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Race and Retention in a Competitive Labor Market: The Role of Historically Black Colleges and Universities in NCAA Basketball

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Abstract
Between 1994 and 2013, Black head coaches of Division I National Collegiate Athletic Association basketball programs were more likely to be terminated than their White counterparts, adjusting for performance and characteristics of the coach. Controlling for employment at a historically Black college or university, which accounts for approximately a quarter of the Black coaches in our sample, overturns this result. The findings highlight the importance of understanding institutional environments when assessing discrimination in labor market outcomes.

Keywords
discrimination, NCAA basketball, HBCU, hazard models

Introduction

Following Becker (1971), discrimination is usually defined as unequal treatment of equally productive workers on the basis of such factors as race, gender, age, or other characteristics. Previous attempts to test for the effects of racial discrimination have

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often focused on labor markets found in professional or collegiate sports, as a statistical test for the presence of discrimination requires measures of the output or productivity of the workers involved that are difficult to observe in common survey data (e.g., Bertrand & Mullainathan, 2004; Donald & Hamermesh, 2006; Parsons, Sulaeman, Yates, & Hamermesh, 2011). As Kahn (2000, p. 75) notes, there are few markets "other than sports where we know the name, face, and life history of every production worker and supervisor in the industry." The availability of detailed data, especially data on worker productivity, has facilitated attempts to test for discrimination in sports markets as a way to gain insight on discrimination in the larger marketplace.

Past research into the effects of racial discrimination on the labor market outcomes of players or coaches has focused on the effects of race on (i) salary or compensation, (ii) the decision to hire or retain players or coaches, and (iii) the segregation of players or coaches by position or rank. In this study, we focus on the impact of race on the tenure of head basketball coaches at National Collegiate Athletic Association (NCAA) Division I schools over the period 1994-2013.

Although past studies have focused on the impact of race on the retention of players or coaches in the National Basketball Association (NBA), National Football League (NFL), Major League Baseball (MLB), and college football, none have examined head coaches in college basketball. This subject is of particular interest, as basketball has long been considered one of the most racially diverse sports at the college level. During the period 2009-2010 through 2011-2012, 57.1% of all college basketball players were Black, compared to 43.4% in college football and 2.6% in college baseball (Lapchick, 2012). During the same period, 20.5% of all Division I head basketball coaches were Black, which greatly exceeded the percentage of Black head coaches in college football (9.0%) and college baseball (1.1%). However, the environment for Black head basketball coaches has deteriorated significantly in the last few years. Lapchick (2012) reports that:

> A major area of concern for the Racial and Gender Report Card is the African-American coaching presence in men's Division I basketball. Each of the past four years has seen a decline in the number, with 2008-2009 at 20.8 percent, 2009-10 at 20.1 percent, 2010-11 at 18.8 percent, and the past year declining to 18.6 percent. This represents a huge drop from 25.2 percent of African-Americans coaching in men's Division I basketball in 2005-06, the highest percentage ever recorded in the Report Card. (p. 18)

This decrease in the number of Black head basketball coaches has prompted a number of articles in the popular press or online, including the *New York Times* (2012), Powers (2012), Medcalf (2013), and Forde (2014a, 2014b). Belzer (2012, p. 13) examined the hiring and firing data for Division I head basketball coaches between 2002 and 2011[1] and concluded "not only are minorities hired at considerably lower rates in Division I men's college basketball, but they are also fired at a significantly higher rate." Belzer goes on to note that:

> two historically black conferences that are members of Division I, the Mid-Eastern Athletic Conference (MEAC) and the Southwestern Athletic Conference (SWAC) have an alarmingly high turnover rate of coaches at their respective member schools. In fact, over the last decade, of the astonishing 72 coaching changes that have occurred at the schools within these conferences, only two of them can be attributed to coaches leaving for jobs in other leagues. That means that 70 coaching changes (approximately 3.1 per-team) have been fired or forced to resign over the last 10 years. (p. 12)

The high rate of turnover among head coaches at historically Black schools is not unique to Division I basketball. Holmes (2011) examined why head coaches at Division I FBS football programs were terminated during the period 1983-2006; his results indicate that among coaches who were involuntarily dismissed, 34.7% had tenures of 4 years or less. In 2013, 22 historically Black colleges or universities (HBCUs) were classified as Division I FCS in college football. These 22 schools employed 84 unique coaches during the period 1995-2013, only 3 of whom were White. Among the coaches who were involuntarily dismissed, 64.6% enjoyed coaching spells that lasted 4 years or less, a figure almost twice that reported by Holmes (2011) for Division I FBS football coaches.

This study examines the role that race plays in the retention of head basketball coaches in NCAA Division I basketball. Employing data for 298 schools over the period 1994/1995 through 2012/2013, we estimate hazard functions controlling for the characteristics of the coach, their team, the school, and the athletic conference to which the school belonged that may affect the decision to fire a coach. In a raw comparison of firings of Black coaches to their peers, the odds an African-American is fired after a given season are over 1.5 times those of a White coach, indicating the potential for large racial bias in retention decisions. The statistically significant difference persists after controlling for the performance of the team and demographic characteristics of the coach.

However, approximately a quarter of the Black coaches in our sample were employed by schools classified as HBCUs, which have very high rates of turnover among their coaching staffs regardless of race as noted by Belzer (2012).[2] This distinction is a major focus of the analysis, as after controlling for employment at a school classified as an HBCU, we find that race has no statistical or economically significant impact on the likelihood of being terminated. This result is robust to distributional assumptions of our model, subsets of the data, and varying sets of controls including team fixed effects to account for time-invariant unobserved heterogeneity at the school level. With over 240 Black coaches in the data, the lack of discrimination is not a statistical artifact of small sample size or poor precision in our models but reflects no meaningful difference in the firing rates of Black and White coaches after accounting for employment at an HBCU.

The results both speak to the public debate on racial discrimination in labor markets and highlight the importance of rigorous empirical evidence when evaluating claims of discrimination. While our analysis is silent on discrimination of

coaches in obtaining Division I jobs, we find no statistical discrimination against Black coaches in the likelihood they are dismissed. The larger, general conclusion points to the importance of understanding the institutional environment at hand when assessing discrimination based on labor market outcomes.

Previous Literature

There is an extensive literature on the effects of discrimination in professional sports,[3] but the literature focusing on collegiate sports and exit discrimination is somewhat limited. Humphries (2000) examined the impact of gender on the salaries of head coaches of NCAA Division I basketball teams during the period 1990-1991. Controlling for experience and career winning percentage among other factors, he failed to find a significant gender effect among the head coaches of women's teams. When the sample was enlarged to include the head coaches of both men's and women's teams, the gender variable was insignificant, but the results indicate that the head coaches of women's teams are paid approximately 50% less than the head coaches of men's teams. Although the study did not include a variable controlling for race, his results show that coaches at HBCUs are paid less than coaches at other schools.

Brown and Jewell (1994, 1995) employed data from 42 Division I and IA programs during the period 1988-1989 to test for the effects of customer discrimination in college basketball. They reported that replacing an average Black player with an average White player would increase gate receipts by approximately US$100,000 in a season (1994) and that replacing a star Black player with a star White player (defined to be a player selected in the NBA draft) would increase revenues per game by approximately US$30,000 or by up to US$1,000,000 over the course of a season. Cunningham and Sagas (2005) examined the issue of entry or hiring discrimination into the ranks of college basketball coaches using survey data from 191 Division I basketball programs. They found that Blacks make up 48% of the potential applicants, defined to be collegiate basketball players with a college degree, but they hold only 33% of the assistant coaching jobs. Furthermore, they reported that Black assistant coaches are underrepresented on the coaching staffs of teams with White head coaches relative to Black head coaches.

Fizel and D'Itri (1977) explore the factors that explain a school's decision to change their head coach during a given season. Using data from 147 college basketball programs during the period 1984-1991, they estimate probit models to determine the impact of coaching efficiency (measured using data envelopment analysis) and winning percentage among other factors on both voluntary and involuntary coaching changes. Their results indicate that the probability of an involuntary departure is negatively related to a coach's winning percentage and experience and that the impact of coaching efficiency is positive but statistically insignificant. Their analysis, however, did not take race into consideration.

Mixon and Trevino (2004) estimated a discrete time hazard models to explore the effect of race on the decision to terminate head coaches in Division IA football during the period 1990-2000. Controlling for the coach's cumulative winning percentage, the number of games played in a year, year fixed effects, the change in the team's winning percentage, and a binary variable for the coach's first season, they find no evidence of racial discrimination on the probability of dismissal. Holmes (2011) updates the Mixon and Trevino's study, extending the sample to cover the period 1983-2006. Estimating a discrete time hazard model with additional controls for past winning percentages and other factors, he finds no evidence of the effects of race on the probability of dismissal for the first 6 years of a coaches tenure, but there is some evidence that race increases the probability of being terminated in years 7 and 8.

Hoag and Rascher (1999) estimated a hazard function for NBA players using data from 1980 to 1991. Controlling for various performance characteristics, they found that racial discrimination shortened the playing career of Black players by 2 years relative to comparable White players, reducing their career earnings by approximately US$800,000. Groothuis and Hill (2004) employed an 11-year panel of NBA players covering the period 1989-1999 to estimate semiparametric hazard functions to test for the effects of race on retention; controlling for various performance factors, they failed to find a statistically significant relationship between race and the hazard rate. Using panel data for hitters and pitchers over the period 1990-2004, Groothuis and Hill (2008) estimate semiparametric hazard functions to examine the relationship between race and exit discrimination in MLB; controlling for various measures of performance, they fail to find evidence of discrimination against Black hitters or pitchers but find limited evidence that Hispanic pitchers enjoy longer careers than would be expected given their performance statistics. Groothuis and Hill (2013) argue that past tests for salary discrimination in the NBA failed to control for possible survival bias that may arise from exit discrimination. In an effort to control for this problem, they estimated semiparametric hazard functions using data from 1990 to 2008; their results failed to uncover a statistically significant relationship between race and the hazard ratio. Finally, Ducking, Groothuis, and Hill (2015) test for exit discrimination in the NFL employing a panel data set for the period 2000-2008; based on the estimates obtained from both parametric and nonparametric hazard models, they fail to find any statistically significant relationship between race and length of career.

The previous literature focusing on racial discrimination in collegiate sports and on exit discrimination is thus mixed. Past studies by Humphreys (2000), Cunningham and Sagas (2005), and Brown and Jewel (1994, 1995) all report evidence of racial discrimination in college basketball. With the exception of Hoag and Rascher's (1999) study of the NBA, the research by Mixon and Trevino (2004) and Holmes (2011) on college football, Groothuis and Hill (2008) on MLB, Groothuis and Hill (2013) and Groothuis, and Hill (2004) on the NBA, and Ducking et al. (2015) on the NFL all report no evidence of exit discrimination.

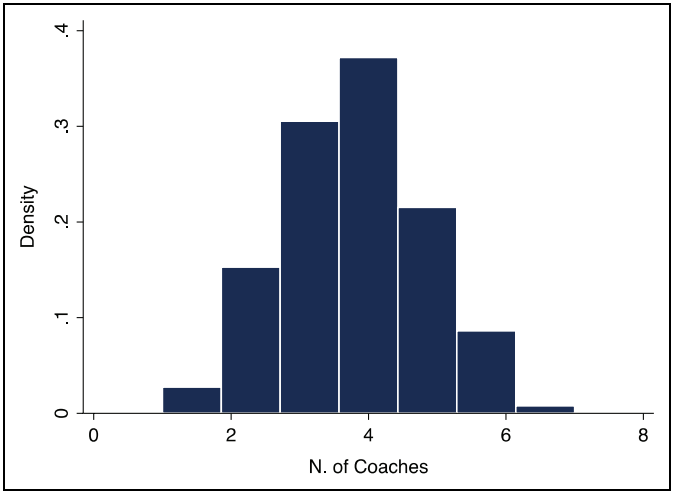

Figure 1. Number of coaches employed by a given school in the period 1995-2013.

Data

This study follows the performance and coaching turnover of every men's collegiate basketball program classified as Division I throughout the 1994/1995-2012/2013 seasons.[4] The sample includes 298 colleges and universities and the 802 unique head coaches who were employed by these schools.[5] For each coach, we identify his race; the length of each coaching spell at a Division I school; and also characteristics of the coach, school, and the athletic conference to which the school belonged that may impact a coach's tenure.[6]

The primary data source is provided by the NCAA (2015), which provides the name of every head coach at a given school, the coach's date of birth, alma mater and year of graduation, the total number of years spent as a head coach at each place of employment, and the team's won–loss record for each year. Using these data, we construct the coach's age and the winning percentage (games won/[games won + games lost]) for each year. In addition, we create dummy variables indicating whether or not the coach had previous experience as a head basketball coach at any level, previous experience as a head coach at the Division I level, and whether or not the coach is an alum of the school at which he is currently employed.

Although there are 802 unique coaches in our sample, approximately 30% were employed at more than one school and a number of coaches were employed at the same school on more than one occasion, implying a great deal of turnover within the coaching ranks. The distribution of the number of coaches employed by the schools in our sample is shown in Figure 1. Seven schools—Austin Peay, Coppin State,

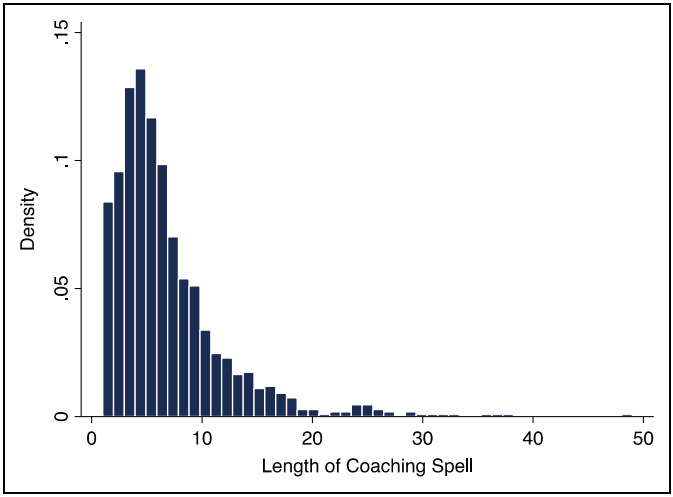

Figure 2. Length of coaching spells in years.

Davidson, Duke, Pacific, Syracuse, and Troy—employed the same coach during the entire period covered by our sample, while two schools, Pepperdine and Tulsa, employed seven; the average school employed 3.76 head coaches during the 19-year period.

We define a coaching spell to be consecutive seasons of employment by a coach at a given school; our sample contains 1,120 such spells. Although the data set begins with the 1994/1995 season, we are able to avoid the problem of left censoring of the spells, as the data indicate the year that a coach started work at a given school. The frequency distribution for the coaching spells, covering both the completed spells and incomplete spells ongoing in 2013, is provided in Figure 2. The mean spell length is 6.47 years; 92 coaches only appear for a single season including 50 coaches who started a spell in 2012/2013, while the longest spell (Jim Phelan of St. Mary's) was 49 years.

The final sample includes 5,662 coach-year observations. Table 1 displays means and standard errors of key variables for the full sample and divided by whether or not the school is one of the 18 HBCUs in our sample. Coaches were categorized by race based on photographs obtained via an Internet search[7]; while 26% of all coach-year observations in our sample are for a Black coach, HBCUs employ nearly exclusively Black coaches—only 3 of the 79 HBCU coaches during the period are non-Black. Black coaches in the full sample tend to be younger and less likely to have previous head coaching experience, except at HBCU schools where none of the three White coaches had previous head coaching experience at the Division I level. In the full sample, Black coaches tend to coach teams with lower winning percentages and play weaker opponents as measured by their strength of schedule (SOS).[8]

Table 1. Descriptive Statistics.

	All Schools			Non-HBCU Schools			HBCU Schools		
	Coach's Race			Coach's Race			Coach's Race		
	All	Black	Non-Black	All	Black	Non-Black	All	Black	Non-Black
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Black (%)	26.21 (0.58)			21.69 (0.57)			96.49 (1.00)		
Winning percentage	51.42 (0.23)	46.69 (0.45)	53.10 (0.27)	52.15 (0.24)	48.61 (0.51)	53.14 (0.27)	39.94 (0.86)	39.98 (0.87)	38.56 (5.27)
Strength of schedule rank	155.46 (1.24)	171.37 (2.60)	149.80 (1.39)	146.67 (1.22)	136.79 (2.49)	149.40 (1.39)	292.24 (1.99)	291.93 (2.05)	301.45 (4.45)
Conference rank	14.98 (0.12)	16.58 (0.27)	14.42 (0.13)	14.01 (0.12)	12.70 (0.24)	14.37 (0.13)	30.15 (0.13)	30.13 (0.13)	30.82 (0.40)
Power conference (%)	23.30 (0.56)	23.23 (1.10)	23.32 (0.65)	24.79 (0.59)	29.90 (1.35)	23.38 (0.66)	—	—	—
HBCU (%)	6.04 (0.32)	22.29 (1.08)	0.26 (0.08)						
Age	47.83 (0.11)	46.51 (0.21)	48.30 (0.13)	47.66 (0.11)	45.36 (0.21)	48.30 (0.13)	50.47 (0.50)	50.50 (0.52)	49.64 (1.61)
Alumnus (%)	11.22 (0.42)	12.93 (0.87)	10.61 (0.48)	10.94 (0.43)	12.05 (0.96)	10.63 (0.48)	15.50 (1.96)	16.01 (2.02)	0.00
Previous head coaching (%)	54.96 (0.66)	41.95 (1.28)	59.59 (0.76)	55.77 (0.68)	41.94 (1.45)	59.60 (0.76)	42.40 (2.68)	41.99 (2.72)	54.55 (15.75)
Previous D1 head coaching (%)	42.25 (0.66)	33.67 (1.23)	45.30 (0.77)	43.36 (0.68)	35.96 (1.41)	45.42 (0.77)	24.85 (2.34)	25.68 (2.40)	0.00
Number of coaching spells	1,120	324	796	1,041	248	793	79	76	3
Number of observations	5,662	1,485	4,177	5,320	1,154	4,166	342	331	11

Note. Table displays means of key variables and their standard errors in parentheses. D1 = Division I; HBCU = historically Black college and university.

Along with team performance, a coach's tenure may be partially determined by the school's conference affiliation; schools that are members of stronger conferences may suffer from playing better quality opponents or benefit due to better facilities, larger crowds, and higher salaries. To control for these effects, we employ two different measures of conference quality: a continuous measure of each conference's rank in a given year based on the conference's rating percentage index and an indicator for schools that are members of the six major college basketball conferences—the Atlantic Coast Conference, Big 10, Big 8/12, Big East, PAC 10, and Southeastern Conference. While HBCUs occupy some of the weakest of college basketball's 32 conferences, the fraction of Black coaches in power conferences is higher than the representation of Black coaches in mid-major and smaller conferences among non-HBCU schools.

Indicative of the high turnover rates in head coaching, there were a total of 860 coaching changes during the period covered by our sample.[9] The NCAA's data allow us to determine when a coach left a particular school but not the reason for the departure. In order to test for the effects of discrimination, it is important to determine whether the coach was fired or whether he left for another reason. Following Mixon and Trevino (2004) and Holmes (2011), we searched for articles around the time of the departure to determine why the employment spell ended. In addition to examining websites maintained by individual schools' athletic departments, the search covered local and national newspapers, Sports Illustrated, SI.com, ESPN.com, and other sources.

In the majority of cases, the search results were unambiguous, clearly indicating whether or not the coach had been fired, moved to another school, retired, and so on. In some cases, however, it was necessary to examine several sources to determine the true reason for the departure.[10] For example, many school websites would indicate that a coach had resigned, while a local newspaper or other source would state that the coach's contract had not been renewed or that he received a buyout of the existing contract. We classify a coach as having been fired if, following his departure, an article indicated that he had been fired or that his contract was not renewed or had been bought out. A coach was considered to have resigned if the search indicated that he had resigned and no other reason could be found for the departure. This procedure may understate the number of coaches who were fired and overstate the number who resigned voluntarily. In some cases, a coach with a losing record may have strategically resigned in an effort to avoid being fired, thus possibly improving his future job prospects; while in other cases, the coach may have been fired but was classified as having resigned because no evidence of an involuntary departure was reported. To address this issue, we defined two larger sets of possible firings by including those who officially resigned but with winning percentages less than 25 and 50 percent as being ''fired'' in the model. None of the results changed when these alternative definitions of firing were used, so we retain the more clearly defined definition of fired used in Table 2.

Table 2. Coaching Changes.

Reason for Exit	All Schools			Non-HBCUs			HBCUs		
	All	Black	Non-Black	All	Black	Non-Black	All	Black	Non-Black
Panel A: Count	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Fired	408	141	267	366	102	264	42	39	3
Better job	246	61	185	237	52	185	9	9	0
Resigned	93	24	69	89	20	69	4	4	0
Professional job	10	2	8	10	2	8	0	0	0
Health reasons	13	1	12	13	1	12	0	0	0
Retired	64	10	54	59	5	54	5	5	0
Fired with NCAA violations	24	9	15	22	7	15	2	2	0
Resigned with NCAA violations	2	2	0	1	1	0	1	1	0
All exits	860	250	610	797	190	607	63	60	3
Panel B: mean spell length									
Fired	6.72 (0.22)	5.81 (0.32)	7.19 (0.29)	6.91 (0.23)	6.06 (0.34)	7.23 (0.29)	5.05 (0.69)	5.15 (0.74)	3.67 (1.20)
Better job	5.37 (0.22)	4.93 (0.39)	5.51 (0.26)	5.34 (0.22)	4.75 (0.38)	5.51 (0.26)	6.00 (1.59)	6.00 (1.59)	
Resigned	6.59 (0.42)	5.00 (0.58)	7.14 (0.52)	6.70 (0.44)	5.15 (0.69)	7.14 (0.52)	4.25 (0.48)	4.25 (0.48)	
Professional job	6.30 (1.61)	6.00 (4.00)	6.38 (1.89)	6.30 (1.61)	6.00 (4.00)	6.38 (1.89)			
Health reasons	7.62 (1.47)	15.00	7.00 (1.46)	7.62 (1.47)	15.00	7.00 (1.46)			
Retired	13.86 (1.31)	11.40 (3.11)	14.31 (1.44)	14.32 (1.37)	14.40 (4.97)	14.31 (1.44)	8.40 (3.78)	8.40 (3.78)	
Fired with NCAA violations	6.67 (0.97)	6.22 (1.81)	6.93 (1.16)	6.41 (0.92)	5.29 (1.51)	6.93 (1.16)	9.50 (7.50)	9.50 (7.50)	
Resigned with NCAA violations	2.50 (1.50)	2.50 (1.50)		1.00	1.00		4.00	4.00	
All exits	6.85 (0.18)	5.77 (0.27)	7.29 (0.23)	6.95 (0.19)	5.82 (0.28)	7.30 (0.23)	5.52 (0.62)	5.62 (0.65)	3.67 (1.20)

Note. Standard errors in parentheses.

Coaches who moved to other schools and for whom no indication could be found that they were terminated or "pushed out" were classified as having left for a better job. Schools that are found guilty of having violated NCAA rules often have no choice but to terminate the coach under whom the violations occurred or do so in an effort to reduce the penalties invoked by the NCAA. The departure of a coach for NCAA violations is thus often not at the discretion of the school, so these coaches are not included among those classified as having been fired. Similarly, in two cases, coaches (Ronny Thompson at Ball St. in 2007 and Tony Harvey at Texas Southern in 2012) were determined to have resigned amid pending NCAA sanctions. The remaining reasons for exiting a spell include leaving for a job in the NBA, health reasons, or retirement.

Table 2 displays a breakdown of the 860 coaching changes. Based on the search, each departure was placed in one of the previously mentioned eight categories: The coach (i) was fired (47.2% of all exits), (ii) left for a better job (29.1%), (iii) resigned (10.9%), (iv) went to the NBA (1.0%), (v) left for health reasons (1.5%), (vi) retired (7.3%), (vii) was fired due to NCAA violations (2.8%), or (viii) resigned due to NCAA sanctions (0.2%).

As the primary variable of interest in our study is time to termination, Panel B of Table 2 also displays the mean length of each coaching spell when the coach exited for one of the eight reasons. Of note is the racial difference in spell length for coaches who are fired—conditional on being fired, Black coaches will have spent 5.81 years at a school and White coaches 7.19 years. Similar to the trend in coaching experience, this trend is again reversed in HBCU schools, although one should recall that there are only three White coaches at HBCUs during this period. Panel B also displays the previously noted discrepancy in overall turnover rates between HBCU and non-HBCU schools—across all exits, spells at HBCU schools last 5.52 years, while those at non-HBCUs last 6.95 years. The empirical models below focus on methods to estimate time to exit as a function of a coach's race to determine whether or not racial discrimination is prevalent in retention decisions.

Empirical Approach

We examine racial discrimination in retention decisions with survival models estimating the hazard of being terminated at a given time t. Our baseline model is a Cox proportional hazard model of the form:

$$\log(h_{ist}) = \beta_1 \text{Black}_i + \gamma x_{ist} + \varepsilon_{ist}, \quad (1)$$

where h_{ist} is the hazard rate for coach i at school s in year t of their coaching tenure and Black_i is an indicator equal to one for Black coaches.[11] Coaches in our sample are in the risk set for failure while still employed with a school, exit due to one of the eight specified reason above, and are defined as failing when they are fired. The

focus throughout is on β_1, how race impacts the hazard of being fired. If Black coaches experience discrimination in retention decisions, the point estimate of β_1 will be less than 1 and the reported hazard rate greater than 1.

The x_{ist} vector includes previously detailed controls for the coach, team, and conference, which serve to isolate the discrimination question into one which matches Becker's seminal definition—conditional on a coach's performance, are Black coaches treated differently than White coaches? We also include calendar year fixed effects in all models to capture overall changes in the college basketball market and fixed effects for conference and school in additional specifications. These adjustments allow us to focus on variation in spell length for Black versus non-Black coaches within a conference or school. Standard errors throughout are adjusted for clustering at the coach level to account for shared components of the error term that persist at each coaching spell for a given coach.[12]

Results

Table 3 reports estimates from Equation 1 with regression coefficients transformed into hazard ratios. Ratios above 1 indicate a higher likelihood of being fired for a given characteristic, and *p* values robust to clustering are included in parentheses. The corresponding coefficients and standard errors are available in Appendix Table A1. As we focus on Cox models throughout, the *p* value for tests of the proportional hazard assumption is included as well at the bottom of each column—we fail to reject the proportional hazard assumption in all models. Appendix Table A5 shows the results are consistent when estimated with an accelerated failure time model.

Column 1 of Table 3 reports the raw correlation between race and termination by estimating Equation 1 with only an indicator for Black coaches in the model. The estimated hazard ratio of 1.780 shows a striking pattern of potential discrimination; Black coaches are approximately 78% more likely to be fired at any given length of tenure. This same pattern is shown in Panel A of Figure 3 that plots the unadjusted Kaplan–Meier survival estimates for African American and non-Black coaches. The survival curve for African American coaches is significantly below the curve for non-Black coaches at all spell lengths. Not only is this difference statistically significant, the magnitude of the difference is quite striking as well.

This significant difference between Black coaches and their counterparts is mitigated, but persists, after adding calendar year fixed effects into the model in Column 2. Column 3 adds the team's winning percentage, the winning percentage of the past season, SOS, and conference rank to the model as characteristics of a coach's performance and institutional expectations that should be highly predictive of retention and turnover. As intuition would suggest, the hazard ratio of 0.952 for winning percentage suggests coaches who win more games in the season are significantly *less* likely to be fired. Current season's winning percentage is a stronger predictor of turnover in our models rather than cumulative winning percentage over a coach's

Table 3. Cox Model Regressions—Hazard Ratios.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Black	1.780*** (.000)	1.630*** (.000)	1.248** (.016)	1.248** (.016)	1.200* (.050)	1.050 (.646)	1.057 (.613)	1.049 (.753)
Winning percentage			0.952*** (.000)	0.952*** (.000)	0.951*** (.000)	0.951*** (.000)	0.950*** (.000)	0.942*** (.000)
Last season's winning percentage			0.982*** (.000)	0.982*** (.000)	0.981*** (.000)	0.981*** (.000)	0.981*** (.000)	0.970*** (.000)
Strength of schedule rank			1.001 (.459)	1.000 (.684)	1.001 (.444)	1.001 (.400)	1.002** (.045)	1.005*** (.000)
Conference rank			0.957*** (.000)	0.964*** (.002)	0.971** (.018)	0.959*** (.002)	0.973 (.160)	0.982 (.293)
Age				1.210*** (.006)	1.189** (.012)	1.190** (.011)	1.178** (.020)	1.173* (.058)
Age^2				0.998*** (.003)	0.998*** (.007)	0.998*** (.006)	0.998** (.011)	0.998** (.046)
Alumnus				0.964 (.808)	0.967 (.817)	0.936 (.649)	0.944 (.704)	0.774 (.255)
Previous head coaching				1.016 (.914)	1.019 (.900)	0.996 (.978)	0.992 (.958)	0.788 (.364)
Previous D1 head coaching				1.129 (.430)	1.063 (.700)	1.049 (.771)	1.058 (.738)	0.945 (.835)
Power conference					1.577*** (.003)	1.444** (.015)		
HBCU						1.853*** (.004)		
Conference FE							Y	
School FE								Y
Year FE		Y	Y	Y	Y	Y	Y	Y
PH test (*p* value)	.395	.925	.930	.783	.690	.669	.796	.786
Observations	5,662	5,662	5,662	5,662	5,662	5,662	5,662	5,662

Note. Table reports hazard ratios with robust *p* values in parentheses based on standard errors adjusted for clustering at the coach level. PH test is a test of the proportional hazard assumption using Schoenfeld residuals, where the null is that the proportional hazard assumption is valid. HBCU = historically Black college and university; D1 = Division I; FE = fixed effects.

***$p < .01$. **$p < .05$. *$p < .1$.

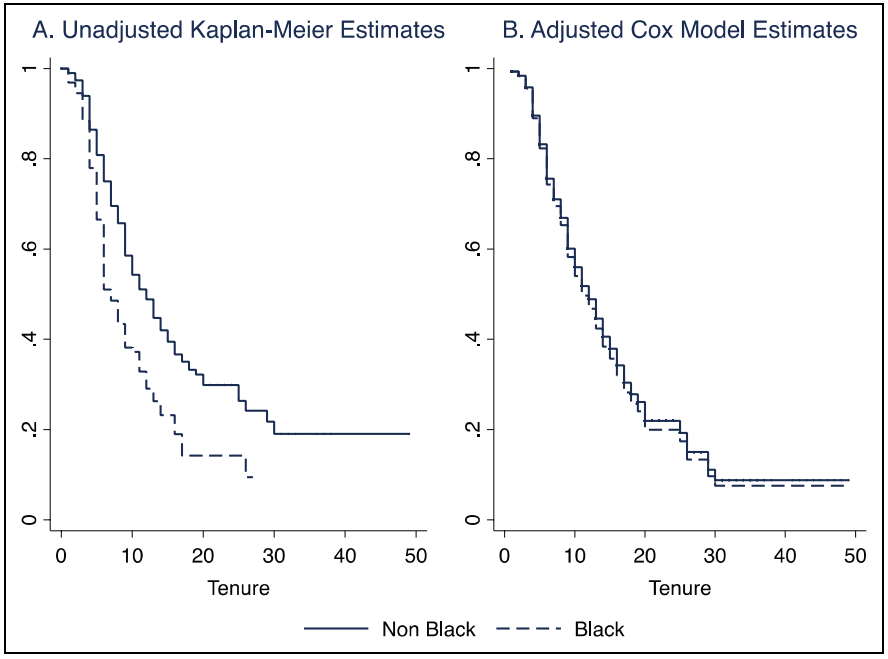

Figure 3. Unadjusted and adjusted survival functions by race. Panel A displays Kaplan–Meier estimates from the raw data associating race with time to firing. Panel B plots survival curves built from the Cox model results in Column 6 of Table 3 adjusting for team performance and whether coach was employed by a historically Black college or university.

tenure. The inclusion of these three performance measures reduces the association between race and firing to where Black coaches are approximately 24.8% more likely to be fired after a given year, but the difference still remains statistically and economically significant.

Adjusting for demographics and previous experience of a coach in Column 4 does not statistically change the discrimination hazard nor does including an indicator for playing in a major conference in Column 5. It is of note however that turnover is significantly higher in power conferences.

Given the previously noted emphasis on HBCUs, which employ approximately a quarter of the Black head coaches during this time period as well as have shorter coaching spells, Column 6 adds an indicator for coaching at an HBCU. The 1.853 hazard ratio attached to HBCUs signifies a coach is nearly twice as likely to be fired if he is coaching at an HBCU conditional on race, team performance, and other controls in our model. This association is representative of higher turnover among coaches at HBCUs visible in Table 2. Once this feature of the coaching market is accounted for, the association between race and termination attenuates to 0 with a

hazard ratio statistically indistinguishable from 1 and economically insignificant. As HBCU coaches are predominantly Black, after controlling for HBCU status, this estimate can be thought of as approximating the association between race and termination for a Black coach at a non-HBCU school.

This relationship is shown in Panel B of Figure 3 that plots the estimated survival functions based on the results in Column 6. As suggested by the insignificant hazard ratio associated with race, the survival functions for Black and non-Black coaches lay nearly on top of each other. The visualization of this result stresses that the lack of discrimination is not a statistical artifact of poor precision in our models but reflects no meaningful difference in the firing rates of Black and White coaches after accounting for coaching at an HBCU.

This pattern holds with increasingly demanding econometric models. The inclusion of conference fixed effects in Column 7 limits the estimation of the impact of race to only within conference comparisons. Similarly, school fixed effects in Column 8 estimate the association between race and retention using only within-school variation —comparing the performance and tenure of Black coaches to coaches of different races but at the same school. This specification accounts for time-invariant unobservables common to a school over time that may be otherwise difficult to measure such as historical performance expectations and general attitudes toward athletics. In both cases, we find no association between race and termination.

Overall, the results suggest that the relationship between race and firing is highly dependent on comparisons across HBCU and non-HBCU schools. This is likely due to the fact that HBCUs both are more likely to employ Black coaches and have higher turnover rates for all of their coaches. There is no statistical or economic difference in the risk of termination once we limit the data to comparisons based on coaches of different races at the same type of institution.[13]

Table 4 builds on this initial finding by specifically examining three distinct groups in our sample relative to each other: White coaches, Black coaches at non-HBCUs, and Black coaches at HBCUs.[14] Note that this division lumps together the 793 White coaching spells at non-HBCUs with the three White coaches at HBCUs. While it is possible to also divide White coaches by HBCU employment, inference based on a sample of only three coaches is potentially misleading. For completeness, the four-way division of the results below are available in Appendix Table A2.

The previous results in Table 3 forced the relationship between race and termination to be the same in both HBCU and non-HBCU institutions. Once we conditioned on working at an HBCU, we saw no relationship between race and termination, but we were not able to estimate how race influenced firings at HBCUs versus non-HBCUs. Moreover, the approach in Table 3 may be masking that Blacks at HBCUs remain disadvantaged relative to their non-HBCU peers. This is a potentially important distinction given the survival estimates shown in the raw data in Panel A of Figure 4 that plots Kaplan–Meier survival curves for three groups; Black coaches at each type of institution and White coaches. Given the relatively large number of non-HBCUs in Division I basketball, the curves for Black and non-Black coaches at non-HBCUs look

Table 4. Interactions and Relative Turnover.

Variable	(1)	(2)	(3)	(4)
Non-Black	—	—	—	—
Black × Non-HBCU	1.514*** (.000)	1.153 (.159)	1.126 (.247)	1.113 (.300)
Black × HBCU	2.027*** (.000)	1.960*** (.000)	2.083*** (.000)	1.882*** (.001)
Winning percentage		0.952*** (.000)	0.951*** (.000)	0.951*** (.000)
Last season's winning percentage		0.982*** (.000)	0.982*** (.000)	0.981*** (.000)
Strength of schedule rank		1.001 (.375)	1.001 (.577)	1.001 (.408)
Conference rank		0.949*** (.000)	0.953*** (.000)	0.961*** (.004)
Age			1.208*** (.006)	1.191** (.011)
Age^2			0.998*** (.003)	0.998*** (.006)
Alumnus			0.936 (.655)	0.941 (.673)
Previous head coaching			0.994 (.969)	1.000 (.998)
Previous D1 head coaching			1.102 (.542)	1.050 (.764)
Power conference				1.473** (.011)
Year FE	Y	Y	Y	Y
Test of equivalence of black hazard ratios (*p* value)	.117	.012	.005	.019
PH test (*p* value)	.693	.912	.727	.694
Observations	5,662	5,662	5,662	5,662

Note. Table reports hazard ratios with robust *p* values in parentheses based on standard errors adjusted for clustering at the coach level. PH test is a test of the proportional hazard assumption using Schoenfeld residuals, where the null is that the proportional hazard assumption is valid. D1 = Division I; FE = fixed effects.
***$p < .01$. **$p < .05$. *$p < .1$.

quite similar to those shown for the overall sample in Figure 3. Estimates for Blacks at HBCUs nearly match the estimates for Blacks at non-HBCUs.

We modify Equation 1 and estimate Cox models with interactions between a coach's race and the type of school to examine how the hazard of termination in each of these groups compares to one another:

$$\log(h_{ist}) = \beta_1 \text{Black} \times \text{nonHBCU}_i + \beta_2 \text{Black} \times \text{HBCU}_i + \gamma x_{ist} + \varepsilon_{ist}. \quad (2)$$

White coaches, the most common designation in the data, serve as the comparison group, and each of the β coefficients estimates the hazard a Black coach at a particular institution type is fired relative to this omitted group. As before, x_{ist} contains a vector of team, coach, and conference characteristics as well as year fixed effects. Standard errors are adjusted based on clustering at the coach level.

Column 1 of Table 4 reports estimates from Equation 2 with only calendar year fixed effects as additional controls. The hazard ratios match the pattern shown in Panel

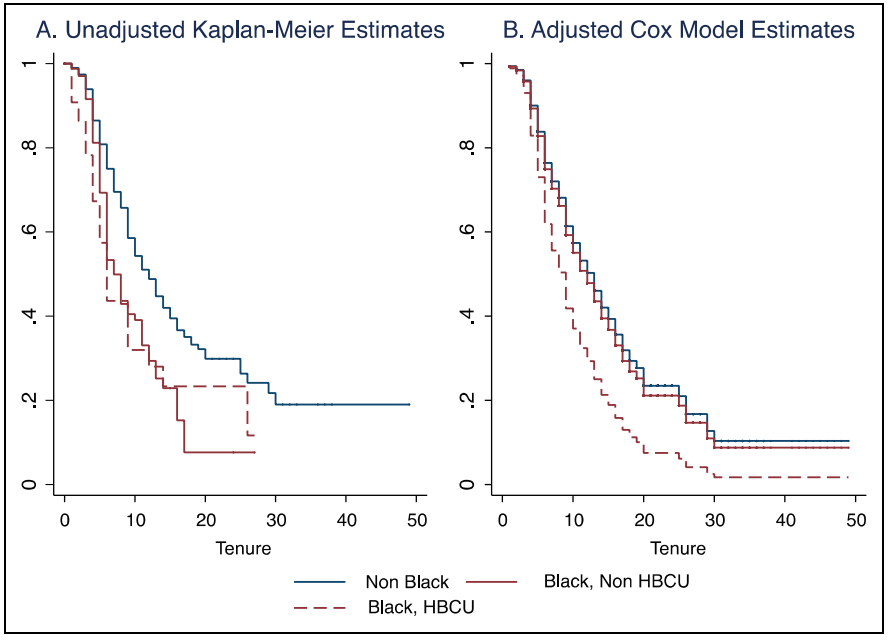

Figure 4. Unadjusted and adjusted survival functions based on race and historically Black college and university (HBCU) status. Panel A displays unadjusted Kaplan–Meier estimates associating race with firing and HBCU status. Panel B plots survival curves built from the results in Column 4 of Table 4 that show how the racial discrepancy in firings disappears after controlling for team performance at non-HBCUs, while HBCUs maintain higher rates of turnover.

A of Figure 4; Black coaches at non-HBCUs are approximately 50% more likely to be fired than White coaches, while Black coaches at HBCUs are approximately twice as likely to be terminated. Compared to each other, the two rates for Black coaches are not statistically different (p value of .117) as shown at the bottom of Column 1.

Echoing the result from Table 3 where controlling for employment at an HBCU and additional characteristics removes any racial effect, Column 2 shows that the racial disparity in firing at non-HBCU programs vanishes after adjusting for team performance. However, differences remain in comparison to HBCU programs which experience particularly high turnover; Black coaches at HBCUs remain nearly twice as likely to be terminated and at a statistically higher rate than Black coaches at non-HBCUs (p value of .012). The difference between HBCUs and other institutions persists after adding in controls for the characteristics of the coach and a power conference indicator in Columns 3 and 4. Panel B of Figure 4 plots the corresponding survival curves.[15]

Table 5 clarifies this pattern by stratifying the sample into non-HBCU and HBCU schools and reestimating models based on Equation 1 to allow all of the covariates to

Table 5. Sample Stratified by HBCU Status.

	Non-HBCU				HBCU			
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Black	1.743*** (.000)	1.174 (.119)	1.164 (.151)	1.163 (.182)	0.383** (.032)	0.580 (.399)	0.566 (.390)	0.728 (.629)
Winning percentage		0.952*** (.003)	0.950*** (.003)	0.950*** (.003)		0.959*** (.010)	0.956*** (.010)	0.950*** (.011)
Last season's winning percentage		0.982*** (.003)	0.981*** (.003)	0.980*** (.003)		0.977** (.011)	0.968*** (.012)	0.965*** (.013)
Strength of schedule rank		1.000 (.001)	1.000 (.001)	1.002 (.001)		1.020*** (.007)	1.020*** (.007)	1.024*** (.006)
Conference rank		0.954*** (.013)	0.968** (.014)	0.977 (.020)		0.878** (.057)	0.855** (.060)	1.095 (.138)
Age			1.228*** (.095)	1.218** (.096)			0.791 (.145)	0.778 (.148)
Age^2			0.998*** (.001)	0.998*** (.001)			1.002 (.002)	1.002 (.002)
Alumnus			0.878 (.148)	0.874 (.152)			1.070 (.430)	1.268 (.500)
Previous head coaching			1.014 (.161)	1.000 (.169)			0.818 (.420)	1.214 (.613)
PreviousD1 head coaching			1.116 (.190)	1.126 (.202)			0.537 (.315)	0.342* (.197)
Power conference			1.373** (.213)				n/a	
Conference FE				Y				Y
Year FE		Y	Y	Y		Y	Y	Y
PH test (*p* value)	.810	.959	.882	.982	.942	.996	.999	.977
Observations	5,320	5,320	5,320	5,320	342	342	342	342

Note. Table reports hazard ratios with robust *p* values in parentheses based on standard errors adjusted for clustering at the coach level. PH test is a test of the proportional hazard assumption using Schoenfeld residuals, where the null is that the proportional hazard assumption is valid. D1 = Division I; FE = fixed effects.
***$p < .01$. **$p < .05$. *$p < .1$.

have a differential impact on survival at HBCU and non-HBCU schools. Despite having only three White coaches at HBCUs, we maintain the baseline specification for completeness but strongly caution against interpreting the relationship between race and firing at HBCUs in Columns 5 through 8 without a larger sample of White coaches at HBCUs. Column 1 shows that Black coaches are approximately 74.3% more likely to be fired at non-HBCU schools. Columns 2 through 4 show that the statistical association between race and termination attenuates as soon as one accounts for performance of the team and remains insignificant after controlling for coach and conference characteristics. Although purely descriptive of the three White HBCU coaches, a similar pattern exists at HBCUs, where there is no association between race and termination once one accounts for team performance in Column 6.

The above results hold for a variety of sample stratifications as well. Given observable differences between HBCUs and non-HBCUs, a possible concern is that the set of all 280 Division I non-HBCUs is an inappropriate comparison group for the 18 HBCUs. This is akin to the concern of a common support in the treatment effects literature. To address this issue, Appendix Table A3 repeats the key baseline analysis from Table 3 with samples of non-HBCUs defined to more closely match the HBCU schools. This is done through annual enrollment figures from the Integrated Postsecondary Education Data System and athletic department financial information from the Office of Postsecondary Education for each of the schools in our sample.[16]

We report three regression results for each of our school groups in Table A3, and each replicates the primary result of the article; a positive association between Black and being terminated exists conditional on performance and demographic characteristics until controlling for HBCU status. HBCUs are significantly smaller than non-HBCUs with median enrollment of 6,010 versus 15,081. Columns 1–3 limit the sample of non-HBCUs to those that are smaller than the largest of the HBCUs (Florida Agricultural and Mechanical University) based on enrollment over the sample period. This removes 170 of the 280 non-HBCU schools, yet results remain consistent as seen by the attenuation and loss of statistical significance for the hazard ratio associated with race between Columns 2 and 3.

We next defined a comparison set by utilizing only those non-HBCUs that were above the median share of Black students enrolled in a school. The results again do not change after omitting those 140 non-HBCUs with relatively few Black students. Given the previously noted disparity of athletic spending across institution types, Columns 7–9 limit the non-HBCU sample to those schools with total athletic department expenses smaller than the largest HBCU budget. This removes all power conference schools and leaves 133 comparison schools. Again the results do not change.[17]

The final columns of Table A3 utilize a non-HBCU sample selected by a propensity score matching approach. Following Rosenbaum and Rubin (1985), Dehejia

and Wahba (1999, 2002), and Imbens and Rubin (2015), we estimate the propensity a school is an HBCU in a first-stage regression using student enrollment, total athletic department expenses, athletic department total revenues, expenses and revenues on all men's teams, and expenses and revenues on men's basketball. Using metrics discussed in Imbens and Rubin (2015), this defines a set of 68 non-HBCU schools as a conservative, overlapping comparison group. Estimating the models on this sample shows consistent results, as race appears to play a role in termination in columns 10 and 11 until HBCU status is controlled for in column 12.

Our results also hold under alternative specifications and estimation strategies. Appendix Table A4 reports results based on a parametric Weibull distribution that are consistent with the proportional hazard models in Tables 3–5 as are estimates from accelerated failure time survival models in Appendix Table A5. While we utilize a more flexible continuous time approach based on the continuous nature of the underlying termination process (Heckman & Singer, 1984), past work examining exit discrimination in sports has relied on a discrete time estimation strategy (e.g., Ducking, Groothuis, & Hill, 2015; Groothuis & Hill, 2004, 2008; Hoang & Rascher, 1999). Appendix Table A6 reports odds ratios from the discrete time logit model that match our continuous time findings—race again appears to play a role in the odds of termination until accounting for HBCU status.[18]

Discussion

College basketball has long been considered to be one of the more racially diverse sports in the United States. During the 2005-2006 season, African Americans comprised 47.9% of all Division I basketball players and 25.2% of all head basketball coaches. Since that time, however, the percentage of Black head coaches has declined to 18.6%, leading some analysts to question whether or not colleges and universities maintain a commitment to diversity in the coaching ranks.

This concern is echoed in our raw data that suggest a stark difference in the likelihood a Black coach is retained after a given season relative to a White peer. Belzer (2012) was the first to highlight the rapid rate of turnover among head basketball coaches employed at HBCUs, a finding that is true with head football coaches employed at HBCUs as well. HBCUs employ 7% of all coaches in the data but 23% of Black coaches; controlling for employment at an HBCU, we find no evidence of statistical discrimination in firings once one accounts for team performance and other factors.

The HBCUs in our sample differ from the non-HBCUs in that they are smaller, enroll more Black students, and have smaller athletic budgets. In an effort to determine whether these factors are responsible for the higher turnover

rate among HBCUs, the model was estimated limiting the comparison group to only those schools with similar enrollments, with Black student enrollment above the median of the non-HBCUs, and with similar athletic budgets. Finally, the model was estimated with a non-HBCU sample selected by a propensity score matching approach taking into account student enrollment, total athletic department expenses and revenues, expenses and revenues for all men's teams, and expenses and revenues for men's basketball teams. In every case, the results indicate that Black coaches have a higher probability of being terminated conditional on performance and demographic characteristics until employment at an HBCU is taken into consideration.

Our findings demonstrate that head basketball coaches employed at HBCUs face higher rates of turnover than coaches at non-HBCUs and that the relationship between race and the probability of termination disappears when employment at an HBCU is taken into consideration. We are unable, however, to identify why HBCUs have higher rates of turnover than non-HBCUs; this is obviously an issue worthy of further consideration. The broader implications of this work point to the difficulties in assigning correlations between labor market outcomes and race an interpretation of discrimination. Even in markets where observed outcomes can be appropriately thought to proxy for the productivity of an employee, a detailed understanding of the nuanced institutional context at hand is essential for interpreting associations as indicative of discrimination. This broader conclusion has implications for the study of race-, gender-, and opportunity-based discrimination in a wide range of settings and markets.

Appendix

Table A1. Regressions Coefficients and Standard Errors Corresponding to Table 3 Hazard Ratios.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Black	.576*** (.000)	.489*** (.000)	.222** (.016)	.222** (.016)	.183* (.050)	.048 (.646)	.056 (.613)	.048 (.753)
Winning percentage			−.049*** (.000)	−.049*** (.000)	−.050*** (.000)	−.051*** (.000)	−.051*** (.000)	−.060*** (.000)
Last season's winning percentage			−.018*** (.000)	−.018*** (.000)	−.019*** (.000)	−.019*** (.000)	−.020*** (.000)	−.030*** (.000)
Strength of schedule rank			.001 (.459)	.000 (.684)	.001 (.444)	.001 (.400)	.002** (.045)	.005*** (.000)
Conference rank			−.044*** (.000)	−.037*** (.002)	−.029** (.018)	−.042*** (.002)	−.028 (.160)	−.018 (.293)
Age				.190*** (.006)	.173** (.012)	.174** (.011)	.164** (.020)	.159* (.058)
Age^2				−.002*** (.003)	−.002*** (.007)	−.002*** (.006)	−.002** (.011)	−.002** (.046)
Alumnus				−.037 (.808)	−.034 (.817)	−.066 (.649)	−.058 (.704)	−.256 (.255)
Previous head coaching				.016 (.914)	.019 (.900)	−.004 (.978)	−.008 (.958)	−.238 (.364)
Previous D1 head coaching				.122 (.430)	.061 (.700)	.048 (.771)	.057 (.738)	−.057 (.835)
Power conference					.456*** (.003)	.367** (.015)		
HBCU						.617*** (.004)		
Conference FE							Y	
School FE								Y

(continued)

Table A1. (continued)

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Year FE		Y	Y	Y	Y	Y	Y	Y
PH test (p value)	.395	.925	.909	.792	.656	.675	.819	.627
Observations	5,662	5,662	5,662	5,662	5,662	5,662	5,662	5,662

Note. Table reports hazard model coefficients with robust standard errors adjusted for clustering at the coach level corresponding to the hazard ratios in Table 3. HBCU = historically Black college and university; D1 = Division I; FE = fixed effects; Y = yes.
***$p < .01$. **$p < .05$. *$p < .1$.

Table A2. Interactions With Four Race—HBCU Groups.

Variable	(1)	(2)	(3)	(4)
Non Black × Non-HBCU	—	—	—	—
Black × Non-HBCU	1.532*** (.000)	1.126 (.249)	1.095 (.390)	1.081 (.459)
Black × HBCU	2.045*** (.000)	1.960*** (.000)	2.073*** (.000)	1.863*** (.002)
Non-Black × HBCU	5.475*** (.003)	5.773*** (.000)	5.544*** (.001)	4.878*** (.003)
Winning percentage		0.952*** (.000)	0.952*** (.000)	0.951*** (.000)
Last season's winning percentage		0.982*** (.000)	0.982*** (.000)	0.981*** (.000)
Strength of schedule rank		1.001 (.369)	1.001 (.567)	1.001 (.410)
Conference rank		0.947*** (.000)	0.951*** (.000)	0.959*** (.002)
Age			1.199*** (.008)	1.184** (.014)
Age^2			0.998*** (.004)	0.998*** (.007)
Alumnus			0.938 (.669)	0.943 (.687)
Previous head coaching			0.993 (.963)	0.998 (.992)
Previous D1 head coaching			1.106 (.526)	1.057 (.733)
Power conference				1.437** (.017)
Year FE				
Test of equivalence of Black (*p* value)	.117	.012	.005	.019
PH test (*p* value)	.693	.912	.727	.694
Observations	5,662	5,662	5,662	5,662

Note. Table reports hazard ratios with robust *p* values in parentheses based on standard errors adjusted for clustering at the coach level. PH test is a test of the proportional hazard assumption using Schoenfeld residuals, where the null is that the proportional hazard assumption is valid. HBCU = historically Black college and university; D1 = Division I; FE = fixed effects.
***$p < .01$. **$p < .05$. *$p < .1$.

Table A3. Alternative Non-HBCU Comparison Groups.

	Comparison Non-HBCUs Defined by [. . .]											
	Total Enrollment			Black Student Enrollment (%)			Athletic Department Expenses			Propensity Score Matching		
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Black	2.038*** (.000)	1.372** (.038)	0.956 (.834)	1.599*** (.000)	1.258** (.049)	1.079 (.579)	1.864*** (.000)	1.326** (.034)	1.043 (.812)	2.019*** (.000)	1.417* (.068)	0.968 (.909)
Winning percentage		0.946*** (.000)	0.945*** (.000)		0.954*** (.000)	0.953*** (.000)		0.950*** (.000)	0.949*** (.000)		0.941*** (.000)	0.941*** (.000)
Last season's winning percentage		0.984*** (.001)	0.984*** (.000)		0.982*** (.000)	0.982*** (.000)		0.980*** (.000)	0.979*** (.000)		0.984*** (.008)	0.983*** (.005)
Strength of schedule rank		1.005*** (.004)	1.005*** (.008)		1.000 (.824)	1.000 (.761)		1.004** (.015)	1.004** (.020)		1.006*** (.006)	1.006** (.013)
Conference rank		0.947*** (.002)	0.929*** (.000)		0.984 (.278)	0.970* (.074)		0.952*** (.002)	0.940*** (.001)		0.971 (.229)	0.957* (.099)
Age		1.236** (.028)	1.232** (.031)		1.189* (.071)	1.198* (.060)		1.132 (.172)	1.126 (.190)		1.126 (.264)	1.119 (.290)
Age^2		0.998** (.023)	0.998** (.021)		0.998** (.047)	0.998** (.036)		0.999 (.122)	0.999 (.122)		0.999 (.175)	0.999 (.170)
Alumnus		1.318 (.149)	1.200 (.343)		1.168 (.362)	1.127 (.483)		1.122 (.498)	1.061 (.727)		1.320 (.230)	1.181 (.490)
Previous head coaching		0.958 (.858)	0.897 (.655)		1.008 (.970)	0.974 (.897)		1.144 (.467)	1.089 (.650)		1.074 (.785)	1.003 (.993)
Previous D1 head coaching		1.166 (.545)	1.156 (.577)		1.146 (.513)	1.140 (.547)		1.212 (.315)	1.194 (.375)		0.933 (.822)	0.970 (.923)
Power conference		2.152* (.094)	1.719 (.240)		1.574** (.043)	1.402 (.133)		n/a	n/a		n/a	n/a
HBCU			2.306*** (.005)			1.671** (.034)			1.860** (.021)			2.053** (.031)
Number of schools in sample												
Non-HBCU	110	110	110	140	140	140	133	133	133	68	68	68
HBCU	18	18	18	18	18	18	18	18	18	18	18	18
PH test (*p* value)	.638	.869	.872	.704	.900	.917	.807	.962	.943	.578	.869	.924
Observations	2,432	2,432	2,432	3,002	3,002	3,002	2,869	2,869	2,869	1,634	1,634	1,634

Note. Table reports hazard ratios with robust *p* values in parentheses based on standard errors adjusted for clustering at the coach level. PH test is a test of the proportional hazard assumption using Schoenfeld residuals, where the null is that the proportional hazard assumption is valid. Each set of three columns defines a subset of non-HBCU comparison schools that are more similar in observed characteristics than the population of all non-HBCUs used in the primary analysis. Columns 1–3 limit non-HBCUs to those whose (mean) total enrollment is less than the largest HBCU (Florida Agricultural and Mechanical University). Columns 4–6 limit non-HBCUs to those in the upper half of Black student enrollment percentages. Columns 7–9 limit non-HBCUs to those with (mean) athletic department expenses that are *less* than the largest HBCU (Texas Southern). Columns 10–12 utilize a propensity score matching technique, where the propensity score is defined by total student enrollment, athletic department expenses, expenses on men's basketball, athletic department revenue, and revenue of men's basketball. See text for further description. HBCU = historically Black college and university; D1 = Division I.

***$p < .01$. **$p < .05$. *$p < .1$.

Table A4. Parametric Weibull Regressions.

	Baseline Model					Interactions			HBCU [. . .]			
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	No (9)	Yes (10)	No (11)	Yes (12)
Black	1.735*** (.000)	1.255** (.029)	1.068 (.573)	1.075 (.548)	1.075 (.689)				1.153 (.234)	0.464 (.394)	1.146 (.280)	0.556 (.490)
Black × Non-HBCU						1.681*** (.000)	1.100 (.414)	1.083 (.513)				
Black × HBCU						1.976*** (.002)	2.148*** (.001)	3.146*** (.006)				
Non Black × HBCU						6.568*** (.000)	5.247*** (.007)	9.201*** (.004)				
Winning percentage		0.949*** (.000)	0.949*** (.000)	0.948*** (.000)	0.940*** (.000)		0.949*** (.000)	0.948*** (.000)	0.949*** (.000)	0.941*** (.000)	0.949*** (.000)	0.937*** (.000)
Last season's winning percentage		0.980*** (.000)	0.981*** (.000)	0.980*** (.000)	0.967*** (.000)		0.981*** (.000)	0.980*** (.000)	0.980*** (.000)	0.969*** (.004)	0.979*** (.000)	0.968*** (.004)
Strength of schedule rank		1.001 (.350)	1.001 (.256)	1.003** (.016)	1.005*** (.001)		1.001 (.270)	1.003** (.018)	1.000 (.940)	1.019*** (.001)	1.002 (.197)	1.022*** (.000)
Conference rank		0.968** (.011)	0.952*** (.001)	0.961** (.035)	0.981 (.285)		0.953*** (.001)	0.961** (.036)	0.964** (.011)	0.867* (.057)	0.967* (.086)	0.937 (.622)
Age		1.304*** (.000)	1.303*** (.000)	1.286*** (.001)	1.162 (.129)		1.298*** (.000)	1.277*** (.001)	1.363*** (.000)	0.868 (.527)	1.347*** (.000)	0.814 (.387)
Age^2		0.997*** (.000)	0.997*** (.000)	0.997*** (.000)	0.998* (.072)		0.997*** (.000)	0.997*** (.000)	0.997*** (.000)	1.001 (.748)	0.997*** (.000)	1.001 (.543)
Alumnus		0.857 (.335)	0.838 (.260)	0.829 (.261)	0.669 (.141)		0.843 (.278)	0.832 (.272)	0.758 (.121)	1.176 (.726)	0.741 (.114)	1.331 (.542)
Previous head coaching		1.075 (.661)	1.050 (.771)	1.047 (.789)	0.771 (.384)		1.059 (.732)	1.053 (.764)	1.060 (.742)	0.989 (.985)	1.057 (.766)	1.415 (.519)
Previous D1 head coaching		1.201 (.293)	1.182 (.350)	1.208 (.305)	1.135 (.687)		1.185 (.341)	1.198 (.325)	1.230 (.273)	0.965 (.958)	1.246 (.261)	0.640 (.526)
Power conference		1.480** (.017)	1.342* (.069)				1.333* (.077)		1.259 (.167)			
HBCU			2.094*** (.002)									
Conference FE				Y				Y			Y	Y
Team FE					Y							
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
p	1.552*** (.000)	1.986*** (.000)	2.006*** (.000)	2.079*** (.000)	2.831*** (.000)	1.554*** (.000)	2.011*** (.000)	2.088*** (.000)	2.048*** (.000)	2.099*** (.000)	2.131*** (.000)	2.147*** (.000)
Observations	5,662	5,662	5,662	5,662	5,662	5,662	5,662	5,662	5,320	342	5,320	342

Note. Table reports hazard ratios with robust *p* values in parentheses based on survival models using a parametric Weibull distribution. HBCU = historically Black college and university; D1 = Division I; FE = fixed effects; Y = yes.
***$p < .01$. **$p < .05$. *$p < .1$.

Table A5. Accelerated Failure Time Weibull Regressions—Coefficient Estimates.

	Baseline Model					Interactions			HBCU			
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	No (9)	Yes (10)	No (11)	Yes (12)
Black	−0.355***	−0.115**	−0.033	−0.035	−0.026				−0.069	0.366	−0.064	0.273
	(0.000)	(0.028)	(0.572)	(0.548)	(0.689)				(0.231)	(0.392)	(0.278)	(0.486)
Black × Non-HBCU						−0.334***	−0.048	−0.038				
						(0.000)	(0.413)	(0.512)				
Black × HBCU						−0.438***	−0.380***	−0.549***				
						(0.002)	(0.000)	(0.006)				
Non Black × HBCU						−1.211***	−0.824***	−1.063***				
						(0.000)	(0.006)	(0.005)				
Winning percentage		0.026***	0.026***	0.026***	0.022***		0.026***	0.026***	0.026***	0.029***	0.025***	0.030***
		(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Last season's winning percentage		0.010***	0.010***	0.010***	0.012***		0.010***	0.010***	0.010***	0.015***	0.010***	0.015***
		(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
Strength of schedule rank		−0.001	−0.001	−0.001**	−0.002***		−0.001	−0.001**	−0.000	−0.009***	−0.001	−0.010***
		(0.351)	(0.258)	(0.017)	(0.001)		(0.271)	(0.018)	(0.940)	(0.005)	(0.196)	(0.003)
Conference rank		0.016**	0.024***	0.019**	0.007		0.024***	0.019**	0.018**	0.068*	0.016*	0.031
		(0.011)	(0.001)	(0.034)	(0.289)		(0.001)	(0.035)	(0.011)	(0.073)	(0.085)	(0.623)
Age		−0.134***	−0.132***	−0.121***	−0.053		−0.130***	−0.117***	−0.151***	0.067	−0.140***	0.096
		(0.000)	(0.000)	(0.001)	(0.130)		(0.001)	(0.001)	(0.000)	(0.528)	(0.000)	(0.383)
Age^2		0.002***	0.002***	0.001***	0.001*		0.001***	0.001***	0.002***	−0.000	0.002***	−0.001
		(0.000)	(0.000)	(0.000)	(0.072)		(0.000)	(0.000)	(0.000)	(0.749)	(0.000)	(0.543)
Alumnus		0.078	0.088	0.090	0.14 2		0.085	0.088	0.135	−0.077	0.141	−0.133
		(0.333)	(0.257)	(0.259)	(0.131)		(0.275)	(0.270)	(0.118)	(0.725)	(0.111)	(0.540)
Previous head coaching		−0.036	−0.024	−0.022	0.092		−0.028	−0.025	−0.029	0.005	−0.026	−0.162
		(0.660)	(0.770)	(0.789)	(0.386)		(0.732)	(0.764)	(0.741)	(0.985)	(0.765)	(0.527)
Previous D1 head coaching		−0.092	−0.084	−0.091	−0.045		−0.085	−0.087	−0.101	0.017	−0.103	0.208
		(0.291)	(0.349)	(0.303)	(0.686)		(0.339)	(0.323)	(0.272)	(0.958)	(0.259)	(0.541)

(continued)

Table A5. (continued)

	Baseline Model					Interactions			HBCU			
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	No (9)	Yes (10)	No (11)	Yes (12)
Power conference		−0.197**	−0.147*				−0.143*		−0.112			
		(0.019)	(0.073)				(0.080)		(0.171)			
HBCU			−0.369***									
			(0.002)									
Conference FE				Y				Y			Y	Y
Team FE					Y							
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ln(p)	0.439***	0.686***	0.696***	0.732***	1.041***	0.441***	0.699***	0.736***	0.717***	0.742***	0.756***	0.764***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	5,662	5,662	5,662	5,662	5,662	5,662	5,662	5,662	5,320	342	5,320	342

Note. Table reports coefficients with robust standard errors in parentheses based on accelerated failure-time models using a parametric Weibull distribution. HBCU = historically Black college and university; D1 = Division I; FE = fixed effects; Y = yes.
***p < .01. **p < .05. *p < .1.

Table A6. Discrete Time Analog.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Black	1.723*** (0.190)	1.341*** (0.152)	1.363*** (0.156)	1.306** (0.151)	1.107 (0.142)	1.134 (0.154)	1.062 (0.214)
Winning percentage		0.942*** (0.003)	0.942*** (0.003)	0.942*** (0.003)	0.941*** (0.003)	0.940*** (0.004)	0.924*** (0.005)
Last year's winning percentage		0.981*** (0.004)	0.981*** (0.004)	0.980*** (0.004)	0.981*** (0.004)	0.980** * (0.004)	0.965*** (0.005)
Strength of schedule rank		1.001 (0.001)	1.001 (0.001)	1.001 (0.001)	1.001 (0.001)	1.003** (0.002)	1.006*** (0.002)
Conference rank		0.948*** (0.014)	0.953*** (0.014)	0.961*** (0.015)	0.945*** (0.016)	0.962 (0.023)	0.965 (0.023)
Age			1.234*** (0.096)	1.215** (0.094)	1.213** (0.094)	1.216** (0.097)	1.290*** (0.127)
Age^2			0.998*** (0.001)	0.998** (0.001)	0.998** (0.001)	0.998** (0.001)	0.998** (0.001)
Alumnus			0.913 (0.160)	0.906 (0.156)	0.873 (0.150)	0.873 (0.162)	0.743 (0.205)
Previous head coaching			0.917 (0.167)	0.916 (0.167)	0.897 (0.167)	0.903 (0.178)	0.679 (0.227)
Previous D1 head coaching			1.184 (0.218)	1.109 (0.210)	1.092 (0.214)	1.074 (0.222)	0.867 (0.303)
Power conference				1.581** (0.293)	1.425* (0.265)		
HBCU					2.172*** (0.582)		
Conference FE						Y	
School FE							Y

(continued)

Table A6. (continued)

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Polynomials in job tenure							
Tenure	2.631*** (0.332)	3.690*** (0.557)	3.611*** (0.549)	3.578*** (0.544)	3.589*** (0.544)	3.747*** (0.566)	4.506*** (0.886)
$Tenure^2$	0.897*** (0.017)	0.867*** (0.019)	0.869*** (0.020)	0.871*** (0.020)	0.871*** (0.020)	0.870*** (0.019)	0.869*** (0.027)
$Tenure^3$	1.005*** (0.001)	1.006*** (0.001)	1.006*** (0.001)	1.006*** (0.001)	1.006*** (0.001)	1.006*** (0.001)	1.006*** (0.002)
$Tenure^4$	1.000*** (0.000)	1.000*** (0.000)	1.000*** (0.000)	1.000*** (0.000)	1.000*** (0.000)	1.000*** (0.000)	1.000** (0.000)
Observations	5,662	5,662	5,662	5,662	5,662	5,649	4,522

Note. Table reports logit odds ratios with robust standard errors in parentheses. HBCU = historically Black college and university; D1 = Division I; FE = fixed effects; Y = yes.
***$p < .01$. **$p < .05$. *$p < .1$.

Table A7. Likelihood of Early Dismissal.

Variable	(1)	(2)	(3)	(4)	(5)
Black	3.118** (1.581)	3.016** (1.444)	2.520* (1.246)	2.381* (1.183)	0.939 (0.573)
Winning percentage season before hired		0.991 (0.012)	0.991 (0.011)	0.984 (0.011)	0.999 (0.013)
Age at hiring			0.677* (0.160)	0.613** (0.144)	0.700 (0.170)
Age at hiring^2			1.004* (0.003)	1.005** (0.002)	1.004 (0.003)
Alumnus			1.546 (0.945)	1.486 (0.885)	1.503 (0.916)
Previous head coaching			1.606 (1.127)	1.558 (1.082)	1.353 (0.918)
Previous D1 head coaching			0.128* (0.147)	0.073** (0.080)	0.199 (0.228)
Power conference				4.333** (2.598)	
HBCU					9.588*** (6.672)
Quadratic time trend	Y	Y	Y	Y	Y
Number of coaches	779	779	779	779	779

Note. Table reports odds ratios with robust standard errors in parentheses from a logit model of termination within the first 3 years of working at a school. Each observation is a coach hired between 1995 and 2011. Y = yes; D1 = Division I.
***$p < .01$. **$p < .05$. *$p < .1$.

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Notes

1. Belzer's analysis focuses on conference-level data and is solely descriptive in nature.
2. The 18 historically Black colleges or university (HBCU) schools in our data are Alabama St., Alcorn St., Bethune Cookman, Coppin St., Delaware St., Florida Agricultural and Mechanical University, Grambling, Howard, Jackson St., Maryland Eastern Shore, Mississippi Valley St., Morgan St., North Carolina A&T, Prairie View A&M, South Carolina St., Southern, Tennessee St., and Texas Southern.
3. See Kahn (1991) or Kahn (2000) for excellent reviews of the previous literature examining the relationship between race and labor market outcomes in professional sports. Kahn (2012) provides a more recent review of the literature on discrimination in basketball.
4. In an effort to provide a homogeneous sample, we include only schools that were classified as Division I by the beginning of the 1994/1995 season and remained in Division I until the end of the 2012/2013 season.
5. If a school changed coaches in midseason, we include only the coach who was in charge at the beginning of the season in our sample and attribute the entire won/loss record to that coach.
6. Those without conference affiliations are grouped as independents.
7. The classification of coaches by race followed a two-step process: (i) Two research assistants worked independently to identify a coach's race based on Internet photos and to identify cases where the race was ambiguous, and (ii) the authors then reviewed the ambiguous cases to make the final determination of race, often times relying on multiple photos of the coach. We did not attempt to identify Hispanic coaches—all coaches were classified as either White or Black.
8. SOS rank is a continuous variable ranking each team by the quality of their opponents in a given year. The variable ranges from 1, most difficult schedule in Division I, into the 300s as determined by the number of Division I teams in a given year.
9. Coaching changes that occurred at the end of the 2012-2013 season are included.
10. There was no apparent relationship between the race of the coach and the probability of an ambiguous initial finding regarding the coach's departure. The majority of cases in which a departure was reclassified from being voluntary to involuntary involved coaches with very low winning percentages.
11. We prefer the proportional Cox model in Equation 1, as we fail to reject the proportional hazard assumption in each of the models presented below. Results obtained with parametric survival functions are consistent with those using the more flexible

semiparametric Cox approach as are results from accelerated failure time models. Examples using the Weibull distribution and a proportional hazard are available in Appendix Table A4 and accelerated failure time in Appendix Table A5.

12. Standard errors allowing clustering at the school or conference level are consistent with those reported here as are bootstrapped standard errors allowing for two-way clustering by coach and school. Clustering at the coach level is maintained so as to not impose the independence of the error terms for the same individual across time.
13. In joint tests of interaction terms with HBCU status and other covariates in the model, we fail to reject the specification presented in Table 3, where HBCU enters as an indicator (p value = .11). Moreover, the qualitative interpretation and estimated magnitude between race and exit discrimination are no different in models including HBCU interactions with other covariates. We also fail to reject the baseline specification, where Black enters linearly as an indicator rather than with interactions (p value = .22).
14. Of the 1,120 coaching spells in our data, 70.80% are non-Black coaches at non-HBCUs, 22.14% are Black coaches at non-HBCUs, 6.79% are Black coaches at an HBCU, and 0.27% are non-Black coaches at an HBCU.
15. Given all but one of the HBCUs in the data plays in an exclusively HBCU conference, models including conference fixed effects are excluded from Table 4 to avoid drawing conclusions based on a comparison sample of three White HBCU coaches. These results are available on request.
16. Integrated Postsecondary Education Data System data for 1995-2013 were obtained for all 298 schools from https://nces.ed.gov/ipeds/. Budget data from the Office of Postsecondary Education are available from 2003 to 2013 from http://ope.ed.gov/athletics/Index.aspx and excludes the three service academies with Division I basketball (Air Force, Army, and Navy).
17. Results are also consistent when defining comparison non-HBCUs by athletic department revenue, men's basketball expenses, or men's basketball revenue.
18. The results are also robust to specifications grouping firings/resignations under National Collegiate Athletic Association scrutiny with other firings as the exit of interest as well as estimating a logit model for being fired within the first 3 years at a given school as a function of characteristics of the school and coach at the time of hiring. Estimated odds ratios showing that the association between early termination and race attenuates to zero after controlling for employment at an HBCU are included in Appendix Table A7.

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