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Abstract

Using panel data on National Collegiate Athletic Association Division I women's college basketball head coaches, we examine if there is a difference in tenure length based on the race and gender of the head coach. First, we find that athletic success is the main reason for a lower probability of exiting their coaching position. Second, we find that female head coaches have a lower probability of exiting a coaching position than male head coaches after controlling for performance. Third, we find that the race of the head coach has no influence on the exit probability of the head coach. We explore if this difference in exit probabilities is due to a difference in outside opportunities of males, a difference in gender matched preferences for mentoring, or discrimination against one of the groups.

Keywords: NCAA women's basketball, discrimination, race, gender, performance

Introduction

In men's National Collegiate Athletic Association (NCAA) sports of football, basketball, and baseball there are no female head coaches. Yet in women's NCAA sports many head coaches are male. For instance, in NCAA women's basketball thirty-seven percent are male coaches, in women's softball thirty-three percent are male coaches, and in women's soccer sixty-six percent are male coaches. In addition, in NCAA football twelve percent of head coaches are Black and in men's basketball thirty percent are Black. In women's NCAA basketball twenty percent are Black coaches. In our study we analyze both the influence of gender and race on the tenure of NCAA Division I women's basketball head coaches.

Many factors influence whether a coach remains in a coaching position. Some factors may be influenced by the coach's personal preferences, and some factors may be influenced by changes at the coach's college or university. A coach could leave a head coaching position by voluntarily deciding to take a different coaching position or by voluntarily deciding to leave the coaching profession. A head coach could also leave a head coaching position involuntarily as a dismissal by being fired. In this analysis, we are not able to determine whether the coach is leaving the position voluntarily or involuntarily. Even though we are not able to identify whether a coach is leaving the position voluntarily or involuntarily, it still informative to explore whether males and females or Blacks and Whites experience different exit probabilities from head coaching positions.

Literature Review

The market for coaches in NCAA Division I women's basketball is a publicly visible labor market with performance data and demographic information available for coaches. Kahn (2000) indicates how data availability makes labor markets in sports a good place to test hypotheses. After controlling for coach performance, the exit probabilities of coaches who leave head

coaching positions in women's NCAA Division I college basketball voluntarily are expected to be similar by gender and race if the outside opportunities and preferences are similar by gender and race. If a particular gender or race has more outside opportunities, this can increase the probability that a coach will exit a head coaching position in women's NCAA Division I college basketball.

We use the same econometric technique Groothuis and Hill (2004, 2008, & 2013), Ducking et. al. (2015), Ducking and Groothuis (2023), and Jepsen (2023) used to analyze the impact of race on the tenure of players in professional sports. Ducking and Groothuis (2023) and Jepsen (2023) find evidence that race impacts a player's tenure in their professional sport while Groothuis and Hill (2004, 2008, & 2013) and Ducking et. al. (2015) do not find evidence that race impacts a player's tenure in their professional sport.

Gobillon et. al. (2015) finds that the probability of a female getting a job decreases as the wage increases. This provides some evidence that females have fewer outside opportunities than males. If a gender or race has a stronger preference for change or upward mobility, this can also increase the probability that a coach will exit a head coaching position. It is also not clear if males or Whites have a stronger preference to change jobs than females or Blacks, but the group with the stronger preference to change jobs will likely have a higher probability of exiting a head coaching position in women's NCAA Division I college basketball.

Becker (1971) identifies different types of discrimination and reveals that individuals in the preferred group may earn more than individuals in the group that is not preferred. Bertrand and Hallock (2001) finds that women earned 45% less than men. It is possible that discrimination may impact the exit probabilities of coaches in addition to compensation. After controlling for coach performance, the exit probabilities of coaches who involuntarily leave head coaching

positions in women's NCAA Division I college basketball are expected to be similar by gender and race if discrimination does not play a role in the firing decision. If there is a preference for discrimination that leads males to be treated differently from females or Whites to be treated differently from Blacks, the group that is discriminated against will likely have a higher probability of exiting a head coaching position in women's NCAA Division I college basketball.

Several studies have examined the impact of preferences and opportunities in sports. Cunningham et. al. (2006) shows no difference between the desire of African Americans and Whites to become head coaches. Darvin et. al. (2017) uses WNBA and women's college basketball data and finds that the coach's gender does not impact player performance. Larsen and Clayton (2019) examine Division I women's college basketball and show that race and gender play a role in determining the pathway that is required to become a head coach in women's college basketball. Wasend and LaVoi (2019) finds no difference in the number of women who enter coaching by their coach's gender.

Several studies have examined whether there is evidence of discrimination in sports. Humphreys (2000) discerns that female head coaches earn 9% higher base salaries than male head coaches in women's college basketball. Cunningham et. al. (2006) finds greater turnover for Black coaches in both football and basketball than for White coaches. Kopkin (2014) uses data from major college football and finds that Black head coaches are 5.28% more likely to be fired than White head coaches. Traugutt et. al. (2018) analyses power five conferences and finds no evidence that gender impacts the salaries of coaches in women's college basketball. Given that women and men have experienced different outcomes in workplace environments, we use NCAA Division I women's basketball head coaches to determine whether there are differences in coaching tenure by gender and race.

Lastly, it is possible that male and female head coaches provide different degrees of mentoring to female athletes that play a role in the decision to fire a coach. Park et. al. (2017) provides evidence that the gender of the female student athlete's mentor did not impact the mentoring relationship while Swim et. al. (2022) provides evidence that the gender of the mentor did impact the mentoring relationship.

Data

We use data from the Sports Reference website on NCAA Division I women's head basketball coaches from 1982 to 2023. The data includes information on win percentage, wins, losses, experience, and women's NCAA tournament accomplishments. Table 1 contains descriptive statistics for the panel dataset. There are 369 teams, 64 conferences, 1,463 head coaches, 11,544 coach seasons, 930 female head coaches, 7,200 female coach seasons, 533 male head coaches, and 4,344 male coach seasons. In our sample of NCAA Division I women's basketball head coaches, 31% are White males, 6% are Black Males, 51% are White females, and 12% are Black females. On average, males have more experience, win more games, and perform better in the NCAA tournament.

Empirical Method and Analysis

Given the length of our panel study from 1981 to 2023, we first analyze how the proportion of coaches has changed over time. In 1981, White coaches made up 95.9% of head coaches while female coaches made up 30.7% of head coaches. In 2023, White coaches made up 68.3% of head coaches, a drop of 27.6%. In 2023, female coaches made up 66.7 of the total number of head coaches, an increase of 36%.

By each category, we find that Black male head coaches went from 1.5% in 1983 to 8.4% in 2023 while Black female head coaches 2.5% in 1983 to 22.3% in 2023. Further we find that

White male head coaches went from 67.8% in 1983 to 23.9% in 2023 while White female head coaches 28.2% in 1983 to 44.4% in 2023. Given these large changes in the mix of head coaches away from male and White head coaches, our panel provides an interesting period to study tenure length.

Non-parametric Estimates of Tenure Duration

To help understand tenure duration for head coaches in Women's Division I college basketball, we calculate the yearly hazard function as:

$$h_t = d_t / n_t , \quad (1)$$

where d_t is the number of coaches who end their tenure in year t and n_t is the number of coaches at risk of ending their career in year t. The hazard rate can be interpreted as the percentage of coaches who exited their coaching job given, they have survived up to some level of tenure. Table 2 and figure 1 show the hazard rate by gender, table 3 and figure 2 show the hazard rate by race, and table 4 and figure 3 show the hazard rate by gender and race.

Table 2 and figure 1 show that female head coaches have a higher hazard rate in 9 of the first 15 seasons as head coach, with female head coaches having a higher exit rate after the first year as a head coach. Table 3 and figure 2 show that Black head coaches have a higher hazard rate in 10 of the first 15 seasons as head coach, with Black head coaches having a higher exit rate after the first two years as head coach. Table 4 and figure 3 show that Black male head coaches have a higher hazard rate in 7 of the first 15 seasons as head coach, with Black male head coaches having a higher exit rate after the first year as head coach.

Semi- Parametric Estimates of Tenure Duration

To model the end of the coaching tenure of head basketball coaches in NCAA Division I Women's College Basketball, we follow Berger and Black (1998), Berger et. al. (2004), Groothuis and Hill (2004, 2008, 2013 and 2018), Ducking et. al. (2015), Depken et. al. (2017), Ducking and Groothuis (2023), and Jepsen (2023) by estimating semi-parametric hazard functions with our hazard model calculated as a discrete random variable with season level data. This approach allows us to incorporate right censored and left censored careers in addition to completed careers into the analysis. We estimate the following hazard model:

$$\frac{h(t,x,\beta)}{1-h(t,x,\beta)} = \Phi(t)\, e^{x\beta} = \exp(\phi(t) + x\beta)\,, \qquad (1)$$

which is simply a logit model where $\phi(t)$ is a 5th order polynomial of the coach's tenure in NCCA Division I Women's College Basketball. The 5th order polynomial reduces the number of parameters to be estimated from 41 using the dummy variable approach to 5 because it is used instead of 41 dummy variables representing years of coaching tenure. The term h_t is a baseline hazard function, which is common to all. The $x\beta$ term, determined by the coach's personal and productivity characteristics, shifts the baseline hazard function, but it affects the baseline hazard function in the same way each period. Berger and Black (1998) consider other hazard functions and find that the results are relatively robust across various specifications of the hazard function.

Because coaches in the panel have varying degrees of job tenure prior to the beginning of the panel, we identify the hazard function for both long and short tenures. The disadvantage to the dummy variable approach is that the number of dummy variables that need to be added to the model can be very large. In our study it would require 41 dummy variables. We also run into

problems with the Cox (1972) technique because we have too few coaches who have long tenures. The 5th order polynomial therefore includes tenure to the first, second, third, fourth and fifth powers. We chose the Taylor series approximation technique over using tenure dummies due to the small number of observations for high tenures. This method provides a very flexible specification of the baseline hazard but does impose more restrictions than Cox's model.[1]

Table 5 provides the results from our hazard model. We find that win percentage, making the first round, and making the second round of the NCAA Women's Basketball tournament lowers the probability of exit. These results suggest that the exit of coaches is more likely a dismissal than a quit because coach's success decreases the probability of an exit. We find there is a statistically and economically lower probability of exit for female coaches than for male coaches. We find there is no statistically significant influence of race on the exit of coaches. When compared to White males, we find there is a statistically and economically lower probability of exit for both Black female coaches and White female coaches with Black female coaches exhibiting the largest difference. When compared to White males, we find there is neither a statistical nor economic difference in exit for Black male coaches.

To understand the magnitude of effects we transform the coefficient using $(e^{\beta} - 1) \times 100$. Looking only at the influence of gender when female when $\beta = -0.139$, we find that females have a thirteen percent lower likelihood of exit. When comparing White females to White males when $\beta = -0.132$, we find that white females have a twelve percent lower likelihood of exit. When comparing Black females to White males when $\beta = -0.223$, we find that Black females have a twenty percent lower likelihood of exit.

Discussion and Conclusion

Our results are inconsistent with the hypothesis that female or Black coaches exhibit tenure discrimination. Our findings show that female coaches have a lower likelihood of exit than male coaches and Black head coaches no difference than White head coaches. So, what might cause this difference?

Although there are no examples of a White male women's head coach moving to a men's head coaching position, our results are consistent with the conjecture that males have more outside opportunities than females and males have a stronger preference to pursue outside opportunities. It is also possible that females coaching the same gender could be more effective mentors and coaches which could lead to longer tenures for female head coaches. The results of our analysis are also consistent with the conjecture that we are studying a time where both gender and racial discrimination existed at the beginning of our panel in 1981 that has greatly diminished by 2023 as shown by the large shift from male coaches to female coaches and the large shift from White coaches to Black coaches.

Future research can examine whether males or females are more likely to be fired or resign from their head coaching position to get a better understanding of why coaches are leaving their head coaching positions. Future research can also explore controlling for other factors such as the influence state taxes on exit rates, the influence of the increased popularity of women's sports on exit rates, and the influence of name, image likeness (NIL) and the new ability to write contracts with players.

Notes

1. The results do not change when higher order polynomials of the sixth and seventh power are included indicating that a fifth order polynomial is flexible enough to capture the influence of the base line hazard.

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Tables

Table 1: Descriptive Statistics

	Head Coaches		Female Head Coaches		Male Head Coaches	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Female	0.624	0.484				
Exit Head Coaching	0.099	0.299	0.099	0.299	0.099	0.299
Experience	7.485	6.414	7.288	6.226	7.812	6.700
Winning Percentage	0.492	0.200	0.478	0.198	0.515	0.200
Wins	14.789	6.769	14.302	6.650	15.597	6.886
Losses	14.719	5.416	15.090	5.369	14.103	5.439
NCCA Tourn. First Round	0.083	0.276	0.076	0.265	0.095	0.293
NCAA Tourn. Second Round	0.042	0.201	0.040	0.196	0.046	0.210
NCAA Tourn. Sweet 16	0.021	0.142	0.021	0.143	0.020	0.139
NCAA Tourn. Elite 8	0.009	0.095	0.009	0.095	0.009	0.097
NCAA Tourn. Final 4	0.009	0.095	0.008	0.086	0.012	0.108
Major Conference	0.184	0.387	0.201	0.400	0.156	0.363
Number of Coach Seasons	11,544		7,200		4,344	
Number of Coaches	1,463		930		533	

Table 2: Hazard Rate by Gender

year	female	male
1	0.08	0.07
2	0.058	0.086
3	0.098	0.09
4	0.121	0.13
5	0.127	0.128
6	0.108	0.096
7	0.098	0.065
8	0.092	0.102
9	0.067	0.049
10	0.095	0.115
11	0.11	0.072
12	0.061	0.102
13	0.086	0.054
14	0.088	0.051
15	0.087	0.084
Max	42	39

Table 3: Hazard Rate by Race		
year	White	Black
1	0.069	0.102
2	0.065	0.076
3	0.106	0.057
4	0.121	0.135
5	0.115	0.171
6	0.102	0.112
7	0.087	0.082
8	0.088	0.135
9	0.062	0.053
10	0.104	0.094
11	0.082	0.171
12	0.081	0.051
13	0.058	0.166
14	0.067	0.121
15	0.078	0.142
Max	42	41

Table 4: Hazard Rate by Gender and Race				
year	White male	White female	Black male	Black female
1	0.048	0.086	0.177	0.064
2	0.086	0.054	0.085	0.072
3	0.103	0.107	0.036	0.065
4	0.121	0.121	0.167	0.121
5	0.123	0.112	0.156	0.177
6	0.101	0.103	0.074	0.13
7	0.071	0.096	0.042	0.103
8	0.088	0.086	0.167	0.117
9	0.053	0.067	0.03	0.066
10	0.113	0.098	0.129	0.074
11	0.064	0.092	0.115	0.026
12	0.097	0.071	0.13	0
13	0.037	0.069	0.151	0.176
14	0.049	0.077	0.067	0.154
15	0.065	0.086	0.214	0.095
Max	39	42	22	41

Table 5: Hazard Model Results		
	(1)	(2)
Variables	Exit	Exit
Win loss percentage	-4.793***	-4.791***
	(0.196)	(0.192)
Female	-0.139**	
	(0.065)	
White	0.08	
	(0.074)	
Black Male		-0.059
		(0.139)
White Female		-0.132*
		(0.072)
Black Female		-0.223**
		(0.097)
NCAA tournament 1st Round	-0.366*	-0.366*
	(0.209)	(0.209)
NCAA tournament 2nd Round	-1.015**	-1.016**
	(0.396)	(0.396)
NCCA tournament Sweet 16	-0.548	-0.548
	(0.478)	(0.478)
NCAA tournament Elite 8	-0.133	-0.133
	(0.584)	(0.584)
NCAA tournament Final 4	0.383	0.383
	(0.576)	(0.576)
Major Conference	0.009	0.009
	(0.08)	(0.08)
Constant	-1.302***	-1.228***
	(0.185)	(0.177)
N	13137	13137
Pseudo R2	0.1179	0.1179

Clustered standard errors in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level.

Figures

Figure 1: Hazard Rate by Gender

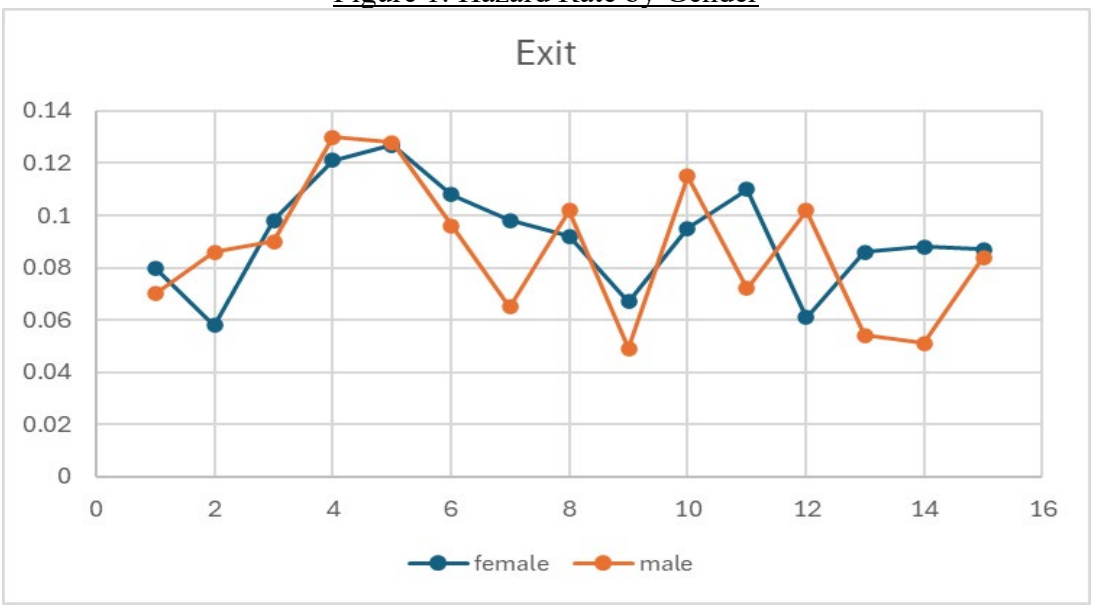


Figure 2: Hazard Rate by Race

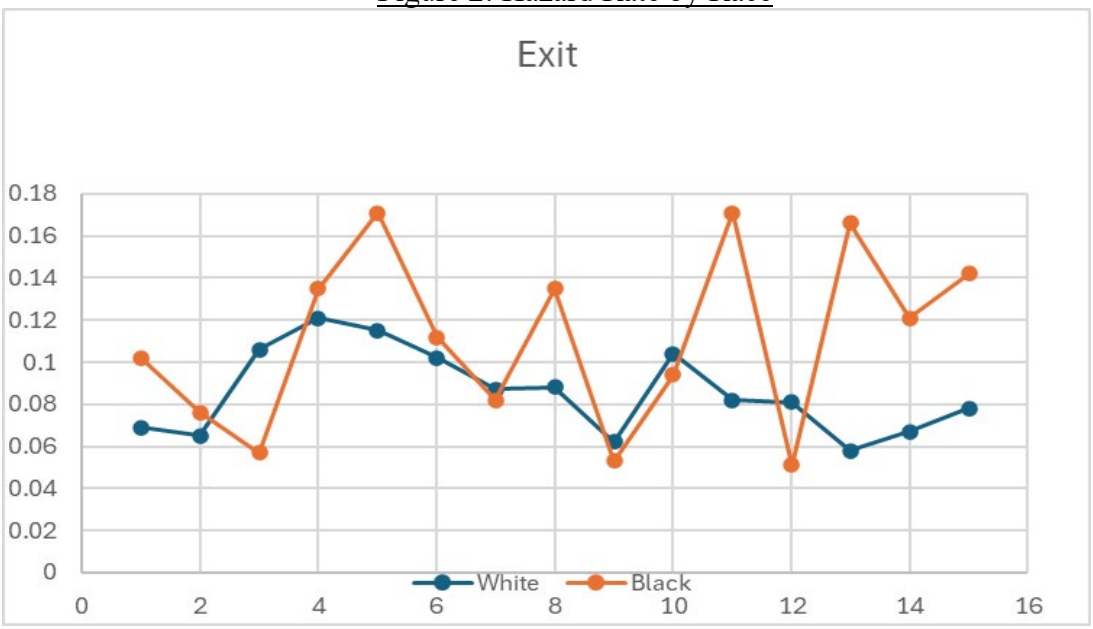


Figure 3: Hazard Rate by Gender and Race

