The NBA, Exit Discrimination, and Career Earnings

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The purpose of this article is threefold. First, it complements the many wage discrimination studies by examining exit discrimination in the NBA using a decade's worth of data (the 1980s). White players have a 36 percent lower risk of being cut than black players, *ceteris paribus*, translating into an expected career length of 7.5 seasons for an apparently similar player who is white and 5.5 seasons for the same player who is black. Second, the career earnings effect of exit discrimination in the 1980s is larger ($808,000) than the career earnings effect of wage discrimination ($329,000). Third, our data are consistent with the hypothesis that customer racial discrimination is the reason for the observed exit discrimination.

Introduction

Within the literature on labor market discrimination, most researchers have focused on the conditions under which otherwise identical workers receive different wages.[1] Yet, in addition to such wage discrimination, Becker (1971) notes that employment discrimination also can occur at the points of job entry, promotion, and exit. Workers can be denied opportunities at each part of the labor market process that result in differential *lifetime* earnings. This study focuses on *exit discrimination*, defined as the

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[1] See Cain (1986) for a review.

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involuntary dismissal of workers based on the preferences of employers, coworkers, or customers. Because it provides fine-grained measures of individual productivity, we examine exit discrimination among black and white players in the National Basketball Association (NBA). Using salary data from the league, we show that, in fact, the effect of exit discrimination on career earnings is greater than that due to wage discrimination.

While attention to promotion and hiring discrimination has been longstanding, the focus on exit discrimination has only recently received theoretical and empirical attention.[2] In an analysis of current population statistics (CPS) tenure supplements for 1983, 1987, and 1991, Diebold, Neumark, and Polsky (1994) showed that there was a decline in the retention rates of black relative to white workers, whereas all other subgroups experienced no such declines. According to Swinnerton and Wial (1995), retention, as a function of tenure, has an inverted-U shape for both black and white workers and for workers in nonprofessional services, a category that includes the entertainment industry. Their study covers the 1979–1991 period and uses the CPS tenure supplements from 1979, 1981, 1983, 1987, and 1991.[3]

While the results are suggestive, one difficulty that these studies face is an inability to distinguish empirically between voluntary and involuntary job separation. This is critical because, unlike involuntary quits, voluntary quits may not be the result of discriminatory employers, coworkers, or customers but rather are based on differing preferences. Hence we turn to the sports labor market to focus solely on the effects of involuntary turnover. Because of the extremely high opportunity costs of quitting the NBA, turnover among professional basketball players is predominantly involuntary. Kahn (1991) states that "considering the high incomes earned by professional athletes, it seems likely that much turnover among them is involuntary."[4]

Another more general criticism of empirical studies of discrimination in the labor market is the difficulty of operationalizing individual ability or productivity. A similar shortcoming of empirical analyses in this area has been the omission of critical but difficult to measure characteristics

[2] See Brown et al. (1997, chap. 2) for a recent review of quit behavior studies.

[3] This is consistent with our findings of a U-shaped *unconditional* hazard function for NBA players. However, as shown in Figure 1, when we estimated the hazard function *conditional* on productivity, the shape changed significantly. Swinnerton and Wial (1995) do not perform this type of analysis.

[4] If some turnover is voluntary, one might expect to find higher retirement rates for whites. Whites would be more likely to quit because of greater employment opportunities inside and outside the sport. If there is a difference in quit rates, we argue that a greater tendency for voluntary retirement among white players is likely to bias our effects downward, thereby providing a conservative test of exit discrimination.

that are related to worker productivity (Allison, 1983). An omitted variable such as "quality of prior work experience," for example, can inflate the differential effect of race or sex on earnings, hiring, promotion, or exit rates. In light of these difficulties, the availability of detailed performance measures in sports alleviates the problem of biased results due to mismeasurement or correlation of errors with race and can get us closer to a state of the world where, in Becker's terms, a "taste for discrimination" can be discerned between different racial groups of otherwise equal ability (Becker, 1971).

For these reasons, many researchers have turned to the sports labor market in order to test for evidence of discrimination. In a number of sports, evidence for wage discrimination by race has been found.[5] In particular, Kahn (1991), in a survey of the literature, found that the wage gap in basketball is between 11 percent and 25 percent against black players. Brown, Spiro, and Keenan (1991), and Kahn and Sherer (1988) both examined wage and entry discrimination in the NBA. No entry effect was found, but tests of a differential wage effect were significant. Extending this literature, our study enables a comparison to be made between the career earnings effect of wage and exit discrimination.

Similarly, Jiobu (1988) determined that black baseball players had significantly higher exit rates than their white counterparts from 1971 to 1985.[6] He used race, age, playing position, and three measures of total career performance to examine exit discrimination. No numerical interpretation is offered regarding the extent of exit discrimination, no reason for it is analyzed, and no effect on career earnings is mentioned.

With explicit attention to exit discrimination, Johnson and Marple (1973) found that white benchwarmers had longer careers than black benchwarmers in the NBA using data from the 1970 season. They rank players based on points scored per game and use a comparison of means by race. No other controls are included. Because of the methodology used, the amount of discrimination is difficult to determine in their study.

We extend these studies by gathering better productivity data (eight annual measures of performance for eleven seasons) as well as more

[5] See Hill and Spellman (1984) and Cymrot (1983) for baseball; Kahn and Sherer (1988), Koch and Vander Hill (1988), Wallace (1988), and Brown, Spiro, and Keenan (1991) for basketball; Mogull (1973) and Kahn (1992) for football; and Walsh etal. (1988) and Jones and Walsh (1988) for hockey.

[6] Sam Jethroe, the 1950 Major League Baseball National League Rookie of the Year, alleged that racial discrimination had shortened his career. On October 4, 1996, a federal court ruled the claim was barred by the statute of limitations (*Contra Costa Times*, October 6, 1996). The relevance is that he is not eligible for pension benefits because his career was not long enough. Another baseball example comes from an article in the *San Francisco Chronicle* on April 15, 1997. Black players believe that "the average black player is more likely to be released in favor of a white player of relatively equal skills."

extensive information on alternative factors that could affect the decision to retain players: injuries, trades, team record, and draft number. We also employ the more methodologically appropriate technique of event-history analysis to test for differential exit rates for black versus white players. Additionally, the effect on career earnings is assessed along with analyses that suggest customer preferences play an important role.

As Kahn (1991) noted in his survey of the literature, there was evidence of customer or fan preferences as a determinant of some forms of discrimination in the NBA. Kahn and Sherer (1988) show that fan attendance is affected by team racial composition. Having more white players on a team results in greater turnout. Brown, Spiro, and Keenan (1991) report that there is evidence of "geographical sorting by race"; i.e., there is a high correlation between the racial composition of teams and their corresponding cities. A deeper look into customer discrimination by Burdekin and Idson (1991) reveals that not only is higher attendance associated with increases in the percentage of white players on a team but that the matching of team to city racial composition also increases attendance, at the margin.

Customer-based discrimination has received little attention because few goods could be identified as being white or black produced. Hence much of the focus has been on employer and coworker discrimination as likely sources of the disparities in wages and income levels that are observed between blacks and whites in the general labor market (Cain, 1986). Kahn (1991) argued, however, that customer discrimination may be more prevalent in sports than in the general labor market because professional sports are in the public eye, where there is contact between fans and players. In a context where the majority of employees are black, he hypothesized that fans place a premium on watching white players. Indeed, he suggested that this premium may have increased as the total percentage of whites in the league decreased from approximately 42 percent in the early 70s to roughly 20 percent in the 1980s. Following the work of Burdekin and Idson (1991), we test a model of customer discrimination by examining the influence of team racial composition on fan attendance. We test a longer period of time, control for the autocorrelation present in these types of data, and add an index of the availability of substitute products that is shown to be an important determinant of the demand for NBA contests.

The rest of the article is organized as follows: The development of a theory of customer-driven exit discrimination is included in the second section. The next section contains the event-history analysis of exit rates in the NBA. The estimate of expected career length, its effects on career

earnings, and a test of customer discrimination appear in the fourth section. A summary of the results and their implications constitutes the final section.

Theory

The standard theory of discrimination asserts that competition may remove coworker or employer wage discrimination but not customer discrimination. Further, customer discrimination is more likely to occur in service industries (where there is consumer-producer contact) than in manufacturing, all else equal. Because consumers know *exactly* who the producers are, the NBA epitomizes this aspect of a service industry. Given the significant body of evidence showing wage discrimination in the NBA, the purpose of this section is to develop a theory of customer discrimination that allows for both wage and exit discrimination to coexist. Suppose (1) that customers demand a combination of talent and white players because of their desire to see winning teams and their discrimination against black players. Further, assume (2) that the pool of available talent with sufficient skill is becoming increasingly black. Thus there are two opposing forces at work that lead to an optimal number of black players on a team, assuming a diminishing marginal revenue product of the number of white players on a team. First, employ as many black players as possible to capitalize on their relative abundance. Second, employ as many white players as possible to satisfy customer preferences.

For a typical NBA team, let $Q = Q(T, n_w)$, where Q is the demand for the games played by this team. T is total team talent and is defined as $T = n_w T_w + n_b T_b$, where n_w and n_b are the number of white and black players on the team, respectively, and T_w and T_b are their average talent levels. Further, N, the total number of players on the team, is fixed by the league and is defined as $N = n_w + n_b$. The argument n_w is in the demand function because it represents the fans' preferences for watching white players.

An owner chooses the amount of talent and team racial composition that maximizes profits "π_i. Explicitly, "$\pi_i = PQ(T, n_w) - (w_w n_w T_w + w_b n_b T_b)$, where P is the ticket price and is assumed constant and w_w and w_b are the white and black wage per unit of talent, respectively. The resulting equilibrium condition is

$$w_w T_w - w_b T_b = MRP_T \left(T_w - T_b \right) + MRP_{n_w} \tag{1}$$

MRP_T [defined as $P(\partial Q/\partial T)$] is the marginal revenue product of talent and is assumed to be positive but decreasing. MRP_{n_w} [defined as $(\partial Q/\partial_{n_w})$] is the marginal revenue product of the fraction of white players on the team and is assumed to be positive and decreasing up to a certain n_w. This is the effect of including the first exogenous factor into the model; fans discriminate based on race.[7]

As Kahn (1991) indicates, there is a wage gap, ranging from 11 percent to 25 percent, that favors white players in the NBA. Equation (1) shows that there is a white wage premium that comes directly from customer preferences for white players. In other words, a white player of comparable ability to a black player receives an income in excess of the black income [i.e., $(w_w - w_b)T$] by an amount equal to the effect that their race has on the attendance decisions of fans MRP_{n_w}. In equilibrium, the owner hires the number of white players n_w^* that causes Eq. (1) to be true.

To satisfy the fans, there is a minimum number of white players on a team. The second assumption, that the pool of quality available talent is becoming increasingly black, causes the annual replacement of players with rookies to occur mostly among black players. The white players have longer careers simply because there are fewer qualified white rookies to replace them, whereas the black players are constantly being cycled in and out of the league.[8] The exit discrimination is caused by the biased preferences of fans (assumption 1) but is heightened by the fact that the pool of available rookies is mostly black and increasing (assumption 2).[9]

This theory, like any other, is dependent on its assumptions. The fourth section tests the validity of assumption 1. For assumption 2, we note that the percentage of players drafted who are black has grown from 58 percent to 80 percent over the last two decades, which is in line with the

[7] It is possible that the demand maximizing number of white players on a team is greater than N, the total number of players on the team. This depends on the magntitude of the marginal attendance decisions of white and black fans.

[8] When there are a lot of white players on a team, as was the case in the early 70s, the replacement of a white player with a black player has little effect on attendance and thus wages. As the team approaches the critical minimum number of white players, each white player represents a larger proportion of the white players on the team, and his removal has a larger effect on attendance and therefore wages. Counter to what might be expected, the real effects of discrimination are likely to be *increasing* in the NBA as the transition to the equilibrium occurs.

[9] The theory also predicts that the team racial composition may affect the hazard rate in one of two ways. Black players on a team with many black players might have an increased chance of being fired because the team is approaching the critical minimum number of white players. On the other hand, a particular black player on a team with many black players may be less likely to be the one who is replaced from the pool of available talent. Thus the direction of the effect is indeterminant.

growth in the percentage of college players who are black.[10] Thus the pool of qualified talent has become increasingly black.[11]

If the two assumptions are true empirically, what are their implications for the data analysis that follows? The theory distinguishes between the following two hypotheses. The null hypothesis is that if performance is the sole criterion that earnings and employment decisions are based on, then there should be no difference between wages and hazard rates across races.[12] The alternative hypothesis is that if race matters, wages will be lower and hazard rates will be higher for black players as compared with equally talented white players.

Exit Discrimination

The Data. The sample includes all players selected in the first two rounds of the 1980–1986 NBA draft.[13] We restricted the sample to those who received a contract and played at least 1 year in the NBA. Of those who were excluded, 53 players did not receive a contract and 1 player played in Europe only to return to the NBA for 1 year. We followed the remaining 275 players' careers until they were cut from the league or until the 1990–1991 season, the last year for which data were obtained. During the time frame of this study, 184 of the 275 players in this sample were eventually cut from the league.

Using player photographs available from the *Official NBA Guide* (1980–1991), we coded the race of each player in the sample; 51 of the 275 players are white. In addition, player position, performance statistics,

[10] In 1993, black athletes formed 27.5 percent of the division I athletes (all sports, not just basketball), up from 23.6 percent in 1986 (Blum, 1995).

[11] Although it is beyond the scope of this study, it is important to understand the causes for the increase in the number of blacks in the pool of available talent. Harry Edwards suggests that it "began with the integration of blacks into mainstream professional sports," which continues today, but is further urged along by the media's "elevation of black professional athletes to the status of role models/heroes/celebrities and the black community's association of these images with making it" (Edwards, 1994). "The almost universal perception that sport, among all American institutions, offers African-Americans unique socioeconomic and career advancement opportunities has prompted black parents to be four times more likely than white parents to view their children's participation in sport not as mere recreation, but as a start down the road to a professional sports career. Similarly, black parents are more likely than white parents to see their children's sports participation as a potential economic mobility vehicle for the entire family" (Edwards, 1992).

[12] In a race-blind world, MRP_{n_w} would be zero, a larger proportion of the players in the league would be black, and wages would be based solely on talent. This implies that the number of teams with only black players should be lower in the discrimination than in the null setting. Given our data, the expected number of all-black teams is about 5.4, whereas the actual number is 4, so the sign is as expected, but the difference is not statistically significant.

[13] Players who were selected beyond the second round were rarely offered contracts. In 1989, the NBA itself finally narrowed down the number of rounds to two.

number of games played, team record, and detailed information on player injuries and trades were collected from *The Official NBA Encyclopedia* (1989) and *The Sports Encyclopedia* (1991).

Player position is included as a control variable in order to account for the relative scarcity and greater difficulty that teams face in replacing their taller players. Because taller players typically occupy the center and forward positions, we divided players into two positions: center/forward and guard (the reference category). We expect centers and forwards to have a lower risk of exiting than the guards, who are generally smaller.

Scoring, assists, steals, rebounding, and blocks are used as measures of each player's ability on the court. Since these performance statistics may depend on how much playing time a player receives, the performance measures are divided by the number of minutes played during the season. The number of games played during the regular season is also included as a separate control. Free throw shooting and field goal shooting are entered as percentages and serve as additional measures of scoring ability.

A player's performance and the length of his career may be affected by the occurrence of injuries. A dummy variable, *injury*, accounts for the presence of any one of 14 types of injury or illness. The extent of the injury is controlled for by combining it with games played.

A possible influence on a player's career length is the likelihood of being traded, which is measured by the number of trades during his career. Most player trades occur during the interim season as players become free agents and teams try to rebuild their roster and vie for future top draft picks. The effect of being traded was analyzed along with the subsequent year's performance on the rate of exit. The direction of the effect is not clear because trades could breathe new life into a player's career if the player is sent to a team that has a greater need for his services. However, being traded also can signal a player's declining ability, thereby leading to a decrease in playing time on the new team.

Team record, expressed as the percentage of games won during the regular season, is included. Because poorly performing teams often undergo major roster changes in order to improve their performance, players might be at greater risk for being cut as losing teams attempt to rebuild.

A player's draft number is the order in which a player was taken in the NBA draft. It is included in the analysis as a measure of a team's financial commitment to a player and as a measure of the player's expected future performance; earlier draft picks receive larger salaries in their contracts and are expected to be top performers. These contracts represent a sunk cost incurred by the drafting team that have been shown to affect career

length such that, controlling for performance and other factors, players who were picked earlier in the draft were found to have a significantly lower risk of being cut from the league (Staw and Hoang, 1995). Consequently, we include draft order in this analysis and expect to replicate this finding.

Because the risk of being cut from the NBA can be expected to change with the number of years (seasons) a player has already spent in the league, tenure in the NBA is also included. The tenure "clock" stopped, however, for some players who left to play for teams in Europe, since performance measures are not available for those years. The clock restarted when they returned to the NBA.

Methods. Examining survival in the NBA poses several challenges to standard regression techniques. First, there is no satisfactory way of handling right-censored cases, i.e., the group of players for which the event of being cut from the league is not observed within the time period of the study. Conducting a logistic regression on a categorical dependent variable that distinguishes those who were cut and those who were not cut would retain information from both groups. However, logistic regression is unsatisfying because it cannot incorporate the effect of duration or time spent in the state prior to the occurrence of the event. The effect of duration, measured by length of tenure in the NBA, is particularly important because we would expect that a player's risk of exiting will change the longer he remains in the league.

Finally, ordinary regression techniques are problematic because they cannot easily incorporate changes in the values of the explanatory variables over time. Creating performance variables for every year spent in the league for up to 12 years would be very cumbersome and introduce problems of multicollinearity.

In order to address each of these challenges, we use event-history analysis to examine how race influences the risk of being cut from the NBA. The model of the survival process using this framework would explicitly include (1) both those who were and were not cut from the league, (2) information on duration, and (3) explanatory variables that can vary over time.

The dependent variable in event-history analysis is the hazard rate. The *hazard rate* is interpreted as the probability of exiting the NBA during the time interval t to $t + \Delta t$, given that the individual is at risk for being cut at time t (Petersen, 1995). Dividing the probability by Δt and letting $\Delta t \rightarrow 0$ give us the more precise formulation of the hazard rate expressed as an instantaneous rate of transition:

$$\lambda(t) = \lim_{\Delta t \to 0} \frac{P\left(t < T < t + \Delta t \middle| T > t\right)}{\Delta t} \tag{2}$$

We specify a piecewise constant rate model in which the estimated rates are modeled as a function of performance, team performance, and number of years spent in the league. This model is extremely flexible because, while it forces the estimated rate to stay constant within each period, the rate is allowed to vary arbitrarily between periods.[14] The effect of tenure is captured by nine dummies, one for each year spent in the league. The last dummy captures the effect of remaining in the league for 9 or more years. The hazard rate function can be expressed as

$$\lambda = \exp\left[\alpha + \beta_1 X + \beta_2 X(t) + \gamma_j T_j\right] \tag{3}$$

where λ is the hazard rate or risk that a player is cut from the NBA, α is a constant, X is the vector of time-constant variables such as draft number and race, $X(t)$ is the vector of time-dependent variables such as performance that are updated each year, and T_j are the time dummies. β_1, β_2, and γ_j are the coefficient vectors to be estimated.

Results. Black and white players do not differ greatly in terms of their performance levels. The correlations are shown in Table 1 and differences by race in Table 2. Two performance measures are modestly correlated with race. White NBA players have lower steals per minute and points scored per minute than their black counterparts ($r = -0.17$, $p < .01$; $r = -0.11$, $p < .01$). White players are also more likely than black players to play the center/forward position ($r = 0.1$, $p < 0.1$). As a group, white players also were traded more often (24 percent more per player) and suffered more injuries than black players (14 percent more injuries per player). In an analysis of the means, Table 2 shows that blacks and whites differed in the average number of seasons spent in the NBA. Of those who exited during the time span of the study, white players were cut on average after 5.43 seasons in the league, whereas blacks were cut after 4.08 seasons.

The correlations also show that a variety of the performance measures are collinear. For example, rebounds are correlated with blocks, and steals are correlated with assists. This is not surprising, since the measures capture a number of underlying defensive and offensive skills associated with

[14] The results were not significantly different using a Gompertz model in which the log of the hazard rate could increase or decrease linearly with time.

TABLE1

MEANS, STANDARD DEVIATIONS, AND CORRELATIONS OF INDEPENDENT VARIABLES (N = 1455)

				Intercorrelation													
		Meaj hn	SD	1	2	3	4	5	6	7	8	9	10	11	112	13	14
1	Center/forward	0.70	0.46	1.00													
2	Free throws	71.74	15.00	–0.19[b]	1.00												
3	Field goals	46.63	7.79	0.15[b]	0.20[b]	1.00											
4	Assists	0.09	0.07	–0.67[b]	0.29[b]	–0.02	1.00										
5	Rebounds	0.18	0.08	0.58[b]	–0.24[b]	0.26[b]	–0.53[b]	1.00									
6	Steals	0.04	0.02	–0.33[b]	0.07[c]	0.00	0.40[b]	–0.08[b]	1.00								
7	Blocks	0.02	0.02	0.42[b]	–0.19[b]	0.15[b]	–0.38[b]	0.50[b]	–0.22[b]	1.00							
8	Points scored	0.43	0.14	0.05	0.41[b]	0.41[b]	0.04	0.00	0.14[b]	–0.09[b]	1.00						
9	Injury	0.08	0.27	0.00	–0.03	–0.10[b]	0.00	–0.01	–0.05	–0.02	–0.03	1.00					
10	Trade	0.15	0.36	0.01	–0.02	–0.09[b]	–0.03	–0.06[c]	–0.01	–0.06[c]	–0.12[b]	–0.02	1.00				
11	Games	63.52	22.69	0.00	0.39[b]	0.44[b]	0.11[b]	0.07[b]	0.03	0.08[b]	0.29[b]	–0.30[b]	–0.15[b]	1.00[c]			
12	Team record	49.45	14.37	0.06	0.01	0.09[b]	–0.02	0.02	–0.02	0.04	0.06[c]	–0.04	–0.09[b]	0.07[b]	1.00		
13	Draft number	17.96	12.16	–0.04	–0.16[b]	–0.16[b]	–0.04	–0.06[c]	0.07[b]	–0.05[c]	–0.34[b]	–0.05	0.09[b]	–0.26[b]	–0.03[b]	1.00	
14	Tenure[a]	3.94	2.46	0.03	0.13[b]	0.04	0.02	–0.03	–0.08[b]	–0.01	0.10[b]	0.09[b]	0.17[b]	0.06[c]	0.10	–0.17[b]	1.00
15	Race	0.22	0.41	0.10[b]	0.08[b]	0.01	–0.05[c]	0.05[c]	–0.17[b]	0.00	–0.11[b]	– 0.01	0.01	0.01	0.06[a]	0.01	0.05

[a] Time dummies are converted to a continuous variable.
[b] $p < .01$, two-tailed.
[c] $p < .05$, two-tailed.

TABLE 2

COMPARISON OF EXPLANATORY VARIABLES BY PLAYER RACE

	Blacks	Whites
Totals		
Number of players	224	51
Percentage of center forwards	67%	78%
Percentage of guards	33%	22%
Means		
Free throw percentage	0.71	0.74
Field goal percentage	0.47	0.47
Assists/minute	0.10	0.09
Rebounds/minute	0.18	0.19
Steals/minute	0.04	0.03
Blocks/minute	0.02	0.02
Points/minute	0.44	0.40
Winning percentage of team	48.98	51.09
Draft number	17.88	18.22
Percent black on team	0.76	0.68
Games played	63.42	63.86
Instances of being injured	0.41	0.47
Instances of being traded	0.76	1.00
Tenure[a]	4.08	5.43

[a] Mean tenure of players who were cut (not right-censored).

the different positions on a team. Centers and forwards, for instance, have higher rebounds per minute and blocks per minute than the other positions (r =.58, $p < .01$, two-tailed test; $r = .42$, $p < .01$, two-tailed test).

While the relationships across the performance measures are to be expected, multicollinearity presents two problems for the subsequent event-history analysis. First, standard errors of the performance measures are likely to be inflated, thereby leading to a higher probability of incorrectly accepting the null hypothesis of no effect (a type II error). Another consequence of multicollinearity is the sensitivity of the estimates and the standard errors to changes in the model. In our analyses, we found that the injury variable became significant, while the trade variable became insignificant when the number of games played was included in the analysis. Because of the high collinearity, the effects of trade and injury should be interpreted with caution. Despite the problem of multicollinearity, however, we decided to include all the measures in the event-history analysis in order to conduct the most conservative test of player race as a predictor of exit rates.

The results of the event-history analysis using the piecewise constant rate model appear in Table 3. In the total sample, 184 players were cut from the league. Therefore, the annual proportional hazard rate for dropping out of the NBA was 0.13. The full model with control variables and

TABLE 3

THE EFFECT OF RACE ON THE RATE OF EXIT FROM THE NBA

	β
Center/forwards	−1.06
Free throw percentage	0.05
Field goal percentage	0.02
Assists/minute	−11.54
Rebounds/minute	2.46
Steals/minute	−13.82
Block/minute	−51.72
Points/minute	−13.59a
Instances of being injured	−6.10a
Instances of being traded	2.26
Games played	−0.31c
Winning percentage of team	−0.06
Draft number	0.21b
Race	−4.45a
Year 2	0.73
Year 3	0.68
Year 4	3.34
Year 5	2.88
Year 6	2.96
Year 7	1.50
Year 8	9.34b
Year 9+	8.00b
Intercept	−4.02
Number of events	184
Number of one-year spells	1,455
χ^2	223.73

Note: All coefficients and standard errors are multiplied by 10.
[a] $p < 0.05$, one-tailed.
[b] $p < 0.01$, one-tailed.
[c] $p < 0.001$, one-tailed.

draft number offered a significantly better fit than the null model (χ^2 = 223.73, 22 d.f., $p < .01$).

Controlling for performance and team characteristics, there is strong evidence of higher exit rates for black than white players in the NBA (β = –0.45, $p < .05$, one-tailed test).[15] In order to make the coefficient meaningful, it must be exponentiated and converted into a percentage using 100[exp(β) – 1]. This calculation gives us the percentage difference in the hazard rate between whites and blacks, the omitted category (Allison, 1983). Using this method, white players have a 36 percent lower hazard

[15] Team racial composition was insignificant and had no effect on the other variables when it was included in the hazard analysis (see footnote 2).

FIGURE 1
Estimated Hazard Rate for Black and White Players

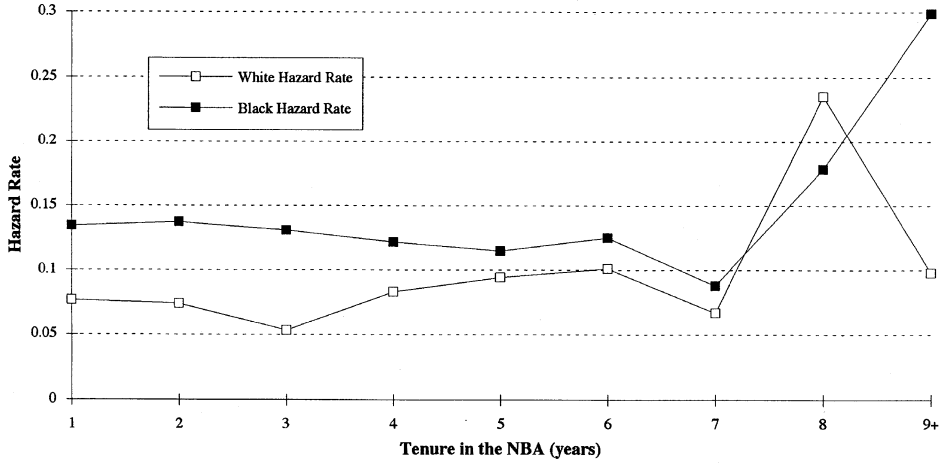
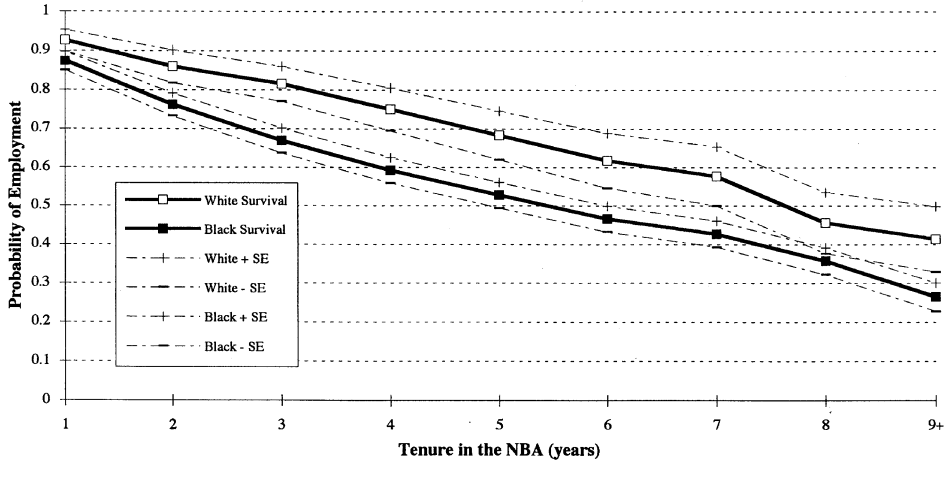


FIGURE 2
Survival Functions for Black and White Players (with standard errors)



rate than black players of being cut from the league[16] (Fig. 1). As a result, they have a higher survival rate than black players (Fig. 2).

The effects of the other variables are also of interest.[17] Only one performance statistic, points scored per minute, significantly affected the hazard rate for career mortality ($\beta = -1.36$, $p < .05$, one-tailed t test). Games played in the regular season had a strong effect on the hazard rate ($\beta = -.03$, $p < .001$, one-tailed t test). The other performance measures may be insignificant due to multicollinearity (see Table 1). For example, when the number of games played is excluded from the model, the effect of being traded and the performance measure *blocks per minute* become significant.

An injured player is less likely to be cut than an uninjured one, perhaps because the coach has not had time to evaluate the player ($\beta = -.6$, $p < .05$, one-tailed t test).[18]

As predicted, a later draft number has a positive effect on the hazard rate ($\beta = .02$, $p < .01$, one-tailed t test), which is consistent with Staw and Hoang (1995). Finally, as the positive coefficients on the year dummy variables indicate, the risk of being cut increases over time.[19]

Customer Discrimination

The data are consistent with the theory that not only do white players earn a higher salary, but they also have longer careers than comparable black players. The theory is based on the assumption that customers

[16] It is possible that career length may differ across races because one race may have longer guarantees in their contracts. The cost of firing a worker with a guaranteed contract includes the salary, whereas firing a worker without a guarantee does not. Thus players with contract guarantees, which may vary by race, are likely to have longer careers. What this study may end up measuring is not whether black players are discriminated against in employment decisions, but whether they are discriminated against in contract decisions. This is just as important a measure of discrimination as exit discrimination, just earlier along in the process.

[17] Possibly the general manager and/or coach may make employment decisions based on their own racial preferences as opposed to those of their customers. A test concluded that the race of general managers and coaches is not associated with the hazard rate. We also found that the salary cap and free agency had no significant effect on the hazard rate.

[18] To control for the intensity of an injury, an interaction term of injury and the number of games played was tested but was not significant.

[19] An increase in the hazard rate over time is strong evidence against the argument that unobserved heterogeneity in the sample of players is producing this time-dependent effect. Typically, differences between individuals in our sample that are not taken into account in the model would cause individuals at greater risk of being cut from the league to drop out earlier than those at less risk. If the argument for unobserved heterogeneity were true, we would expect a declining hazard function over time. While it is often difficult to determine whether a declining hazard rate is an artifact of unobserved differences, an increasing rate over time is strong evidence for a time-dependent effect.

prefer watching white players. The following tests suggest the presence of customer prejudice.

All else being equal, employer discrimination would lead to a team racial composition that represents the racial preferences of the team decision makers: the owner, the general manager, and the coach. On the other hand, the preferences of the fans would determine the team racial makeup if customer discrimination existed. To distinguish between employer and customer discrimination, the relationship between the race of the decision maker (approximated by coach and general manager race), the race of potential fans (approximated by city racial composition), and the racial composition of the team is analyzed.[20]

Following Burdekin and Idson (1991), we examine whether the racial composition of the basketball teams in turn affects fan attendance. Because fan turnout is an important source of revenue, we focus on attendance in order to show that management must be concerned with both team performance and team racial composition in order to maximize ticket revenue.[21]

Data and Methods. In the first analysis, the percentage of white players on each team is modeled as a function of the percentage of whites living in the metropolitan area of the stadium, the race of the coach, and the race of the general manager. Information on the racial composition of each team was provided by Robert McCormick and Robert Tollison, who used the names listed on team rosters to identify the players using the *Official NBA Guide* and the *Official NBA Register.*

The racial composition of the city was defined as the percent of the Standard Metropolitan Statistical Area (SMSA) that was white in the area in which the team was located. SMSA data were obtained from the 1980 and 1990 Census. Because the percentage white changed little from the first point of observation to the second (the maximum difference was Miami, which saw a 3.6 percent rise in its black population), city racial composition was imputed for 1980–1989 with 1980 SMSA data, while the remaining years were imputed with 1990 SMSA data. Hence much of the variation explained by the SMSA data was constrained to be across teams rather than within teams. The race of the coach and general manager were obtained from the *Official NBA Guide*.

In the second analysis, fan attendance is modeled as a function of the ratio of the racial composition of the team to that in the surrounding city,

[20] All owners except one were white during this time period.

[21] Reported ticket price data are fairly uniform across teams.

team winning percentage, the total population of the area, arena capacity, and a recreation index to account for alternative entertainment goods.[22] The ratio of percentage white on a team to percentage white in the city (ranging from 0.08 to 0.77) is used because an increase in the ratio implies an increase in the racial match between the team and the city. We obtained from Quirk and Fort (1992) the annual home attendance for each team in the league from 1980 to 1991, the arena capacity from each team's World Wide Web homepage, and the recreation index from *Places Rated Almanac* (1989).[23]

Results. Consistent with the hypothesis of customer discrimination, we found that city racial composition was a significant predictor of team racial composition. As Table 4 indicates, the higher the fraction of whites in a city, the higher is the fraction of whites on the team ($\beta = .67$, $p < .01$). Furthermore, race of the coach was marginally significant, whereas race of the general manager was not significant. Our theory also predicts that teams with a higher number of black players should perform better on average because some of the white players are still playing, in part, because of their race. The correlation of team winning percentage and the fraction of players on a team that are black is positive, as expected, but insignificant.

It is possible that a match between team and city racial composition could be induced by supply instead of demand, as we predict. Black players may desire to live in cities with a greater fraction of blacks. Before 1983, during the reserve clause period, there were no individual supply decisions because each team owned the property rights of its players. Thus labor demand determined team racial composition. With the adoption of limited free agency in 1984, players who met certain criteria could negotiate to play on any team. These players could forgo higher salaries in favor of living in preferred metropolitan areas. Empirically, this implies that there should be a greater correlation between team and city racial composition after 1983. The estimated equations for the two different periods are virtually identical. Perhaps players' preferences are in line with team demands, or they are swamped by the higher salaries attributable to satisfying team demands.[24]

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[22] In previous studies, price and income data were found to be unimportant determinants of demand for sports contests, possibly because of the uniformity of the price variable.

[23] Due to autocorrelation, an AR(1) process is used that results in serially uncorrelated errors.

[24] A reviewer suggested that another way of bolstering this result would be to see how attendance at home games varied with the race of the opposing team. We agree, but unfortunately, most games in the NBA are sellouts; thus there wouldn't be any variation to explain. However, Rascher (1997) shows that if the visiting team's pitcher in Major League Baseball is black, attendance is lowered by about 1500 fans, all else equal.

TABLE 4

DETERMINANTS OF THE PERCENTAGE OF WHITE PLAYERS ON A TEAM

Dependent variable	Percent white on team		
Goodness of fit (R^2)	.132042		
Adjusted R^2	.121282		
F statistic (zero slopes)	12.2718		
Number of observations	246		
	Estimate	Standard Error	t Statistic
Constant	–.312130	.096949	–3.21952
Percent white in SMSA	.666987	.110725	6.02380
Coach is black	–.035907	.023541	–1.52528
General manager is black	–.052971	.052229	–1.01421

Given that there is a relationship between team racial composition and that of the local population, what is the return for doing this? In other words, how is attendance affected by the team racial composition? In the second analysis, the ratio of team racial composition to city racial composition was in turn found to be related to the fan attendance level. As presented in Table 5, replacing a black player with a white player (holding city racial composition constant) increases attendance by over 15,000, about a 3 percent rise above average attendance ($\beta = 163{,}103$, $p < .001$).[25] As expected, one more win increases attendance by 4530 ($\beta = 371, 469$, $p < .001$). Because about 20 percent of the team-seasons were sold out, arena capacity had a significant effect on seasonal attendance. The addition of 100 extra seats throughout the season (about 2.4 per game) increased seasonal attendance by about 47 ($\beta = .470$, $p < .001$).[26] A decrease in the recreation index (fewer alternative recreation opportunities) by 1 standard deviation moves an average city from fifteenth place among NBA cities to twenty-sixth place and coincides with an increase in attendance by 11,432.

The race of the coach and the general manager had no effect in the customer discrimination analysis. The results show that customer preferences to watch white players significantly affect the employment decisions of team general managers and coaches.

[25] The theory predicts that increases in the percentage white on a team will increase attendance, but at a decreasing rate. Attendance is increased, but not necessarily at a decreasing rate; i.e., the ratio-squared term was not significant and, further, removed the significance of the ratio itself.

[26] The population variable is insignificant due to its correlation with arena capacity. Larger population centers have larger arenas.

TABLE 5

AR(1) ANALYSIS OF FAN ATTENDANCE

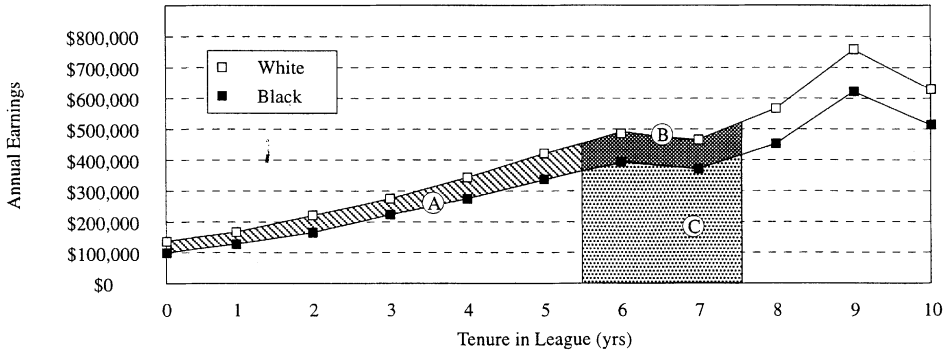
Dependent varaible	Attendance		
R^2	0.45		
Number of observations	235		
Durbin-Watson statistic	2.14		
	Estimate	Standard Error	*t* Statistic
Constant	−3213	54973	−0.058
Arena capacity for the season	0.470	.0528	8.90
Percent white on team ÷ percent white in city	163103	52039.5	3.13
Winning percentage	371469	49199.5	7.55
Population (thousands)	−2.45	2.15	−1.14
Recreation index (higher means more)	−14.11	8.56	−1.65

Discussion

Career Earnings Effect. Up to this point, we have shown that there is significant exit discrimination against blacks in the NBA and that it is consistent with customer discrimination. What are the magnitudes of these effects on total career earnings? Figure 3 shows the effect on career earnings of exit and wage discrimination for an average player, controlling for performance. The line with the white (black) squares is the predicted pay for an average player who is white (black). The vertical line at 7.5 (5.5) years represents the expected career length of a typical player who is white (black). Area *A* measures the wage discrimination effect on career earnings. Due to wage discrimination, a typical player who is white will earn about $329,000 more than the same player who is black up to the expected end of the black player's career. Area *C* denotes the salary foregone by the black player from the exit discrimination effect of 2 years, assuming that wage discrimination is still in effect for those 2 years. A white player will earn $808,000 more than a black player attributable to exit discrimination. Area *B* represents the extra salary difference from wage discrimination if exit discrimination did not exist at all, allowing a black player to play 7.5 years instead of just 5.5. The value of area *B* is about $185,000.[27]

[27] The methodology used to calculate the wage-tenure profiles is as follows. First, we took the predicted pay equations from the first column of Table 2 of Kahn and Sherer (1988) and plugged in the average data of the rookie years for all 275 players in our sample, thus creating the predicted pay for rookies at the 1985–1986 price level (that used by Kahn and Sherer). Second, we deflated the predicted pay to 1980 dollars by using the annual average salary data for all NBA players from Figure 6.1 in Quirk and Fort (1992). We did this to have our profile begin the same year as our sample, 1980. Third, the white (black) predicted

FIGURE 3
A Comparison of the Effect of Wage and Exit Discrimination on Career Earnings



For NBA players beginning their career in 1980, exit discrimination had a larger effect on career earnings ($808,000) than the more widely noted finding of wage discrimination (329,000). Overall, wage and exit discrimination together costs black players more than $1 million in relinquished wages. Furthermore, if career length is a factor in determining postcareer earnings, $808,000 is an underestimate of the lifetime effect of exit discrimination. A shortened career affords less endorsement and basketball-related opportunities after the playing days are over.

Summary. On the surface, the labor market in professional sports would appear to be one of the least likely arenas in which to find racial discrimination. It has been almost half a century, for example, since Chuck Cooper became the first black basketball player to cross the color barrier by signing with the Boston Celtics. Since that time, blacks have made significant inroads into professional sports. Black players have come to constitute roughly 80 percent of the NBA, and the 13 highest paid players in the league were black in 1995 (*Dallas Morning News*, Dec. 24,

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pay comes from setting the race variable to 1 (0) in the Kahn and Sherer model. This gives us the first two points on the graph (the points above zero tenure). Fourth, the same calculations are repeated for the 1-year veteran measures using the next year's performance statistics, setting the tenure variable to 1 and using the correct measure of NBA wage inflation, which averaged about 13 percent per season throughout the 1980s. This method takes all the players of a certain vintage, places the beginning of their careers at 1980, and creates a standard player. Then we vary the race and measure predicted pay, controlling for on-the-court productivity.

1995). However, as our findings show, exit discrimination is an important source of inequity despite apparent substantial progress. This study shows that for players with average performance levels, a black player can expect to play 5.5 years, whereas a white player can expect to play for 7.5 years. The value of this gap ($808,000) is greater than the value of the wage gap ($329,000), emphasizing the importance of job duration, not just wages, in understanding discrimination in this industry.[28]

Our results compare favorably with Jiobu (1988). In his study, Major League Baseball consisted of 25 percent black players and 61 percent white players in comparison with the NBA, which was 82 percent black during the time frame of our study. Comparable with our 36 percent finding, his results show, on further calculation, that being black increased career mortality by 28 percent. This is consistent with the idea that increases in the percentage of black players (on a team and in the available talent pool) lead to higher retention rates for whites.

Why does exit discrimination exist? We found that the racial composition of teams was affected by the racial composition of the metropolitan area in which the team played. There is a significant positive relationship between the percentage of citizens who are white and the percentage of players who are white within a given city, and this, in turn, has an important effect on attendance. The race of the coach and general manager were not significantly related to the team racial composition, providing further evidence that customer, not employer, discrimination is the source of the exit discrimination.

Implications. This research adds to the discrimination literature by (1) analyzing another form of discrimination (exit) that has mostly been ignored, (2) showing the value of wage discrimination in a comparison with the exit discrimination effect on career earnings, and (3) providing an examination of the sources of the discrimination. The results of these analyses have two wider implications for the study of labor market discrimination. First, exit discrimination in the general labor market demands greater empirical attention than heretofore received. As we have shown here, even while controlling for individual productivity, a key personnel decision in the NBA was influenced by the player's race. Moreover, the significance of exit discrimination in terms of its effect on career earnings was found to be greater than that attributed to wage

[28] The career earnings effect was for a player beginning his career in 1980. In today's market, the average salary is just over $2 million (*Dallas Morning News*, Dec. 24, 1995). If exit discrimination is worth about 2 years of pay, this amounts to approximately $4 million of lost income for an average black player.

discrimination. More generally, translating the effect into dollar terms underscores the importance of examining disparities in *lifetime* earnings between racial or gender groups.

To be sure, the sports context provides a relatively pure case for the study of exit discrimination. Isolating the effects of involuntary exit from voluntary exits will be an important next step in extending this work to the broader labor market context. Another challenge for future research will be to examine how exit discrimination is affected by other *ex ante* processes, including hiring and the structure of promotion ladders within an organization (Baron, Davis-Blake, and Bielby, 1986).

A second implication of this work is that customer preferences or prejudices may be an important determinant of labor market discrimination. While we focus on exit, race is likely to be an important factor at the points of entry and promotion when there is consumer-producer contact. For example, the race of the service provider may be important in judgments about the quality of customer service and may in turn influence hiring decisions. In the case of the NBA, preferences for whites may be based on the greater entertainment value that fans receive from watching a white versus a black player. Our results provide evidence in support of Kahn's (1991b) model that shows that customer discrimination can persist in markets where there is contact between consumer and producer. The results of this study suggest that workers in the entertainment and service industries are particularly vulnerable to customer discrimination.

REFERENCES

Allison, Paul D. 1983. *Event History Analysis: Regression for Longitudinal Event Data.* London: Sage Publications.

Baron, James, Alison Davis-Blake, and William T. Bielby. 1986. "The Structure of Opportunity: How Promotion Ladders Vary Within and Among Organizations." *Administrative Science Quarterly* 31 (June): 248–273.

Becker, Gary. 1971. *The Economics of Discrimination* 2d. ed. Chicago: University of Chicago Press.

Blum, Debra E. 1995. "Proportion of Black Athletes Rises at NCAA's Division I Iinstitutions." *Chronicle of Higher Education* 41 (22, Feb 10):A36.

Brown, C., Y. Nakata, M. Reich, and L. Ulman. 1997. *Work, Learning and Earning: Employment and Pay Systems in the U.S. and Japan.* Oxford, England: Oxford University Press.

Brown, Eleanor, Richard Spiro, and Diane Keenan. 1991. "Wage and Nonwage Discrimination in Professional Basketball: Do Fans Affect It?" *American Journal of Economics and Sociology* 50 (3): 333–44.

Burdekin, Richard C. K., and Todd L. Idson. 1991. "Customer Preferences, Attendances and the Racial Structure of Professional Basketball Teams." *Applied Economics* 23:179–86.

Cain, Glen. 1986. "The Economic Analysis of Labor Market Discrimination: A Survey." In *Handbook of Labor Economics*, ed. by O. Ashenfelter and R. Layard. Amsterdam: North-Holland, pp. 693–785.

Cymrot, Donald J. 1983. "Migration Trends and Earnings of Free Agents in Major League Baseball, 1976–1979." *Economic Inquiry* 21 (4, October): 545–56.

Diebold, Francis X., David Neumark, and Daniel Polsky. 1994. "Job Stability in the United States." Working paper no. 4859, National Bureau of Economic Research, Cambridge, MA.

Edwards, Harry. 1992. "Are We Putting Too Much Emphasis on Sports? (Blacks in Sports: The Next 45 Years)." *Ebony* 47 (10, August):128.

Edwards, Harry. 1994. "Black Youths' Commitment to Sports Achievement: A Vvirtue-Turned-Tragic-Turned-Virtue." *Sport* 85 (7, July):86.

Fort, Rodney, and James Quirk. 1995. "Cross-Subsidization, Incentives, and Outcomes in Professional Team Sports Leagues." *Journal of Economic Literature* 33(3):1265–99.

Hill, James Richard, and William Spellman. 1984. "Pay Discrimination in Baseball: Data from the Seventies." *Industrial Relations* 23 (1, Winter): 103–12.

Hollander, Zander, and Alex Sachre. 1989. *The Official NBA Encyclopedia.* New York: Villard Books.

Jiobu, Robert M. 1988. "Racial Inequality in a Public Arena: The Case of Professional Baseball." *Social Forces* 67 (2, December): 524–34.

Johnson, Norris R., and David P. Marple. 1973. "Racial Discrimination in Professional Basketball: An Empirical Test." *Sociological Focus* 6 (4, Fall): 6–18.

Jones, J. C. H., and William D. Walsh. 1988. "Salary Determination in the National Hockey League: The Effects of Skills, Franchise Characteristics, and Discrimination." *Industrial and Labor Relations Review* 41 (4, July): 592–604.

Kahn, Lawrence M. 1991. "Discrimination in Professional Sports: A Survey of the Literature." *Industrial and Labor Relations Review* 44 (3, April):395–418.

Kahn, Lawrence M. 1992. "The Effects of Race on Professional Football Players' Compensation." *Industrial and Labor Relations Review,* 45 (2, January):295–310.

Kahn, Lawrence M., and Peter D., Sherer. 1988. "Racial Differences in Professional Basketball Players Compensation." *Journal of Labor Economics* 6 (1, January):40–61.

Koch, James V., and C. Warren Vander Hill. 1988. "Is There Discrimination in the 'Black Man's Game'?" *Social Science Quarterly* 69 (1, March):83–94.

Mogull, Robert G. 1973. "Football Salaries and Race: Some Empirical Evidence." *Industrial Relations* 12 (1, February):109–12.

Neft, David, and Richard Cohen. 1991. *The Sports Encyclopedia: Pro Basketball*, 4th ed. New York: St. Martin's.

Official NBA Guide. Annual. St. Louis, MO: Sporting News.

Official NBA Register. Annual. St. Louis, MO: Sporting News.

Petersen, Trond. 1995. "Analysis of Event Hhistories." In *Handbook of Statistical Modeling for the Social and Behavioral Sciences*, ed. by Gerhard Arminger, Clifford C. Clogg, and Michael E. Sobel. New York: Plenum Press.

Places Rated Almanac. 1989. Englewood Cliffs, NJ: Prentice-Hall.

Quirk, James P., and Rodney Fort. 1992. *Pay Dirt: The Business of Professional Team Sports.* Princeton, NJ: Princeton University Press.

Rascher, Daniel. 1997. "Organization and Outcomes: A Study of Professional Sports Leagues." Ph.D. dissertation, U.C. Berkeley Economics Department.

Staw, Barry, and Ha Hoang. 1995. "Sunk Costs in the NBA: Why Draft Order Affects Playing Time and Survival in Professional Basketball." *Administrative Science Quarterly* 40: 474–94.

Swinnerton, Kenneth A., and Howard Wial. 1995. "Is Job Stability Declining in the U.S. Economy?" *Industrial and Labor Relations Review* 48 (2, January):293–305.

Wallace, Michael. 1988. "Labor Market Structure and Salary Determination Among Professional Basketball Players." *Work and Occupations* 15 (3, August):294–312.

Walsh, William D., Marc Lavoie, Gilles Grenier, and Serge Coulombe. 1992. "The Entry Problem of Francophones in the National Hockey League: A Systemic Interpretation." *Canadian Public Policy* 18 (4, December):443–69.