhaps due to more marketing and endorsement opportunities for players to further their brand or image. These correlations all help a team determine its plan of attack when luring free agents come March.

4.4 Percent Difference by Overall Rating

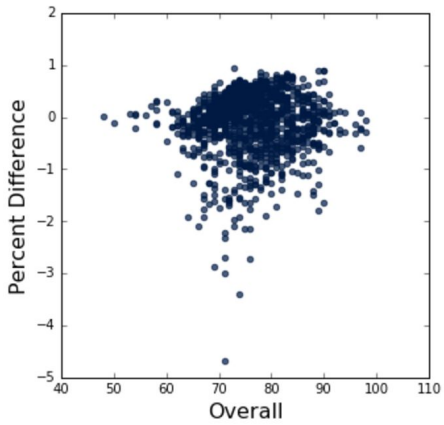

Figure 12 - Percent Difference vs. Player Overall Ratings

The ratings are, by and large, uncorrelated with the Percent Difference (correlation coefficient of .04), meaning that the two characteristics are largely independent, as intended by the design. Thus, the predictions generated by the average of the data range are roughly off by the same percentage for all overalls, with the exception of slight systematic error at the extreme high end of overalls, due to the inability of the metric to record high contract values.

4.7 Percent Difference by Position

By grouping the data by position, we observed Percent Difference averages over 2011-2016 to analyze salary trends of certain positions over that 5-year period.

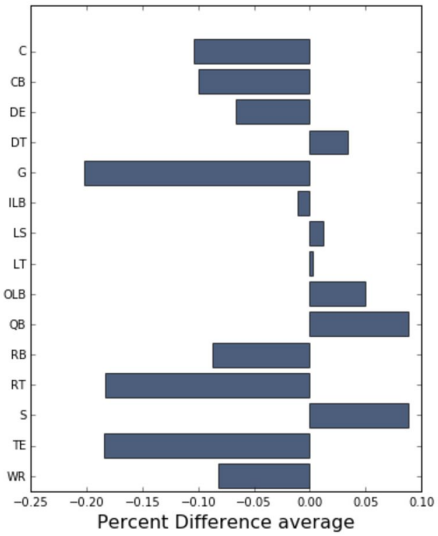

Figure 13 - Percent Difference averages over each position from 2011-2016

Overall, salaries for most positions have been over their expectations, with quarterbacks being a notable exception. The high Percent Difference average for quarterbacks, despite the record deals being signed by elite quarterbacks is a possible byproduct of an increasing pay gap between blue chip quarterbacks and all others, since elite quarterbacks are almost never allowed to hit free agency, and thus are not recorded in the average.

4.7.1 Battle of the Trenches

The Percent Difference average provides an interesting perspective on the recent evolution of offensive line salaries. For decades, the Left Tackle position has been considered by many as the second most important offensive position in football, a premise supported by the plethora of high draft picks and salary cap space devoted to protecting the blind side. Nevertheless, over the past 5 years, the salaries of offensive linemen playing in the other four slots have climbed drastically while the salaries of left tackles have stagnated, with teams putting more emphasis on interior protection. With the likes of J.J. Watt and Aaron Donald feasting on interior linemen, front offices are dishing out increasingly large amounts of money towards the trenches.

4.8 What FAR Says About a Franchise's Value

It's within reason to assume that the FAR metric can help us assess which franchises are more valuable than others, as a higher FAR means that that franchise is viewed as more favorable or valuable for free agents. However, after comparing with several franchise rankings from reputable sources (Bleacher Report, Fansided, Forbes), it's clear that there are many factors that determine a franchise's value, and how they perform in free agency is a very small part. For example, Forbes takes into account revenue streams and ownership, Fansided looks at historic winning, and Bleacher Report uses a variety of factors in their evaluations including team success, fanbases, star power, and future prospects. Clearly, FAR, by itself, is not an accurate predictor of a franchise's value.

Team	FAR	BR	FS	Forbes
PIT	1	2	3	15
BAL	2	16	24	14
NO	3	15	27	29
CAR	4	14	30	22
SEA	5	5	20	16
DET	6	25	17	31
WAS	7	9	8	5
CIN	8	24	25	30
OAK	9	3	11	20
SD	10	28	22	21
CHI	11	12	4	8
ARI	12	27	20	23
NYJ	13	26	28	7
MIA	14	22	14	12
ATL	15	31	29	19
NYG	16	10	2	3
MIN	17	18	11	17
NE	18	6	13	2
KC	19	8	19	26
BUF	20	11	18	32
DAL	21	4	5	1
DEN	22	7	15	11
SF	23	17	6	4
PHI	24	23	16	10
GB	25	1	1	13
IND	26	13	7	18
HOU	27	30	32	9
TEN	28	21	22	24
TB	29	20	26	28
JAC	30	32	31	25
CLE	31	19	10	27
LA	32	29	9	6

Table 9 - Different value based rankings of NFL franchises from multiple sources

5 Conclusion

In this study, we were able to develop a metric called FAR to properly assess how a franchise performs in free agency, specifically how good they are at creating properly valued contracts. Free agency is not the only factor that determines a franchise's success, but it is significant in allowing the franchise to not only win in the regular season, but go far in the playoffs and contend for championships.

In our results, we showed that there is a strong correlation between winning and FAR, although it is hard to tell which causes which. For example, it's shown that bad teams tend to have to overpay, while good teams tend to be able to sign free agents at discounted values. On the flipside, overpaying for free agents can lead to an unbalanced and less complete team, as we saw with the Indianapolis Colts, who stopped winning after having an offseason of overpaying. However, the theory that free agents highly value things like market size, weather, and region has been debunked. As shown above, there is little to no correlation between these factors and FAR, as one might expect, even though in some few cases, having good weather or having a large population might help. It is clear that building a winning culture is the single most important factor to succeed in free agency.

We hope that the FAR rankings, shown above, offer fans and analysts a more quantitative approach to determining where free agents in the future might land. If, for example, three teams are looking to land a particular free agent, it's reasonable to think the team with highest FAR will have the highest chance of landing that free agent. This is not always guaranteed to be the case, as there might be other factors weighing into the decision, but it is a reliable tool to use. Perhaps more significant is the impact that this research can have on teams' front offices. Understanding what factors cause individual free agents to get underpaid and overpaid including talent, age, position can help teams better set minimums and maximums for certain free agents they're interested in and avoid overpaying and unnecessarily using more cap space.

6 Future Research and Applications

There are many ways to apply this research. First off, when future free agency seasons come around and each unrestricted free agent is linked to a few teams, the findings in this research can help to assess approximate probabilities of the free agent signing with those teams and thus, better predict where they'll go. Additionally, this research could be used to accurately predict whether free agents will get underpaid or overpaid, and by how much they will get underpaid or overpaid by using machine learning techniques. Factors to be considered would include current team, current salary, position, age and overall rating.

One limitation for this research was the time range, as we were unable to find reliable salary and free agent information from before 2011. Expanding the time frame of this analysis would give us a much larger sample size and help us better recognize how teams stack up against each other in terms of free agency over time, understand how winning affects FAR in different time periods, as well as identify trends and patterns in free agency over time.

Perhaps the biggest impact of our research is that this FAR metric can be created in any sports league that has free agency, such as the NBA, MLB, and NHL. In fact, free agency is arguably a bigger part of a team's success in these sports than in the NFL.

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