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Race and Coaching Hierarchy: An Analysis of Hiring and Firing in the NFL

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Abstract

Despite its best efforts, the National Football League (NFL) has long been criticised for its lack of minority leadership amongst its teams. Recent hires (and non-hires) have only served to heighten this criticism. To assess this, we use a new, rich and unique dataset to examine the relationship between race and coaching hierarchy in the NFL. Our results indicate that young, experienced and well performing coordinators are likely to be promoted to Head Coach while older and poorly performing coaches are more likely to be fired. A coach's race does not seem to play a role in either promotions or firings. In the post Rooney Rule era (post 2003) however, black coordinators are marginally more likely to be promoted than previously. Black Head Coaches on the other hand, are neither more nor less likely to find a job at the same level. The Rooney Rule has been successful to the extent that teams now consider (and ultimately appoint) equally skilled black coordinators to Head Coaching jobs, despite our evidence suggesting that equally skilled black coordinators had always been available.

Keywords: Racial Discrimination, NFL, Coaches

JEL Classification: J71, Z21, Z22

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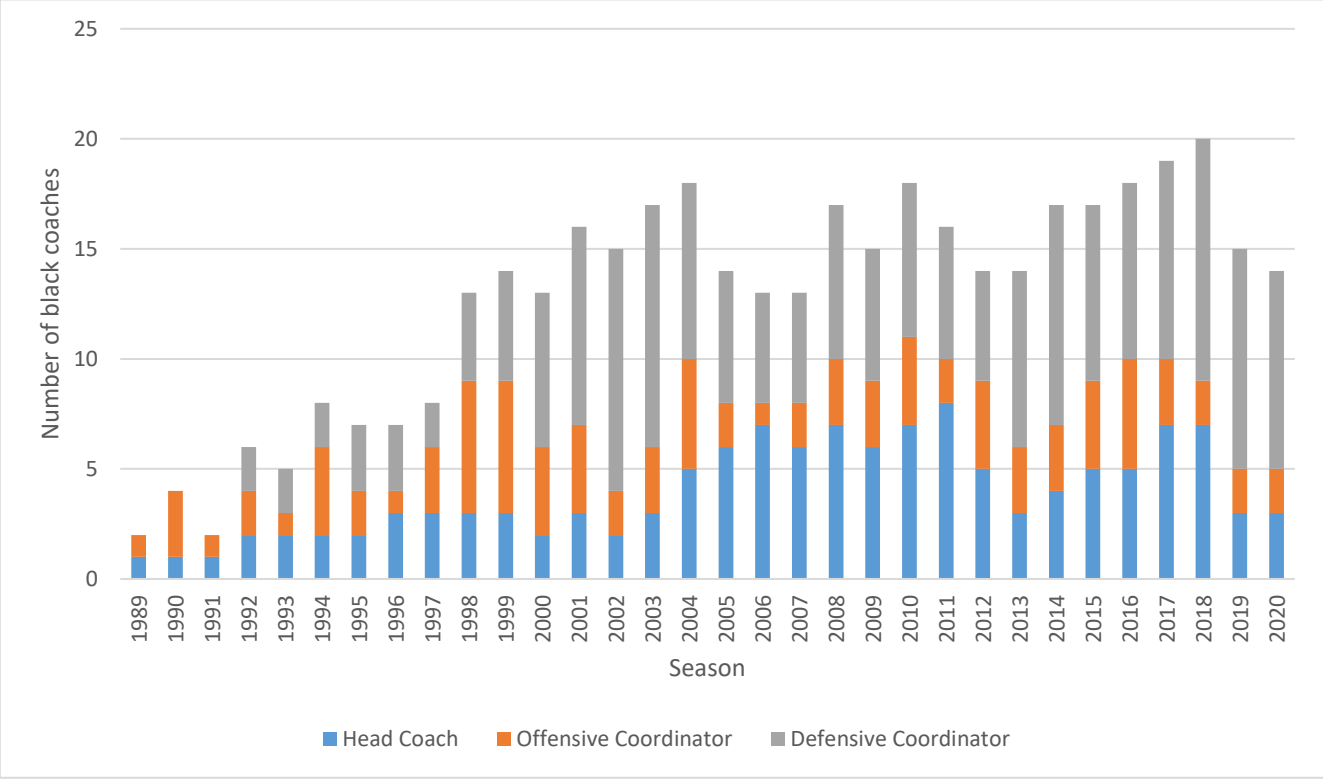
1. Introduction & Background

The 2021 hiring cycle in the National Football League (NFL) once again drew considerable attention after several minority candidates were seemingly overlooked for Head Coaching positions. Perhaps most notably, the minority candidate Eric Bienemy, Offensive Coordinator of the Kansas City Chiefs was overlooked for a second successive year, despite heading up one of the league's most productive offenses. This was despite the league's continued attempts to promote diversity on coaching staffs through its affirmative action policy, the Rooney Rule (more on this in Section 3) and even incentivising teams with draft picks for making minority hires.

While the league has made progress over the last 30 years in this regard, the last few seasons have highlighted that there is still a long way to go. Since 2017, teams have gone from employing a joint high number of black Head Coaches (seven) to a joint low since the inception of the Rooney Rule in 2002. Ahead of the 2021 season, this left just Brian Flores (of the Miami Dolphins) and Mike Tomlin (Pittsburgh Steelers) as the leagues only black Head Coaches[1]. Figure 1 charts how the composition of minority candidates in the top three coaching positions (Head Coach, and Offensive and Defensive Coordinators) has changed since 1989, when Art Shell became the NFL's first black Head Coach.

Figure 1: Number of Black Coaches per season in NFL, 1989-2020



[1] As of the end of the 2020 season, following the customary rounds of firing. During the off season, the Houston Texans hired David Culley, leaving the number of black Head Coaches for the 2021 season at 3, plus Ron Rivera at Washington who is of Hispanic origin, and Robert Saleh, hired by the New York Jets, who is of Lebanese descent.

The prospects for minority coaches do seem to be improving over said period, and a couple of notable years can be picked from this timeframe. The 2003 season saw the introduction of Rooney Rule, aimed at increasing minority representation amongst Head Coaches. The rule requires teams interview at least one minority candidate for the role of Head Coach. The success of the rule is still widely debated by academics, analysts, journalists and even coaches themselves. However, one thing that is certain from Figure 1; consistently fewer black Head Coaches were in jobs in the years before the rule was introduced. This perhaps hints at some degree of success. Other notable events include the 2007 Super Bowl (the end of the 2006 season), which was the first to be contested between two minority coaches.

While relatively few coaching positions are held by black (and other minority) candidates, the composition of the playing staff who are black is an entirely different story. Around 70% of players in the NFL are black, a proportion which is higher when considering defensive positions (this is one possible explanation as to the greater numbers of Black DCs shown in Figure 1).[2] Herein lies the root of the widespread attention and criticism – in a league of predominantly black players, and players presumably making ideal coaching candidates, how come so few coaches are black?[3]

Of course, the argument is not quite as clear cut as that. The lack of black coaches in the NFL is not itself a sign of discrimination. Only if minority coaches face different barriers to entering the coaching profession, or face differential treatment by employers, can it be claimed that discrimination is present. These are arguments that we explore in this paper.

Detecting discrimination is notoriously difficult. It is rare to find such accurate and objective measures of worker and firm performance that are required for an assessment of discrimination. This is a major advantage of using sports data. As noted by Kahn (2000), there is no other industry where we know the name, face and performance of every worker (players), firm (teams) and supervisor (coaches) in the industry. Along with the easily and regularly observable measures of performance, the use of sports data offers a clear advantage over other, more conventional settings. Moreover, NFL teams have an easily identifiable coaching hierarchy, allowing for clear assessments of promotions and dismissals.

While the matter in the NFL is interesting in its own right, the issues we discuss are certainly not limited to just the NFL, or sports more generally. Literature on sports Head Coaches likens their role to that of a Chief Executive Officer (CEO) in a regular firm (e.g. Pieper *et al* (2014)). Both Head Coaches and CEOs tend to be of a similar age, can cope with intense pressure and scrutiny, particularly from the media. Moreover, both are appointed by owners and or directors who will ultimately decide when their employment should be terminated. A similar concern also exists about the lack of Black and minority representation amongst CEOs and top executives.

[2] The Institute for Diversity and Ethics in Sports (TIDES) 2018 article, reports that around 70% of NFL players are black, and 27% are white.

[3] Interestingly however, very few players go on to become top level coaches (only 27% in our sample), while being a good player is not a guarantee of being a good coach. Many coaches start their career after a failed college career, perhaps due to lesser ability or injury.

We contribute to the literature in a number of ways. Our newly assembled dataset covers NFL coaches over the last 30 seasons, allowing us to analyse more years of data than many previous studies. The larger sample size also allows us to control for team specific trends. Moreover, we are not only interested in the reasons behind coaching promotions, but also the causes of a variety of other types of exits, including firings. We also include alternative measures of coaching performance at the coordinator level.

2. Theory & Previous Literature

2.1 Theoretical Background

A number of theories lie at the heart of the issues that we will test empirically, including theories of promotion, job separation, discrimination, leadership changes and the role of affirmative action policies.

Lazear & Rosen (1981) consider (internal) promotions as an incentive device where rewards depend on rank among a group of workers. Yet, several authors (including for example Baker *et al* (1988)) are sceptical about promotions acting as a pure incentive device, because promotions often involve a change of job responsibilities and require new skills, possibly leading to sub optimal job assignments (sometimes referred to as The Peter Principle (Peter & Hull (1969)). This may well be true in a sporting context, given the extra and more varied responsibilities taken on by higher-level coaches (although many assistant coaches go on to make superb coaches). Possibly more closely related to the sporting context is to consider the role of signalling in promotions, whereby outside firms use promotions as an imperfect signal of ability (see for example Waldman (1984)).

After hiring a worker, the quality of the firm-employer match will alter over time, with factors such as age and performance (probably relative to some expected performance) determining the quality of that match. When the quality of the match falls below the value of an outside option, either party may look to terminate employment (Gielen & van Ours (2006)). The employer's outside option is in the form of another worker, which given that in a sporting setting, performance or coaching ability should be easy to observe, team performance should improve when changing Head Coaches (Bryson *et al* (2021, a)). Ilmakunnas *et al* (2005) also argue that job separation is likely to improve firm productivity, by means of bringing in new ideas and knowledge. Leaders also have an important role in determining the performance of subordinate workers (Rosen (1982)), something that has also been shown to be important in the sporting setting by Muehlheusser *et al* (2018). Interestingly however, at least in a sporting setting, leadership changes are found to have very little impact at all on team performance, possibly because of the inefficiency in discovery of new talent, as identified by Terviö (2009).

Of interest in the market for hiring and firing of NFL coaches is the large body of literature on discrimination. Whether teams have a desire to maximise profits or wins, then the presence of some non-discriminatory owners and co-workers, along with the presence of equally skilled minority workers, should mean discriminatory practises will fall over time (Groothuis & Hill

(2004)). A team could simply not afford to not employ a good minority coach over an 'average' non-minority coach for example, as the potential risk of failing in competitions increases.

It is possible that the lack of minority representation we observe amongst NFL coaches today is due to discrimination much further back in a coach's career, perhaps even during their playing careers, rather than due to discriminatory hiring by NFL teams at the top levels of coaching. Pitts & Yost (2013) for example, find evidence that players are stacked into different positions according to their race as they transition from High School to College, leading to an abundance of White players at Quarterback (a central playing position with a high level of influence on the game).

Racial stacking has its roots in the theory of Centrality, whereby non-minorities tend to gravitate to roles with a higher level of influence, which in sports tends to mean a central playing position. In applying the theory of Centrality to Baseball teams, Grusky (1963) finds that players who played in central positions (thus having higher levels of interaction with other team members) were far more likely to become field managers than players who played in non-central positions. A similar situation was identified by Latimer & Mathes (1985) in their survey of College football Head Coaches. In particular, black coaches largely played in more peripheral positions (particularly Running Back and Defensive Back), while central positions such as Center, Quarterback and Guard were the least occupied by Black players. This seems to have fed through to coaching too, with Black coaches tending to coach peripheral positions.

As such, the lack of Black coaches we see in NFL today is not necessarily due to hiring discrimination by NFL teams, but perhaps due to barriers (which may be discriminatory) preventing Black coaches coming through the ranks in the first place. Anti-discrimination laws exist to prevent discriminatory hiring and firing, and although it is difficult to prove, critics may argue that despite the existence of such laws, discrimination is still present. This is often cited as a motivation to implement affirmative action policies, which go a step beyond anti-discrimination laws by actively supporting members of minority groups that have been or still are discriminated against. The Rooney Rule is one such example in the case of employment opportunities, but affirmative action policies also exist for example, in many college application policies. Previous literature has examined the outcomes and economic features of such policies in a variety of settings. An excellent review of both theoretical treatments and empirical studies can be found in Holzer (2007).

2.2 Previous Sports Literature

As demonstrated by Madden (2004), African American coaches tended to outperform White coaches between the years 1990 and 2002 (pre Rooney Rule). Her work shows that even when controlling for differences in team quality, African American coaches had better regular season records, and consequently were more likely to make the post-season playoffs, at all stages in their career[4]. She argues that this is consistent with the view that African American coaches were held to higher standards by teams and so had to be better, more able coaches

[4] African American coaches on average won 1.9 more regular season games than white coaches when controlling for team quality.

in the first place before being hired as Head Coach, thus contributing to their better average records.

Madden & Ruther (2011) take the above analysis one stage further, to analyse whether the implementation of the Rooney Rule saw the performance advantage of African American head coaches disappear. The rule should force NFL teams to consider similar skilled white and African American coaches, which could lead to more comparable performance records. Comparing the 13 seasons prior to, and the 7 seasons post Rooney Rule, the authors find that both the difference in number of wins and the probability of reaching the postseason is no longer significant after 2003. They also find that Black or African American Defensive Coordinators are insignificantly less likely to be promoted to a Head Coach role before the Rooney Rule, and faced the same treatment after the rule[5].

Work by Solow *et al* (2011) explores the transitions from coordinator role to Head Coach in more depth. Using a logit regression where the outcome variable equals 1 if a coordinator is promoted, they find that strongly performing, more experienced and younger coordinators are more likely to be promoted to a Head Coach role. Teams also appear to favour hiring Offensive Coordinators, although this result is only marginally significant. There are no significant differences in the likelihood of being promoted from a coordinator position to a Head Coach depending on race. Their results and interpretations remain unchanged when using a Cox proportional hazards model instead. Solow *et al* also split their sample up into a pre- and post-Rooney Rule period in order to analyse its impacts on promotions. Their results suggest that no significant change was observed of the likelihood of a minority coach being promoted after the implementation of the rule. Fu

Fearful that increases in the number of minority Head Coaches working in NFL was just due to changing unobservable social factors (e.g. changes in racial sentiment) that coincided with the introduction of the Rooney Rule, DuBois (2015) uses a Difference in Differences specification to compare hiring trends in the treated group of NFL Head Coaches to the control group of NFL coordinators and College Head Coaches. DuBois finds that a minority candidate is between 19-21% (depending on the control group) more likely to fill a Head Coaching vacancy in the post rule period.

A major drawback of all the work mentioned above, is the relatively few numbers of years of data post-Rooney Rule. It is possible that the reason behind the insignificance of race on coaching moves is simply a lack of time since implementation for any statistical result to show, even if teams' behaviour is changing as a result of the rule. With several additional seasons of data, it is possible the significance of the result may change. We also include more coach specific variables and are able to control for team specific effects in some of our specifications.

[5] In the period under analysis in Madden & Ruther (2011), there was never a Black Offensive Coordinator promoted to a Head Coach role, hence the analysis could only be carried out on Defensive Coordinators.

3. The NFL, and the labour market for coaches

The NFL currently consists of 32 teams, split into two conferences of 16 teams. [6] Within each conference, teams are split into four divisions, where the winner of each, along with wildcard entrants from each conference (teams with the best remaining records) qualify for the post season, a knock-out style tournament culminating in the Super Bowl.[7] Qualifying for the post season is quite often seen as a minimum requirement for most teams, though if teams are going through a rebuild period, then expectations may be more lenient.

The coaching structure of NFL teams makes it an ideal setting to study promotions and firings. Between teams, while the exact responsibilities of the staff may vary slightly, they more or less fulfil the same duties. The Head Coach is in charge of day-to-day coaching activities, sets the overall playing philosophy, is responsible for in game personnel changes, and is very much the public face of the team, with a far greater media presence than other coaches. They tend to work very closely with the General Manager (GM) on decisions such as draft picks and roster decisions, while keeping the wage spending within the annual salary cap. The GM is also responsible for hiring and firing the coaching staff. Below the Head Coach are the coordinator roles. An Offensive Coordinator will typically manage all offensive plays, devise offensive game plans and strategies, and head up the team of offensive positional coaches. Defensive Coordinators will fill similar roles but on the Defensive side of the ball. Exactly who calls the plays during matches may vary across teams and will likely depend on the background and specialities of the Head Coach. In almost all years, all teams employ this trio of coaches, although occasionally the Head Coach fills one of the coordinator roles.

It is not uncommon to see a well performing coordinator promoted to a Head Coach, either internally or externally. During our sample, 135 out of 693 coordinator coaching spells (or 135 out of 1892 coordinator-seasons) have resulted in promotion. Many of them are very successful and enjoy a prolonged spell(s) as a Head Coach, whereas others drop back down into a lower coaching rank or leave coaching completely (180 out of 212 Head Coaching spells end in such a manner). Coaching moves can also occur between the NFL and the hugely lucrative college sector. Coaches who work for the top college teams can very earn large salaries, potentially at least as big as Head Coaches working in the NFL. For example, the highest paid college coach is Nick Saban at Alabama, on a reported $8m per year; similar to the estimated salaries for the top earners in the NFL. Moreover, attendances at college games are regularly upwards of 80-90 thousand. Because of the lucrative nature of this sector, we model these moves as equivalent to moves to the NFL. [8]

A major feature of the labour market for NFL coaches is the Rooney Rule, named after Dan Rooney, former Pittsburgh Steelers owner and chair of the NFL's diversity committee. Its

[6] There have been 32 teams since the most recent expansion in 2002, which saw the Houston Texans added. Other expansions during our sample period of 1989-2020 occurred in 1995, when the Carolina Panthers and Jacksonville Jaguars were added, and in 1996 (Baltimore Ravens). Other teams over the period have changed name and or location.

[7] The 2020 season saw the playoffs expand to 14 teams, rather than 12 as previous. This meant an extra wildcard slot for each division, but fewer teams receiving a first round bye.

[8] Robustness checks (see section 5.7) reveal this definition does not impact on results

implementation followed the sacking of two high profile Black coaches; Tony Dungy from Tampa despite his overall winning records, and Dennis Green from Minnesota despite his first losing season in 10 years. The rule, introduced for the 2003 season, requires that teams hiring a new Head Coach must interview at least one minority candidate. [9] DuBois (2015) describes the rule as a "soft" affirmative action policy, designed to change the composition of the candidate pool, not who is ultimately employed. There are rare circumstances where the rule will not apply, for example if an assistant coach's contract guarantees them the Head Coach's job should it become available. Other industries and sports have also implemented a similar type of rule. Most notably in English Football where both the England national team and all clubs in divisions 2, 3 and 4 of the footballing pyramid must now adopt a similar approach when appointing a new Head Coach (BBC (2018)).

In this paper, we use the Rooney Rule to compare outcomes of minority coaches before and after its implementation. In particular, we focus on whether minority coaches are more likely to be employed as a Head Coach, including both transitions from coordinator to Head Coach, and Head Coaches who stay on the same level, given their performance and human capital. We also extend the analysis of Madden & Ruther (2011) to compare the performance of coaches pre- and post- Rooney Rule.

4. Data & Methodology

4.1 Data

Our new dataset has been collected and assembled entirely by hand, and consists of all individuals who held a top coaching position (i.e. Head Coach, Offensive Coordinator or Defensive Coordinator) at an NFL team between 1989 to the end of the 2020 season. The uniqueness of this study lies in the data; our sample period gives us a generous number of observations before and after the implementation of the Rooney Rule in 2003 and includes a richer set of variables than previous work. Previous work has only included 5-6 years of data post implementation and has lacked variables capturing team characteristics. We have excluded any individual who held their position on an interim or temporary basis, because by definition, their exit is already determined. In the case that an interim coach performs well enough in their role that they are given the job permanently, we only consider the period after they were given the role full time.

Our main source for the data is the website Pro Football Reference (https://www.pro-football-reference.com/). From here, we obtain the entire coaching history for all teams in the NFL i.e. who filled the positions of Head Coach, Offensive Coordinator and Defensive Coordinator. We collect various details on each coach, including past coaching spells, used to construct our experience variable, and their age. This website also contains the end of season records for each club, which we use to construct the performance measures for the coaches.

[9] The Rooney Rule was altered in 2009. The rule now covers all senior positions including GMs, but there is no rule that covers the coordinator roles at this stage. Further, the rule was extended to cover all minorities, not just African American coaches.

For Head Coaches, performance is measured using the win-loss percentage during the regular season (with draws counting as half a win). For the coordinator roles, we use the percentile rank of total points scored and total yards (which we can split into passing and rushing yards) scored and conceded, for offensive and defensive coordinators, respectively.[10] A benefit of considering these alternative measures alongside points scored is that we can rule out any contamination effects of defensive contributions to attacking outputs. A percentile rank assigns the highest scoring and highest conceding team a value of 1, the lowest scoring and conceding team 0, and the mean scoring and conceding a score of 0.5. Following previous studies (including for example Fee *et al* (2006)), using the percentile rank of the performance measures rather than the raw number is preferred, since their distributions will be stable over time, allowing for more meaningful comparisons across seasons and reducing the influence of outliers.

While the main contribution of a coach to an NFL team lies in their on-field success, their complete contribution probably goes beyond this. Player development and overseeing rebuilds for example also form a large part of their job description, though these may be difficult to quantify. Coaches may be afforded a season or two grace period in which they are given the opportunity to build a squad, develop and implement new play calls etc. and as such we include an interaction of performance and tenure.

We include a dummy variable for race, with the variable taking the value 1 if the coach is a minority ethnicity, which we restrict to Black coaches in the sample, and 0 otherwise. We exclude from the sample coaches who are of mixed race for two reasons. [11] First, there are very few mixed race coaches in the NFL, while the second is due to the expansion of the Rooney Rule to cover all minority candidates in 2009. The race of the coach was coded using publicly available information, following Fort *et al* (2008) who *"suspect there is no bias in a dichotomous, researcher assessed measure of race"*.

A coach's experience is measured using the number of years they have held one of the three top coaching positions under consideration, up to and including their most recent year, but excluding any career gaps. This can be thought of as a measure of general human capital and is entered separately for NFL and college roles. Tenure measures the number of seasons that a coach spends at their current team, in their current role. We also include a dummy variable that is equal to 1 if the coach previously played football, 0 otherwise. We include a dummy variable identifying if the coaching change coincided with the team changing their GM, given the GM is ultimately responsible for hiring and firing the coaching staff. Finally, postRR is a variable identifying seasons after the implementation of the Rooney Rule.

In total, our data cover 32 seasons, in which 431 individual coaches held roles at NFL teams. Many of these coaches held more than one role across the 32 seasons and held positions at

[10] By points, we mean in game points i.e. 6 for a touchdown, 1 for a successful point attempt, 2 for a successful two point attempt, 3 for a field goal, and 2 for a safety.

[11] A total of four coaches who were of mixed race and are excluded from the sample. Namely, former Titans OC Norm Chow, of Asian-American descent, and Tom Flores (former Raiders and Seahawks HC), Juan Castillo (former Eagles DC) and Ron Rivera (former Bears and Chargers DC, Panthers HC, and current Washington Football team HC), all of whom are of Hispanic descent.

multiple teams. We view each coaching spell as a series of individual seasons, resulting in 2878 coach-season observations, and in doing so modelling time as discrete.

4.2 Methodology

Our methodology is straightforward. We start by identifying coaching exits at the end of the season, which we later break down into different types of exit. These are Promotions (from Coordinator to Head Coach, either internally or externally), a Sideways move (moving to the same role on a different team), or a Downwards move (dropping down the coaching hierarchy and or dropping out of the sample altogether). Kopkin (2014) suggests that modelling time as discrete is appropriate in this context, as this is the most common and sensible time to make coaching changes. General Managers will have the greatest time to search for, interview, and hire the new Head Coach, while the new coach(es) will have the longest time to implement new training, tactics etc. In the simplest form, we model exits (of any type) for coach *i* at the end of a season *t* using Logit regressions as follows:

$$Prob(Exit_{it} = 1|\boldsymbol{X_{it}}) = (1 + \exp(-\alpha - \boldsymbol{\beta X_{it}}))^{-1}$$

This is estimated separately on Head Coaches, Offensive Coordinators and Defensive Coordinators. Having controlled for performance, human capital etc., any differences in exit probabilities by race may hint at some discriminatory exits. Although such a claim can of course never be concrete.

However, it is unlikely that promotions, sideways and downwards coaching moves are a result of similar circumstances. As such, we extend the analysis to a Multinomial Logit regression to model the different types of coaching moves. In this setting, each season can end in one of four outcomes; specifically No Exit or Exit, where Exit is further split into Upwards, Sideways and Downward coaching moves, defined by where (or if) the coach next appears in the data. Let *k=1…4* denote the 4 possible end of season outcomes, then the probability that the type of exit of coach *i* in season *t* is

$$Prob(Exit_{it} = k) = \frac{\exp\,(b_0^k + \boldsymbol{\beta^k X_{it}})}{\sum_{l=1}^{4} \exp(b_o^l + \boldsymbol{\beta^l X_{it}})}$$

This methodology assumes that each observation is independent of one another. However, as explained by Holmes (2011) and Kopkin (2014) (in the context of college football), this assumption is questionable as certain team and or coach characteristics may make coaching departures more or less likely. Due to the large number of coaches, it is infeasible to include coach fixed effects, although our larger sample size means including team fixed effects for the 32 teams is possible, somewhat dampening this concern. The inclusion of Team Fixed Effects controls for unobservable team characteristics that do not change over time but may change across teams. Another key assumption when using multinomial logit regression is the Independence of Irrelevant Alternatives (IIA) assumption. IIA postulates that the probability of one outcome should be independent of the probability of another. In our case for example, the probability of a promotion should be independent of the probability of a sideways move. This seems a reasonable assumption to make, and it seems implausible that this would be violated.

5. Results

5.1 Descriptive Statistics

Table 1 shows the frequency of each of our types of failure, while Table 2 shows the descriptive statistics for the uninteracted variables, split by role in panels B, C and D.

Table 1: Frequency of type of movement

Type of Move	Frequency	Percent
No Exit	1973	68.55
Promotion	135	4.69
Sideways	204	7.09
Downwards	566	19.67
Total	2878	100.00

Table 2: Descriptive Statistics (selected variables)

Variable	Obs	Mean	Std. Dev.	Min	Max
Panel A: All Coaches					
Tenure	2878	3.10	2.83	1	26
Age	2878	50.38	8.31	28	80
Black	2878	0.14	0.35	0	1
NFL experience	2878	7.48	6.04	0	36
College experience	2878	2.87	4.47	0	25
Played	2878	0.28	0.45	0	1
postRR	2878	0.59	0.49	0	1
GMchange	2878	0.12	0.32	0	1
Panel B: Head Coaches					
Tenure	986	4.22	3.79	1	26
Age	986	51.20	7.38	31	72
Black	986	0.13	0.34	0	1
NFL experience	986	10.14	6.45	0	36
College experience	986	2.89	4.59	0	25
Win Loss percentage	986	0.50	0.19	0	1
Panel C: Offensive Coordinators					
Tenure	934	2.43	1.90	1	12
Age	934	48.40	8.51	28	71
Black	934	0.10	0.30	0	1
NFL experience	934	5.70	4.85	0	28
College experience	934	2.82	3.99	0	21
Points for percentile	934	0.49	0.31	0	1
Yards for percentile	934	0.49	0.31	0	1
Pass yards for percentile	934	0.50	0.31	0	1
Rush yards for percentile	934	0.49	0.31	0	1
Panel D: Defensive Coordinators					
Tenure	958	2.61	1.94	1	13
Age	958	51.46	8.68	31	80

Black	958	0.20	0.40	0	1
NFL experience	958	6.49	5.72	0	34
College experience	958	2.90	4.79	0	24
Pts agn percentile	958	0.50	0.31	0	1
Yards agn percentile	958	0.50	0.31	0	1
Pass yards against percentile	958	0.50	0.31	0	1
Rush yards against percentile	958	0.50	0.31	0	1

By considering the roles separately, we can tell that, on average, Offensive Coordinators tend to be slightly younger than other coaches, while Head Coaches tend to be more experienced (at least in terms of coaching years in the NFL), and spend longer at one team. More Defensive Coordinator positions are filled by minority coaches than Offensive Coordinator positions, which is in line with descriptions in Section 1.

Before progressing with the more detailed regression models, we first present a simple before and after comparison of the probability of observing a black Head Coach in the NFL, pre and post Rooney Rule. As shown by table 3, the probability of observing a black Head Coach in any season after and including 2003 increases by 10%. While this could hint towards some success of the rule, it tells us nothing about any coaching characteristics that make this more likely. This is what we go on to address in the regression analyses that follow.

Table 3: Probability of observing a black Head Coach before and after the Rooney Rule

VARIABLES	Black HC
postRR	0.104***
	(0.023)
Observations	986

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5.2 All Exits

Table 4 presents the results of the logit estimations, which have been estimated separately for the three different coaching roles. Each column for the coordinator roles represents a different performance measure, as indicated by the column headers. Results are displayed as marginal effects, calculated at the variable means and standard errors are clustered at the coach level.

Common across all roles is that the longer spent at a team, the more likely an exit is to occur, although this occurs at a diminishing rate given the negative coefficient on the squared term, with a turning point estimated to be between about 19 seasons for Head Coaches, 7-8 seasons for Offensive Coordinators and between 6-7 seasons for Defensive Coordinators, depending on specification. Given these turning points lie well beyond the average tenure for all roles, for the most part this effect is probably linear in nature.

The performance measures enter with the expected sign, indicating that worse performance is associated with higher likelihood of exit (for HC's and OC's, low values of performance are bad outcomes, whereas for DC's, low values are good outcomes, hence the opposing signs). Win-loss percentages, points scored and points conceded are amongst the strongest predictors of exits.[12] Interestingly however, variables capturing yardage suggest that Offensive and Defensive Coordinators may be valued differently on their outputs, with total yardage mattering on offense, but only rushing yards mattering on defense.

Particularly evident for Head Coaches is the effect of consistent poor performance over a number of seasons, with each additional season further contributing to the likelihood of dismissal, as shown by the negative and significant interaction of win loss percentage and tenure. This could indicate some leniency at the start of their tenure, perhaps if the coach has been tasked with a re-build of the squad. The effect is less pronounced for the coordinator roles. Coaches of teams who reach the postseason (as either a division winner or a wildcard) face lower exit probabilities. However, this is only significant for the coordinator roles, and not for Head Coaches which is likely due to win loss percentages being able to explain a great deal of the variation in post season qualification (the correlation between win loss percentage and post season qualification is about 0.78).

There are no differences in the probability of exiting pre and post Rooney Rule, other than in the OC(1) specification, though this is only significant at 10%, and neither does it differ depending on the coach's race. By itself, race is largely insignificant in explaining exits, other than in specification OC(1), where black Offensive Coordinators are more likely to exit. In both OC(1) and OC(2), black Offensive Coordinators appear to be treated more harshly with regards to poor performance in points scored and yards gained, respectively, since their interactions with race enter significantly.

As for the variables capturing a coach's Human Capital, there are very few significant results. Previous experience at either NFL or college teams are not significant factors in explaining exits, neither is having played professionally before entering coaching. This is perhaps somewhat surprising as one may expect that experience could protect a coach from dismissal, particularly during periods of poor performance, though would be consistent with findings in Bryson *et al* (2021, b), whose work on football (soccer) coaches finds that years of experience matter very little in protecting against dismissals. Older age increases the probability of exiting, but only significantly for Head Coaches.

[12] We also checked to see if Points for and Points against could explain Head Coach departures, but neither could significantly explain Head Coach exits; only win loss percentage was important.

Table 4: All Exits

Role	HC (1)	OC (1)	OC (2)	OC (3)	OC (4)	DC (1)	DC (2)	DC (3)	DC (4)
Performance Measure	Win Loss Percentage	Points for	Yards for	Pass yards for	Rush yards for	Points against	Yards against	Pass yards against	Rush yards against
Tenure	0.090***	0.139***	0.126***	0.126***	0.103***	0.108***	0.107***	0.102***	0.118***
	(0.014)	(0.028)	(0.028)	(0.026)	(0.030)	(0.032)	(0.032)	(0.030)	(0.028)
Tenure Squared	-0.002***	-0.009***	-0.008***	-0.008***	-0.008***	-0.008***	-0.008***	-0.008***	-0.008***
	(0.001)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Black	-0.162	0.224**	0.161	0.166	0.081	-0.031	0.001	0.020	-0.019
	(0.138)	(0.101)	(0.098)	(0.117)	(0.094)	(0.142)	(0.111)	(0.095)	(0.111)
Age	0.005**	0.003	0.003	0.004*	0.003	0.003	0.002	0.002	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Played	0.029	0.017	0.024	0.016	0.028	0.013	0.019	0.021	0.029
	(0.023)	(0.033)	(0.033)	(0.034)	(0.033)	(0.036)	(0.036)	(0.036)	(0.037)
NFL Experience	-0.001	0.001	0.001	0.000	0.001	0.003	0.003	0.003	0.002
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
College Experience	0.002	0.003	0.003	0.004	0.003	-0.003	-0.003	-0.004	-0.004
	(0.002)	(0.005)	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)
Post Season	-0.027	-0.136***	-0.180***	-0.214***	-0.216***	-0.089**	-0.160***	-0.193***	-0.159***
	(0.039)	(0.034)	(0.030)	(0.028)	(0.029)	(0.040)	(0.035)	(0.033)	(0.034)
Performance	-0.558***	-0.152*	-0.162**	-0.062	-0.110	0.295***	0.144	0.048	0.167**
	(0.120)	(0.091)	(0.079)	(0.080)	(0.091)	(0.097)	(0.101)	(0.099)	(0.082)
Black * Performance	0.255	-0.311**	-0.222*	-0.189	-0.038	0.062	0.053	-0.006	0.068
	(0.236)	(0.140)	(0.126)	(0.143)	(0.137)	(0.146)	(0.134)	(0.133)	(0.110)
Tenure * Performance	-0.065***	-0.054**	-0.031	-0.044*	-0.009	0.008	0.018	0.022	-0.006
	(0.021)	(0.027)	(0.024)	(0.022)	(0.025)	(0.029)	(0.032)	(0.028)	(0.025)
postRR	-0.029	0.055*	0.048	0.046	0.045	-0.010	-0.008	-0.007	-0.008
	(0.024)	(0.032)	(0.032)	(0.032)	(0.032)	(0.033)	(0.032)	(0.032)	(0.032)
Black * postRR	0.078	-0.062	-0.045	-0.056	-0.058	0.077	0.054	0.062	0.057
	(0.080)	(0.109)	(0.111)	(0.106)	(0.106)	(0.089)	(0.088)	(0.083)	(0.084)
GMchange	0.115***	0.202***	0.204***	0.206***	0.221***	0.119***	0.122***	0.135***	0.129***
	(0.029)	(0.040)	(0.040)	(0.041)	(0.040)	(0.042)	(0.043)	(0.043)	(0.043)
Team FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	986	934	934	934	934	958	958	958	958

Cluster robust standard errors in parentheses (clustered at the Coach level) *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is Exit (0,1)

5.3 Upwards, Sideways and Downwards Moves

Table 6 displays the results from multinomial logit regressions, where the outcome variable from table 3 (Exit) is now split into No Exit (which was chosen as the base outcome), Upward Moves (i.e. a promotion from coordinator to Head Coach), Sideways Moves (coordinator to coordinator or Head Coach to Head Coach) and Downward Moves. We believe these results are more informative than in 5.2, given the likely different circumstances leading to a promotion, firing etc. The results shown are marginal effects. For reference, table 5 shows the frequency of our different outcomes. An upward or sideways move must occur in the following season, such that the coach is not unemployed for a period during the season, otherwise this is classed as a downward move.

Table 5 : Frequency of Outcomes by Role

Outcome / Role	Head Coach	Offensive Coordinator	Defensive Coordinator	Total
No Exit	774	569	630	1973
Upwards	0	72	63	135
Sideways	32	81	91	204
Downwards	180	212	174	566
Total	986	934	958	2878

The results in table 6 have combined Offensive and Defensive Coordinators into one group to overcome the relative rarity of coordinator promotions. The variable in panel B (table 6) named Points captures the percentile rank of points scored for Offensive Coordinators and percentile rank of points against for Defensive Coordinators, but now the latter has been rescaled such that higher values imply better performance. We also include a dummy variable equal to one if the observation relates to an Offensive Coordinator, in line with Solow *et al* (2011) to check for possible preferences for hiring offensive coaches. There is no upward move equation estimated for Head Coaches because they are already at the top of the coaching ladder so can only move Sideways or Downwards. In order to accurately estimate standard errors, we were unable to include team fixed effects in the Head Coach specification, because for several teams we never observe a Sideways coaching movement. Specifications for our other coordinator performance variables are available in the appendix.

As previously, more seasons at one team tend to increase the likelihood of exiting but at a diminishing rate, though tenure plays no role at all in explaining coordinator promotions. Younger, more experienced (in the NFL), and better performing coordinators are more likely to be promoted to a Head Coaching role. Teams do not appear to be showing any preference towards hiring offensive coordinators for Head Coaching roles, though they are significantly less likely to be retained by their current team even when conditioning on performance. Older Head Coaches and coordinators are likely to drop down coaching levels and or leave coaching altogether. Good performance unsurprisingly protects all coaches from losing their job, shown by the positive and highly significant probabilities on No Exit. Not making the post-season playoffs, however, is likely to result in a downward coaching move.

The effects of age are confirmed by other studies on sports coaches, for example Solow *et al* (2011) for the case of NFL coordinators, Wangrow *et al* (2018) for the case of NBA (basketball) Head Coaches, and Bryson *et al* (2021, b) for football (soccer) Head Coaches. Younger coaches are likely to have a higher job match surplus, while older coaches may suffer from deteriorations in job match surplus. Older coaches may be able to demand a higher salary given their experience and previous success, while with age comes increased risks of health-related issues and concerns about retirement. Indeed, a few coaches in the sample have stepped down due to poor health and or retirement. A further explanation as to why teams may wish to employ younger coaches can be found by drawing on findings from human capital theory (Malone *et al* (2012)). Young coaches have an incentive to invest heavily in acquiring new coaching skills, which are rewarded when appointed as Head Coach. This incentive to invest in new skills falls over time, while skills may also depreciate over time. Anecdotally too, this trend of young, reasonably experienced and well performing coaches being promoted is evident, particularly recently. Of the 8 Head Coaches appointed ahead of the 2019 season, five were aged 40 or younger when appointed, four of whom would be NFL Head Coaches for the first time, yet all could boast several years of previous experience in other roles. This has been labelled in some media circles as the 'Sean McVay effect'; McVay's success as a young offensive mind at the Rams subsequently led to several teams copying the Rams' strategy, or even hiring McVay's assistants.

We can also see the effect of a team changing its GM. Coaches are more likely to drop down coaching levels when the GM changes, perhaps highlighting the new GM's desire to bring in their own coaching staff. More likely however, is that the owners (who themselves hire and fire the GM) decide the whole coaching and scouting teams have been performing below standard and decide on a complete overhaul of these positions.

Now that coaching moves are considered separately, we are able to comment on the success of the Rooney Rule by considering the Black * postRR coefficient. Both promotions from coordinator positions and sideways moves for Head Coaches would potentially be affected by the interview requirement, so it is important to consider both of these. Results suggest that the probability of a Black coordinator being promoted after the rule increases by around 0.074, significant at 10%, pointing toward some degree of success of getting more minority coaches into top coaching roles. This result also holds up in our alternative specifications in the appendix with alternative coordinator performance measures. We can also see however, that in the post rule period, Head Coaches are significantly less likely to find a job on the same level, but there is no difference by race. It appears therefore, that teams are now searching the current pool of Black coordinators rather than just ex-Head Coaches to fill current Head coaching vacancies.

That Black coordinators are more likely to be promoted to a Head Coach role post Rooney Rule is a finding that contrasts the results of and Solow *et al* (2011), who demonstrate no significant differences in probability of promotion by race. It could be that we are capturing some longer term effect of the rule, which is being picked up in the additional seasons in our data, but with that said, the effect shown here is still only marginally significant.

Table 6: Multinomial Logit regression for different coaching outcomes

Panel A: Head Coaches

OUTCOME	Tenure	Tenure Squared	Black	Age	Played	NFL Exp.	College Exp.	Post Season	Win Loss Percentage	Black* WLP	Tenure* WLP	postRR	Black* postRR	GM change
No Exit	-0.074***	0.002***	0.029	-0.006**	-0.001	0.002	-0.002	0.071	0.530***	-0.086	0.056***	0.016	0.009	-0.119***
	(0.014)	(0.001)	(0.146)	(0.002)	(0.022)	(0.003)	(0.002)	(0.047)	(0.117)	(0.254)	(0.021)	(0.023)	(0.097)	(0.028)
Sideways	0.028***	-0.001*	0.142***	-0.001	-0.006	0.001	0.001	0.023	0.033	-0.241**	-0.023*	-0.026**	-0.052	0.010
	(0.010)	(0.001)	(0.041)	(0.001)	(0.012)	(0.001)	(0.002)	(0.019)	(0.080)	(0.095)	(0.013)	(0.013)	(0.034)	(0.014)
Downwards	0.045***	-0.001*	-0.171	0.006***	0.006	-0.003	0.001	-0.094**	-0.563***	0.328	-0.033	0.010	0.043	0.109***
	(0.012)	(0.001)	(0.130)	(0.002)	(0.021)	(0.002)	(0.002)	(0.048)	(0.114)	(0.209)	(0.021)	(0.022)	(0.091)	(0.025)
Team FE	NO													
Observations	986													

Panel B: Coordinators

OUTCOME	Tenure	Tenure Squared	Black	Age	Played	NFL Exp.	College Exp.	Post Season	Points	Black* Points	Tenure* Points	postRR	Black* postRR	GM change	OC=1
No Exit	-0.120***	0.008***	-0.064	-0.002	-0.006	-0.003	-0.000	0.118***	0.246***	0.106	0.028	-0.024	-0.061	-0.155***	-0.071***
	(0.021)	(0.002)	(0.059)	(0.002)	(0.024)	(0.002)	(0.003)	(0.026)	(0.069)	(0.099)	(0.023)	(0.022)	(0.063)	(0.030)	(0.021)
Promotion	0.014	-0.001	-0.042	-0.005***	0.012	0.003*	-0.000	0.007	0.073*	-0.032	0.006	-0.005	0.074*	0.036*	-0.000
	(0.013)	(0.001)	(0.050)	(0.001)	(0.015)	(0.002)	(0.002)	(0.012)	(0.040)	(0.060)	(0.012)	(0.013)	(0.042)	(0.020)	(0.013)
Sideways	0.066***	-0.004***	0.059	-0.003***	0.024	0.004**	0.003	-0.068***	0.049	-0.013	-0.026**	-0.001	-0.029	0.037**	-0.003
	(0.016)	(0.002)	(0.036)	(0.001)	(0.016)	(0.002)	(0.002)	(0.018)	(0.048)	(0.065)	(0.012)	(0.014)	(0.034)	(0.019)	(0.013)
Downwards	0.040***	-0.003	0.047	0.010***	-0.030	-0.003*	-0.002	-0.057**	-0.368***	-0.060	-0.008	0.031*	0.015	0.082***	0.074***
	(0.015)	(0.002)	(0.048)	(0.001)	(0.020)	(0.002)	(0.002)	(0.024)	(0.062)	(0.074)	(0.018)	(0.019)	(0.051)	(0.022)	(0.018)
Team FE	YES														
Observations	1,892														

Cluster robust standard errors in parentheses (clustered at the Coach level)

*** p<0.01, ** p<0.05, * p<0.1

5.4 Evaluating NFL Coaching Performance

In light of these findings, we now turn to examining what effect, if any, the Rooney Rule has had on coaching performance. As explained by Holzer (2007), a common critique of affirmative action policies is that they could lead to firms employing lower qualified (perhaps lower quality) workers, creating a sort of reverse discrimination. In this sense, rather than creating equal opportunities, affirmative action may actually lead to equal outcomes. To test this critique, in an extension of work by Madden & Ruther (2011), using our additional years of data post Rooney Rule, we analyse how the relative performance of Black coaches has changed post Rooney Rule. In table 7, we show the results from several Generalized Linear Models (GLM) to examine changes to Win Loss percentages for Head Coaches, and for our selection of performance metrics for coordinators. A GLM is appropriate here since the dependent variable lies between 0 and 1. The equation in the second column for Head Coaches estimates a Logit model for the likelihood of making the post season playoffs, with results displayed as marginal effects. All standard errors are clustered at the coach level.

Table 7: Coaching performance per and post Rooney Rule

	HC	HC	Coordinators	Coordinators	Coordinators	Coordinators
	Win Loss	Post Season			Passing	Rushing
Outcome	Percentage	(0,1)	Points	Yards	Yards	Yards
VARIABLES	GLM	Logit	GLM	GLM	GLM	GLM
Black	0.090***	0.322***	0.020	0.055	0.064	-0.003
	(0.027)	(0.073)	(0.047)	(0.044)	(0.050)	(0.041)
postRR	-0.007	-0.025	-0.017	-0.008	-0.009	0.001
	(0.019)	(0.041)	(0.021)	(0.021)	(0.020)	(0.020)
Black * postRR	-0.089*	-0.340***	-0.023	-0.053	-0.045	-0.041
	(0.050)	(0.110)	(0.054)	(0.055)	(0.060)	(0.050)
Age	-0.003	-0.003	-0.001	-0.002	-0.001	-0.002
	(0.002)	(0.004)	(0.002)	(0.002)	(0.001)	(0.002)
Played	-0.026	-0.095**	-0.009	0.012	-0.017	0.041
	(0.020)	(0.047)	(0.024)	(0.026)	(0.025)	(0.025)
NFL experience	0.007***	0.010**	0.004*	0.006**	0.003	0.005*
	(0.002)	(0.004)	(0.002)	(0.002)	(0.002)	(0.003)
College experience	0.000	-0.003	0.003	0.002	0.002	-0.000
	(0.002)	(0.006)	(0.003)	(0.002)	(0.002)	(0.002)
Constant	0.578***		0.513***	0.561***	0.505***	0.587***
	(0.076)		(0.076)	(0.075)	(0.066)	(0.075)
Observations	986	986	1,892	1,892	1,892	1,892
R Squared						

Cluster robust standard errors in parentheses (clustered at the Coach level)
*** p<0.01, ** p<0.05, * p<0.1

The results confirm the findings by Madden & Ruther (2011), in that any performance advantage of Black Head Coaches disappeared post Rooney Rule. The magnitudes and opposite signs of the coefficients on Black and Black*postRR in both the win percentage and post season qualification equations shows this disappears almost completely. The decline in win-loss percentage of about 9% equates to just under 1.5 wins per season. As a result of

these fewer regular season wins, the resulting probability of making the playoffs also declines. This performance decline is consistent with the idea that the Rooney Rule is encouraging / forcing teams to consider equally skilled Black and White candidates for Head Coaching positions. Previously to the implementation of the rule, it would appear that only the best black coaches were hired, and consequently, the average performance of black Head Coaches pre Rooney Rule was higher.

The same cannot be said for coordinators. Performance of black and white coordinators was statistically the same both before and after the Rooney Rule implementation in 2003. Of course, the rule did not cover coordinators, so we would not expect it to differ post its implementation. However, given that we also have no statistical significance on the uninteracted Black variable, it is possible that teams were considering equally skilled candidates, regardless of race, unlike the case we demonstrate for Head Coaches. This could shed some light on a comment from Solow *et al* (2011), but never fully explored. Quite rightly, they claim that it is not clear if the Rooney Rule was the sole reason behind the increase in the number of minority Head Coaches (i.e. guaranteeing black coordinators an interview to showcase their ability where they were previously being overlooked), or whether minority coordinators were developing into better coaches in the same period. The results here appear to lend support to the former hypothesis, in that minority coordinators have always been of equal ability, and the rule has simply allowed them to showcase their ability to potential employers during interviews, which perhaps they were not able to do pre–Rooney Rule.

The age of a coach is not a determinant of performance, however more experience in the NFL (though, not experience in College football) does show some association to improved performance, particularly for Head Coaches. The link between performance and experience could be due to experienced coaches accumulating more skills and coaching ability over their career; an extension of an on the job learning type argument (see for example Gaynor *et al* (2005) in the health economics literature). However, this finding could also just be reflecting a selection effect where only the best coaches stay in a job and or find new jobs.

Being a former player is largely insignificant, though Head Coaches who are former players are less likely to make the playoffs. There is certainly no evidence of former players making better coaches. This result contrasts with the findings by Goodall *et al* (2011), (albeit using different methodology in a different sport, and this is by no means the focus of our paper) who compare the outcomes of NBA coaches who were former players against those who never played. They find that teams who hire a former player see an improvement in win percentage and perform better in the playoffs than teams who hire a coach who never played, and this finding is exaggerated when the coach was a star player. Of course, the skills required to be a good coach and a good player are not necessarily the same, so not all good players will make good coaches, although we are not wishing to make any claims about causality here.

5.5 Robustness Checks

We discuss the results from two robustness checks in the following section. The full results tables for these can be found in the appendix.

The first check involves dropping coach-year observations where the coach retires. In the previous analyses, such exits were classed as a downward coaching move since they do not re-appear in the sample. However, a retirement is likely a different outcome to a downward move. The cases were easy to identify, usually via media publications or press statements where the coach announced their intention to retire at some point. On some occasions following their decision to retire, the coach came out of retirement (e.g. Bruce Arians has twice announced his retirement only to return). These cases are still classified as a retirement, on the grounds that their initial decision to retire was, at the time, deemed a permanent decision. This eliminates 53 coach year observations from the downward moves equations. The results and main findings remain unchanged, though age drops out of significance for the No Exit outcome for Head Coaches.

Finally, we check the robustness of our definition of exits to college teams. So far, we have classed an equivalent title at college on equal footing to an NFL team. In reality, some colleges would likely be seen as a downward step so we adjust our definition of sideways and downwards moves to college teams, given the prestige of some colleges. In particular, we use the top 25 ranked college teams, based on CollegeChoice rankings, as colleges that are maintained on an equal footing to NFL teams, whereas moves to other college teams will be considered as a downward move. [13] Using this changed definition, in the main, results are unchanged, however, we do observe some slight differences in the significance of the race variable and its interactions. Namely, sideways moves for black coordinators now enter significantly, while black Head Coaches are now significantly less likely to find a job on the same level post Rooney Rule, though results for black coordinator promotions remain unchanged.

6. Conclusions

We have investigated the relationship between race and organizational (specifically coaching) hierarchy in the NFL, a setting where this issue is never far from the headlines. Using a new, unique dataset considering the top two levels of coaching staffs dating back to 1989, we examine movements between Coordinator and Head Coach positions, and out of these positions altogether.

Results suggest that teams favour employing younger, more experienced and better performing coordinators to fill a Head Coaching vacancy, while teams are more likely to fire older and poorly performing coaches. A coach's race has little impact on exits, although black coordinators are marginally more likely to be promoted to a Head Coaching role after the implementation of the Rooney Rule.

[13] Rankings available at https://www.collegechoice.net/rankings/best-football-schools/, with colleges ranked on 4 categories; on field success, alumni success, game day experience, and culture and influence.

An analysis of Head Coach and coordinator performance pre- and post-Rooney Rule reveals two interesting findings. First, teams do now appear to be considering equally skilled black coaches to fill the Head Coach role, as shown by the win percentages of black and white Head Coaches equalising after the implementation of the rule. Second, when we consider coordinator performance, the performance across our four measures is statistically the same for both white and black coordinators, pre- and post-Rooney Rule. Taken together, this would imply that while a skilled supply of coordinators, regardless of race, has always been available to teams, the Rooney Rule seems to have forced to teams to consider and then hire equally skilled candidates at the Head Coach position. In spite of this, the success of the Rooney Rule is still an open source of debate, particularly when a strong black candidate is seemingly overlooked.

The adoption of very similar policies in a variety of other settings, both sporting (e.g. the English Football League (EFL), the Football Association, the English Cricket Board) and non-sporting (e.g. Facebook) suggest that these other industries look favourably on the outcomes of the rule, or at the very least, believe it has a positive PR value. A survey carried out by Kilvington (2018) on British Asian coaches working in English football (soccer), shows a slight favouritism towards the policy being introduced in the EFL. Support was not universal though, as some coaches referred to the policy as *'tokenistic'*, with coaches pointing out that hiring tends to be as a result of networks, connections and recommendations in the industry, which essentially renders the policy redundant. This could lead to so called 'sham interviews' being conducted just to tick a box and avoid punishment by the league. To date though, only one NFL team has ever been found to be in violation of the Rooney Rule; the Detroit Lions in 2003.

The Rooney Rule is probably best described as a small step in the right direction. One potential avenue could be to improve opportunities for minority coaches lower down the coaching ladder, particularly for coaches with offensive backgrounds. A Denver Post (2017) analysis highlights this issue, that between 2007 and 2017, of the 147 Offensive Coordinator job openings, 110 were filled by former quarterback coaches (in line with Foreman *et al* (2018) on teams' preference for coaches with central position experience). Of these 110, only 5 were filled by a Black coach, with Hue Jackson alone filling 3 of them. Several authors (Foreman *et al* (2018), Solow *et al* (2011)) suggest that the reason we observe so few minority coaches in top coaching positions is due to barriers early on in careers, maybe even during the coach's high school and college playing days (Pitts & Yost (2013)) and so prospective coaches never gain the experiences required for career development. So while the Rooney Rule has been marginally successful in ensuring opportunities for minority coaches at the very top of the coaching hierarchy, the next step to ensure equal access and opportunity for minority coaches is to target grassroots levels.

As a final point, the NFL can only do so much to help improve prospects and opportunities for minority coaches; they have even begun to incentive teams to make minority hires by awarding them with additional draft picks. However, if there is no willingness by team owners and executives to make minority hires, then the NFL policies will be redundant. This is a much harder problem to solve, but interview and recruitment training, is one such possibility.

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APPENDIX

Alternative Performance Measures for Coordinators

Panel A: Total Yards

	Tenure	Tenure Squared	Black	Age	Played	NFL Exp.	College Exp.	Post Season	Yards	Black*Yards	Tenure* Yards	postRR	Black* postRR	GM change	OC=1
No Exit	-0.121***	0.008***	-0.071	-0.002	-0.013	-0.004*	-0.000	0.179***	0.183***	0.086	0.020	-0.022	-0.053	-0.157***	-0.069***
	(0.021)	(0.002)	(0.068)	(0.002)	(0.024)	(0.002)	(0.003)	(0.023)	(0.065)	(0.090)	(0.021)	(0.023)	(0.066)	(0.030)	(0.021)
Promotion	0.012	-0.001	-0.010	-0.004***	0.011	0.003*	-0.000	0.016	0.080**	-0.089*	0.008	-0.005	0.072*	0.038*	-0.001
	(0.014)	(0.001)	(0.043)	(0.001)	(0.015)	(0.002)	(0.002)	(0.012)	(0.038)	(0.050)	(0.011)	(0.013)	(0.041)	(0.020)	(0.013)
Sideways	0.067***	-0.004**	0.040	-0.003***	0.023	0.004**	0.003	-0.076***	0.060	0.021	-0.027**	-0.001	-0.026	0.037*	-0.004
	(0.016)	(0.002)	(0.040)	(0.001)	(0.016)	(0.002)	(0.002)	(0.016)	(0.043)	(0.062)	(0.011)	(0.014)	(0.033)	(0.019)	(0.013)
Downwards	0.042***	-0.003*	0.041	0.009***	-0.022	-0.003	-0.002	-0.119***	-0.323***	-0.018	-0.001	0.027	0.007	0.083***	0.073***
	(0.015)	(0.002)	(0.056)	(0.001)	(0.020)	(0.002)	(0.002)	(0.021)	(0.054)	(0.072)	(0.017)	(0.018)	(0.053)	(0.022)	(0.018)
Team FE	YES														
Observations	1,892														

Table continued on next page

Panel B: Passing Yards

VARIABLES	Tenure	Tenure Squared	Black	Age	Played	NFL Exp.	College Exp.	Post Season	Passing Yards	Black* Passing Yards	Tenure* Passing Yards	postRR	Black* postRR	GM change	OC=1
No Exit	-0.120***	0.008***	-0.047	-0.002	-0.008	-0.003	0.000	0.218***	0.085	0.048	0.031	-0.021	-0.053	-0.164***	-0.072***
	(0.021)	(0.002)	(0.074)	(0.002)	(0.024)	(0.002)	(0.003)	(0.022)	(0.065)	(0.092)	(0.019)	(0.022)	(0.063)	(0.030)	(0.021)
Promotion	0.015	-0.002	0.014	-0.004***	0.012	0.003*	-0.000	0.030***	0.045	-0.154***	0.010	-0.004	0.074*	0.030	-0.000
	(0.013)	(0.001)	(0.039)	(0.001)	(0.015)	(0.002)	(0.002)	(0.011)	(0.039)	(0.054)	(0.012)	(0.013)	(0.042)	(0.019)	(0.012)
Sideways	0.064***	-0.004**	0.003	-0.003***	0.023	0.004**	0.003	-0.079***	0.037	0.088	-0.020	-0.003	-0.025	0.040**	-0.003
	(0.017)	(0.002)	(0.045)	(0.001)	(0.017)	(0.002)	(0.002)	(0.015)	(0.045)	(0.066)	(0.013)	(0.014)	(0.033)	(0.019)	(0.013)
Downwards	0.042***	-0.002	0.030	0.010***	-0.027	-0.003*	-0.003	-0.168***	-0.167***	0.018	-0.021	0.027	0.004	0.094***	0.076***
	(0.016)	(0.002)	(0.055)	(0.001)	(0.020)	(0.002)	(0.002)	(0.021)	(0.052)	(0.072)	(0.016)	(0.018)	(0.050)	(0.022)	(0.018)
Team FE	YES														
Observations	1,892														

Panel C: Rushing Yards

VARIABLES	Tenure	Tenure Squared	Black	Age	Played	NFL Exp.	College Exp.	Post Season	Rushing Yards	Black* Rushing Yards	Tenure* Rushing Yards	postRR	Black* postRR	GM change	OC=1
No Exit	-0.102***	0.008***	0.013	-0.002	-0.016	-0.003	0.000	0.202***	0.138**	0.002	-0.003	-0.016	-0.069	-0.166***	-0.069***
	(0.019)	(0.002)	(0.066)	(0.002)	(0.024)	(0.002)	(0.003)	(0.023)	(0.060)	(0.091)	(0.017)	(0.023)	(0.065)	(0.030)	(0.022)
Promotion	0.021	-0.002	-0.122**	-0.005***	0.010	0.003*	0.000	0.023**	0.050	0.082	0.000	-0.007	0.094**	0.031	0.002
	(0.014)	(0.002)	(0.057)	(0.001)	(0.015)	(0.002)	(0.002)	(0.012)	(0.037)	(0.071)	(0.010)	(0.013)	(0.040)	(0.019)	(0.013)
Sideways	0.058***	-0.004***	0.068**	-0.003***	0.026	0.004**	0.003	-0.069***	-0.023	-0.034	-0.009	-0.002	-0.032	0.036*	-0.007
	(0.014)	(0.001)	(0.032)	(0.001)	(0.017)	(0.002)	(0.002)	(0.017)	(0.041)	(0.051)	(0.010)	(0.015)	(0.034)	(0.019)	(0.013)
Downwards	0.024	-0.002	0.040	0.010***	-0.020	-0.004*	-0.003	-0.156***	-0.164***	-0.050	0.011	0.026	0.007	0.099***	0.073***
	(0.017)	(0.002)	(0.058)	(0.001)	(0.020)	(0.002)	(0.002)	(0.022)	(0.054)	(0.075)	(0.017)	(0.019)	(0.055)	(0.023)	(0.018)
Team FE	YES														
Observations	1,892														

Cluster robust standard errors in parentheses (clustered at the Coach level)

*** p<0.01, ** p<0.05, * p<0.1

Dropping Retired Coaches

Panel A: Head Coaches

VARIABLES	Tenure	Tenure Squared	Black	Age	Played	NFL Exp.	College Exp.	Post Season	Win Loss Percentage	Black* WLP	Tenure* WLP	postRR	Black* postRR	GM change
No Exit	-0.083***	0.002**	-0.012	-0.003	0.007	0.003	-0.002	0.080*	0.444***	-0.010	0.066***	0.013	0.025	-0.122***
	(0.015)	(0.001)	(0.133)	(0.002)	(0.021)	(0.003)	(0.002)	(0.046)	(0.114)	(0.251)	(0.023)	(0.023)	(0.089)	(0.027)
Sideways	0.029***	-0.001*	0.144***	-0.001	-0.005	0.001	0.001	0.024	0.029	-0.244**	-0.024*	-0.026**	-0.054	0.009
	(0.010)	(0.001)	(0.043)	(0.001)	(0.012)	(0.001)	(0.002)	(0.020)	(0.083)	(0.098)	(0.014)	(0.013)	(0.035)	(0.015)
Downwards	0.054***	-0.001	-0.132	0.004**	-0.001	-0.004*	0.001	-0.105**	-0.473***	0.255	-0.042*	0.014	0.029	0.112***
	(0.013)	(0.001)	(0.113)	(0.002)	(0.021)	(0.003)	(0.002)	(0.048)	(0.116)	(0.211)	(0.024)	(0.022)	(0.080)	(0.023)
Team FE	NO													
Observations	966													

Panel B: Coordinators

VARIABLES	Tenure	Tenure Squared	Black	Age	Played	NFL Exp.	College Exp.	Post Season	Points	Black* Points	Tenure* Points	postRR	Black* postRR	GM change	OC=1
No Exit	-0.124***	0.008***	-0.068	-0.000	-0.009	-0.003	-0.000	0.123***	0.218***	0.107	0.034	-0.029	-0.055	-0.156***	-0.073***
	(0.022)	(0.002)	(0.058)	(0.002)	(0.025)	(0.002)	(0.003)	(0.026)	(0.069)	(0.099)	(0.023)	(0.023)	(0.063)	(0.030)	(0.021)
Promotion	0.014	-0.001	-0.042	-0.005***	0.012	0.003**	-0.000	0.007	0.074*	-0.034	0.007	-0.005	0.076*	0.037*	-0.000
	(0.014)	(0.002)	(0.050)	(0.001)	(0.015)	(0.002)	(0.002)	(0.013)	(0.041)	(0.061)	(0.012)	(0.013)	(0.043)	(0.020)	(0.013)
Sideways	0.067***	-0.004***	0.059	-0.003**	0.024	0.004**	0.002	-0.069***	0.047	-0.012	-0.026**	-0.003	-0.028	0.039**	-0.002
	(0.016)	(0.002)	(0.037)	(0.001)	(0.017)	(0.002)	(0.002)	(0.018)	(0.049)	(0.066)	(0.013)	(0.014)	(0.034)	(0.019)	(0.013)
Downwards	0.042***	-0.003	0.051	0.008***	-0.028	-0.004*	-0.002	-0.061**	-0.339***	-0.061	-0.014	0.037**	0.007	0.080***	0.075***
	(0.016)	(0.002)	(0.047)	(0.001)	(0.020)	(0.002)	(0.003)	(0.024)	(0.061)	(0.075)	(0.017)	(0.019)	(0.049)	(0.022)	(0.018)
Team FE	YES														
Observations	1,859														

Cluster robust standard errors in parentheses (clustered at the Coach level)

*** p<0.01, ** p<0.05, * p<0.1

Redefining Exits to College Teams by prestige

Panel A: Head Coaches

VARIABLES	Tenure	Tenure Squared	Black	Age	Played	NFL Exp.	College Exp.	Post Season	Win Loss Percentage	Black* WLP	Tenure* WLP	postRR	Black* postRR	GM change
No Exit	-0.073***	0.002***	0.012	-0.006**	0.000	0.002	-0.002	0.072	0.535***	-0.054	0.057***	0.016	0.031	-0.118***
	(0.014)	(0.001)	(0.148)	(0.002)	(0.022)	(0.003)	(0.002)	(0.047)	(0.117)	(0.257)	(0.021)	(0.023)	(0.100)	(0.028)
Sideways	0.027***	-0.001*	0.165***	-0.001	-0.005	0.001	0.000	0.029	0.012	-0.292***	-0.021*	-0.023*	-0.088**	0.005
	(0.010)	(0.001)	(0.041)	(0.001)	(0.012)	(0.001)	(0.002)	(0.019)	(0.078)	(0.098)	(0.012)	(0.012)	(0.042)	(0.014)
Downwards	0.046***	-0.001*	-0.177	0.006***	0.005	-0.003	0.002	-0.101**	-0.547***	0.347*	-0.035*	0.007	0.058	0.113***
	(0.012)	(0.001)	(0.133)	(0.002)	(0.021)	(0.002)	(0.002)	(0.048)	(0.112)	(0.208)	(0.021)	(0.022)	(0.093)	(0.026)
Team FE	NO													
Observations	986													

Panel B: Coordinators

VARIABLES	Tenure	Tenure Squared	Black	Age	Played	NFL Exp.	College Exp.	Post Season	Points	Black* Points	Tenure* Points	postRR	Black* postRR	GM change	OC=1
No Exit	-0.123***	0.008***	-0.078	-0.002	-0.006	-0.003	0.000	0.118***	0.229***	0.129	0.032	-0.024	-0.061	-0.154***	-0.072***
	(0.021)	(0.002)	(0.059)	(0.002)	(0.024)	(0.002)	(0.003)	(0.026)	(0.069)	(0.098)	(0.022)	(0.022)	(0.063)	(0.030)	(0.021)
Promotion	0.017	-0.001	-0.018	-0.005***	0.011	0.004**	-0.001	0.007	0.095**	-0.051	0.001	-0.006	0.069*	0.027	-0.004
	(0.013)	(0.001)	(0.046)	(0.001)	(0.014)	(0.001)	(0.002)	(0.012)	(0.038)	(0.057)	(0.011)	(0.013)	(0.039)	(0.020)	(0.012)
Sideways	0.067***	-0.004***	0.070**	-0.003**	0.021	0.003**	0.002	-0.063***	0.065	-0.020	-0.029**	0.006	-0.038	0.034*	-0.004
	(0.016)	(0.002)	(0.036)	(0.001)	(0.016)	(0.002)	(0.002)	(0.017)	(0.047)	(0.063)	(0.012)	(0.014)	(0.033)	(0.019)	(0.013)
Downwards	0.039**	-0.003*	0.026	0.009***	-0.026	-0.004**	-0.001	-0.063***	-0.390***	-0.058	-0.004	0.024	0.030	0.093***	0.080***
	(0.015)	(0.002)	(0.049)	(0.001)	(0.020)	(0.002)	(0.002)	(0.024)	(0.063)	(0.076)	(0.018)	(0.018)	(0.052)	(0.022)	(0.018)
Team FE	YES														
Observations	1,892														

Cluster robust standard errors in parentheses (clustered at the Coach level)

*** p<0.01, ** p<0.05, * p<0.1