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Race and the Likelihood of Managing in Major League Baseball

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Abstract

The effects of race on the probability of former Major League Baseball players becoming managers are analyzed using probit models with sample selection correction. The models are estimated using data on the performance and personal characteristics of players from 1955 to 2007. It is shown that given the same performance, personal characteristics, and popularity black former players are 70 to 82 percent less likely to become Major League managers than white former players. It is also shown that being Hispanic does not have a significant effect on the probability of becoming a manager. Additionally, it is observed that catchers and shortstops who are popular but not necessarily good players are most likely to become managers.

Journal of Economic Literature Classification: J71, L83

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Introduction

On opening day of the 2008 Major League Baseball season eight teams had a minority manager writing their starting lineups. Having minorities represent only 27 percent of managers is surprising in a league in which over 40 percent of the players are minorities. While the overall percentage of minority managers has increased by ten percent over the past three seasons the percentage of minority managers is still far below the percentage of minority players.

This paper analyzes data on retired baseball players from 1955 to 2007 to determine what role race plays in the likelihood of former players becoming managers. The analysis is based on probit models which control for the effects of age, performance, popularity, race, and experience at different positions. The models estimated also utilize Heckman sample selection correction to eliminate any bias associated with a nonrandom sample.

It is shown that black former players are 70 to 82 percent less likely to become managers than identical white former players. This effect is statistically significant at the one percent level and appears robust to changes in model specification. The effect is also shown to be persistent over the sample period.

Additionally, the analysis has shown that being Hispanic has no significant impact on the probability of becoming a manager. The effects of performance and experience variables are also analyzed. This analysis shows that Catchers and Shortstops who are popular but not necessarily good players are most likely to become managers.

Previous Literature

Due to the exceptional record keeping of Major League Baseball and the public availability of data on almost all aspects of the game there exists a large literature on the economics of professional baseball. Therefore, only those papers which most directly relate to this analysis will be discussed. The previous research which most closely relates to this analysis

is Singell (1991). Singell uses data on players who started their careers from 1950 to 1965 in order to determine what characteristics make a player most likely to become a coach or manager. He finds that players with long but unexceptional careers are most likely to become coaches. Singell includes a dummy variable for black players in his probit analysis which he finds to be insignificant. However, he does find some evidence that black star players may crowd out lesser qualified black players.

The analysis presented here differs from and improves upon the work of Singell in several ways. Most notably, this analysis looks at the likelihood of players becoming managers not coaches. A manager has significantly more responsibility than a coach and a much smaller percentage of players become managers than coaches. Therefore, Singell's treatment of managers and coaches as the same outcome is inappropriate. Due to the importance of managers and the greater competition for manager positions discrimination is more likely to be observed in the appointment of a manager than a coach.

Additionally, Singell's sample consists of 654 observations of players who began their career over a 15 year period. The sample chosen for this analysis consists of 6,778 observations of players who ended their careers over a 50 year period. Singell also excludes pitchers from his sample as their performance statistics are not comparable to other positions. This analysis solves this problem by developing a performance statistic which can be compared across positions. Lastly, Singell uses dummy variables for each player's position. This implies that being a catcher has the same effect for someone who played 1 game as it does for someone who played 1,000 games and that a year of baseball has the same effect regardless of the position played. This analysis breaks experience down into games played at each position in order to capture not only what position was played but also how much it was played.

Using a much larger and more inclusive sample the models presented here confirm Singell's conclusion that exceptional players are less likely to become managers. However, this analysis finds a large and statistically significant negative effect for black players.

Volz (2009) examines the effect of minority status on the likelihood of a manager returning the following season. Using survival time analysis based on data from 1985 to 2006 Volz shows that minorities are 9.6 percentage points more likely to return the following season than white managers with the same performance and personal characteristics. Volz suggests that this higher probability of survival may be the result of discrimination in the hiring process. The evidence presented in this analysis appears to support that hypothesis.

Other research less directly related to coaches or managers has found mixed results as to whether professional baseball players face discrimination. For example, Jewell, Brown, and Miles (2002) use Baseball Hall of Fame voting to measure discrimination in Major League Baseball. They find limited evidence that Black and Hispanic players do face discrimination in Hall of Fame voting. However, they note that the discrimination is most prevalent for players that would not have gotten into the Hall of Fame anyways.

Hanssen and Torben analyze the role of discrimination in baseball over time using data from Major League All Star voting. They find that black players did face discrimination in the 1970's. However, they observe that this negative effect for black players has declined over time and may have even reversed. When considering the likelihood of managing rather than all star votes received the analysis presented here does not find any evidence that discrimination has decreased over time.

The values of baseball memorabilia have also been used to examine the effects of discrimination in baseball. Using regressions of baseball card prices Andersen and La Croix

(1991) find evidence of customer discrimination against black but not Hispanic players. The analysis presented here finds a similar pattern of discrimination against black but not Hispanic players in the market for managers. Johnson and Stanton (1995) also use regressions of baseball card values to examine the effects of race on rookie card values. Unlike Anderson and La Croix, they find no evidence of discrimination.

It is clear that no consensus has been reached in the literature as to the presence of discrimination in professional baseball. This paper looks to contribute to that debate through a thorough analysis of the effects of race on the probability of a former player managing in Major League Baseball.

Sample Selection

Since 1955, over 85 percent of Major League managers have been former Major League baseball players. Therefore, the sample for this analysis is composed of all Major League baseball players who played their last game from 1955 to 2004. While it would be ideal to include all potential managers in the sample this is not practical for several reasons. Firstly, it is not possible to identify the pool of potential managers from outside of Major League Baseball. Secondly, if such potential managers were identified their qualifications could not be compared statistically to former players. For example, if minor league players were included in the sample it would not be possible to compare their baseball skills to that of Major League players as batting 300 in the minor leagues is not as impressive as batting 300 in the Major Leagues. Additionally, the baseball skills of those who never played professional baseball at any level could not be quantified. By focusing on only retired Major League Baseball players it is possible to construct uniform measures of both personal and performance characteristics. Therefore, this analysis focuses entirely on retired Major League Baseball players.

Jackie Robinson broke the baseball color barrier in 1947 when he became the first black Major League baseball player. Previously, Mike Gonzalez became the first minority manager when he managed the St. Louis Cardinals on an interim basis in 1938 and 1940. Therefore, it was possible for minorities to both play and manage at the Major League level during the years 1955 through 2004.

While the Major Leagues were officially integrated during this time period the first permanent minority manager was not hired until Preston Gomez in 1969. Six years later, in 1975, Frank Robinson became the first black manager. Based on this lack of minority managers in the early years of the sample, the analysis is also conducted using a restricted sample of players that retired from 1970 to 2004.

The full and restricted samples consist of records for 5,914 and 4,742 players respectively. This represents over 87 percent of Major Leaguers who played their last game from 1955 to 2004. Summary statistics for each sample are provided in Table 1. Detailed descriptions of the individual variables and justifications for their inclusion are provided in the following section.

Table 1
Descriptive statistics for the full and restricted samples.

	Players Retired 1955-2004		Players Retired 1970-2004	
Variable	Mean	Standard Deviation	Mean	Standard Deviation
Managed	0.030	0.171	0.022	0.146
Man. 50 Games	0.028	0.164	0.019	0.138
Age	53.418	15.020	47.995	11.014
Performance	0.524	0.275	0.512	0.277
All-Star	0.159	0.366	0.144	0.351
Black	0.153	0.360	0.168	0.374
Hispanic	0.107	0.309	0.125	0.331
P Games	80.347	153.119	81.465	156.990
C Games	33.793	166.839	32.148	164.983
1B Games	34.378	175.166	33.426	173.307
2B Games	33.222	166.986	33.107	169.109
3B Games	34.507	174.322	34.363	176.035
SS Games	33.277	180.978	32.955	182.739
OF Games	102.354	312.472	101.945	314.126
DH Games	11.691	66.034	14.580	73.460
n	5914		4742	

Variable Selection

The goal of this analysis is to determine how various characteristics influence the probability of a Major League baseball player becoming a manager. Therefore, the dependent variable is equal to one if a player managed a game at the Major League level and zero otherwise. In professional baseball it is common for coaches to fill in for a manager on a temporary basis. This may be the result of a manager being suspended, ill, or tending to family commitments. It is also common for a coach to take over as manager on a temporary basis when a manager is fired during the season. In order to eliminate these interim managers from the analysis the model is also run with the added restriction that players must have managed at least 50 games in order to be considered managers.

There are several characteristics which are expected to influence a player's probability of becoming a manager. The most obvious of these characteristics is the player's baseball experience. It is expected that the more games a player participates in the more baseball specific

human capital they will develop. Therefore, it is expected that games played in the Major Leagues will increase the probability that a player becomes a manager.

While all games played increase ones baseball specific human capital the amount of this human capital which is transferable to management may vary depending on the position played. As a manager players will be valued for their decision making abilities rather than their physical abilities. Different positions require different levels of decision making and therefore players at certain positions will develop more managerial skills than others. In order to capture these different experiences the number of games played at each position are included as independent variables. Due to data limitations games played at the three outfield positions are combined into a single outfield variable.

In addition to a player's on the field experience it is also expected that their experiences off the field will influence their probability of becoming a manager. As a player ages they are likely to have experiences off the field which will develop skills related to being a manager. These experiences could include developing communication skills and personal contacts through interactions with others. It is likely that these increased communication skills, contacts, and general life experiences will increase the player's probability of becoming a manager. It is also expected that over time players will have more opportunities to apply for management positions thereby making older players more likely to have managed than younger players. Based on this logic an independent variable equal to the player's age is included in the analysis.

Over time players will likely exhaust the gains from general life experiences and contacts and therefore the impact of age on the probability of becoming a manager may diminish. As players age they will also become more likely to choose retirement over a managing opportunity. This means that beyond a certain age the probability of becoming a manager may actually

decrease. In order to capture these diminishing effects the square of the player's age is also included as an independent variable.

In addition to a player's on and off the field experiences a player's probability of becoming a manager may be affected by their success as a player. In order to be successful on the field a player must have both physical ability and an understanding of the game. If the decision making portion of the skills necessary for success as a player are transferable to management then successful players should make the most successful managers. This would lead to a positive correlation between player performance and the likelihood of becoming a manager.

While good players may possess the best decision making skills they also may be the least likely to accept or desire a managing position. This is due to the fact that exceptional players are likely to have more employment options after their playing careers. Exceptional players may be able to make a career in various manners such as making celebrity appearances and endorsements, selling memorabilia, or broadcasting. In addition to these employment opportunities good players are also more likely to choose retirement after their playing careers. This is due to the fact that exceptionally skilled players make significantly more money than average or low skilled players. This enables good players to retire more comfortably than those of lesser skill. These differences in salary and post baseball opportunities will lead to a negative correlation between player performance and the likelihood of becoming a manager.

In order to capture the effect of a player's performance on their probability of becoming a manager and to determine if the effect is positive or negative a measure of performance is included as an independent variable. For offensive players the measure of performance utilized in this analysis is referred to as on-base plus slugging (OPS). This measure of performance is a

combination of two traditional baseball performance measures, on-base percentage and slugging percentage. On-base percentage is a measure of a player's ability to reach base. Reaching base is desirable as it puts that player in a position to be scored by subsequent hits. Slugging percentage is a measure of a player's ability to hit for power. The ability to hit for power is desirable as it scores players who are already on base and can enable the batter to score themselves in the case of a homerun.

On-base percentage is calculated as the number of hits (H), walks (BB), and hit by pitches (HBP) divided by the number of at bats (AB), walks, hit by pitches, and sacrifice flies (SF). This calculation results in the percentage of plate appearances which result in the player reaching base safely. Slugging percentage is calculated as total bases divided by at bats, where total bases is the number of bases a player gained through hits. Total bases is calculated as a weighted sum of hits, doubles (2B), triples (3B), and homeruns (HR). This calculation represents the average number of bases a player gains per at bat. To calculate OPS these two measures are simply added together. The formula for OPS is presented below.

$$\text{OPS} = \frac{\text{H} + \text{BB} + \text{HBP}}{\text{AB} + \text{BB} + \text{HBP} + \text{SF}} + \frac{\text{H} + 2(\text{2B}) + 3(\text{3B}) + 4(\text{HR})}{\text{AB}}$$

This measure is superior to using a single statistic in that it captures both a player's ability to get on base and a player's ability to hit for power. For example, based on on-base percentage, a player that hits a single half of the time will be ranked higher than a player that hits a double one quarter of the time. However, based on slugging percentage, the player that hits doubles would be ranked higher. By adding the two measures together we find that these players are of similar value which makes more sense as they both achieve the same number of bases. While this is not a perfect measure of offensive performance it has the ability to rank players

who specialize in different types of hitting and therefore is chosen over other traditional measures of offensive performance.

Pitchers are different from all other positions in that they are valued solely for their ability to prevent runs. While pitchers do bat in the National League very little is expected of their offensive performance and pitchers are never chosen or paid based on their ability to bat. Therefore, the relevant performance statistic for pitchers should capture their ability to prevent runs rather than produce them. The traditional measure of a pitchers performance is the earned run average (ERA). This is calculated as the average number of earned runs a pitcher gives up per nine innings, the standard length of a baseball game. ERA is simply calculated as the number of earned runs times nine divided by the number of innings pitched. The less runs a pitcher allows the other team to score the lower their ERA will be.

While OPS and ERA measure the skills of individual players they cannot be included in the analysis as OPS is not relevant for pitchers and ERA is not relevant for batters. Additionally, there are different expectations of offensive performance for different positions. For example, catchers are valued more for their defensive performance than first basemen. This means that a good catcher will likely have a lower OPS than a good first baseman. Therefore, rather than including the actual OPS or ERA as an independent variable the percentile rank of each player within their position is used. This means that for a second baseman their performance variable is equal to the percentile rank of that player relative to all other second basemen based on OPS. For example, if a second baseman has a higher OPS than 75 percent of all other second basemen their performance variable is equal to .75. This ranking is calculated based on career statistics for all players in the sample and included as an independent variable.

While playing skills may reflect managerial ability these performance measures may not capture all the skills necessary to manage. In addition to baseball knowledge a good manager must also be likeable and able to interact well with others. This likeability and ability to interact positively with others may be reflected in how much fans like a particular player. If fans prefer a particular player it is reasonable to assume that future players will also find that player agreeable as a manager. Additionally, owners may have an incentive to hire formerly popular players in hopes that that player's positive traits will be passed on to the current players.

In order to capture the impact of this likeability on the probability of a player becoming a manager all star player status is included as an independent variable. Players have traditionally been appointed to the annual all star game based on fan voting. Therefore, whether a player has been named an all star measures not only how good of a player they are but also how much fans like them. Fans did not vote for all stars during the years 1959 to1969. However, during this time period all star status was based on the votes of fellow players, coaches, and manager. Therefore, during this time period all star status still reflects not only player performance but also likeability. Based on this logic, a variable which is equal to one for players who have been named all stars and zero otherwise is included as an independent variable.

In addition to differences in skill and other employment opportunities the probability of becoming a manager may also be influenced by discrimination. If discrimination exists in professional baseball then potential employers will be less likely to hire minority players than equally skilled white players. This will lead to a negative correlation between minority status and the probability of becoming a manager. Therefore, dummy variables for minority status are included as independent variables in this analysis.

Specifically, a variable which is equal to one for black players and zero otherwise is included to capture any discrimination against black players. Additionally, a variable which is equal to one for Hispanic players and zero otherwise is also included to capture any discrimination against Hispanic players. Minorities are identified using the photographs printed on their baseball cards. While this is not a perfect measure of minority status it closely mirrors the method of identifying minorities used by potential employers. This is because employers are not able to require applicants to identify themselves as minorities but rather have to base their discrimination on their own observations. In order to reduce the measurement error in these variables multiple baseball cards are consulted whenever possible.

While baseball card companies have made great efforts to produce cards for all Major League players there are individuals that have played at the Major League level but have never had a baseball card printed. For this reason minority status can not be determined for all players. Minority status was identified for over 87% of all Major League players who retired from 1955 through 2004. On average those players who could not be identified participated in only 13 Major League games. This represents less than one tenth of a season. Additionally, none of these players went on to become managers. Therefore, it is unlikely that the exclusion of these observations will bias the estimation results. However, to ensure unbiased results the model is estimated with Heckman sample selection correction. The details of this process are discussed in the following section.

Estimation

For this analysis becoming a manager is assumed to be the result of two conditions. The first condition is that the player wants to be a manager. The probability of a player wanting to be a manager is assumed to be a function of personal characteristics and a random component. The

second condition is that the player is actually selected as a manager. The probability of being selected is also assumed to be a function of personal characteristics and a random component. If both of these probabilities are a function of personal characteristics and a random component then their joint probability is also a function of personal characteristics and random noise. Therefore, the model is specified as follows where Managed is a dummy variable for managing at the Major League level, X is a vector of personal characteristics, and e is a random component.

$$\Pr(\text{Managed} = 1) = f(X_i) + e_i$$

If the random noise component of this joint probability is assumed to be normally distributed then the probability of becoming a manager can be estimated using a standard probit model.

Based on these assumptions, probit regressions are estimated for several model specifications and the results are presented in Table 2 and Table 3. Table 2 contains the results of probit regressions run with a dummy variable for whether the player has managed at the Major League level as the dependent variable. The independent variables include age, age squared, the performance measure discussed earlier, the number of games played at each position, a dummy for all star status, and dummies for minority status. This regression is run using the entire sample of players who played their last game from 1955-2004 and for whom all variables were available. The model is also estimated with the restricted sample of players who played their last game from 1970-2004. Table 3 contains the results of the same two regressions run with a dummy for whether the player managed at least 50 games at the Major League level as the dependent variable. The implications of the coefficients from these models are discussed in the next section.

Table 2

Probit Regression: Dependent Variable = Managed

	Players retired 1955-2004		Players retired 1970-2004	
Variable	Coefficient	p-value	Coefficient	p-value
Age	0.09375 ***	0.000	0.23279 ***	0.001
Age Squared	-0.00054 ***	0.008	-0.00179 ***	0.003
Performance	-0.42380 **	0.031	-0.26343	0.293
All-Star	0.20045	0.120	0.28763 **	0.080
Black	-0.54749 ***	0.000	-0.39965 **	0.011
Hispanic	-0.22794	0.147	-0.08411	0.605
P Games	-0.00160 ***	0.002	-0.00192 ***	0.005
C Games	0.00081 ***	0.000	0.00066 ***	0.000
1B Games	0.00052 ***	0.001	0.00034 *	0.075
2B Games	0.00062 ***	0.000	0.00043 **	0.021
3B Games	0.00057 ***	0.000	0.00037 **	0.028
SS Games	0.00078 ***	0.000	0.00064 ***	0.000
OF Games	0.00024 *	0.054	0.00003	0.866
DH Games	0.00085 **	0.022	0.00073 *	0.059
n	5914		4742	

***significant at the 1% level

**significant at the 5% level

*significant at the 10% level

Table 3

Probit Regression: Dependent Variable = Managed 50 Games

	Players retired 1955-2004		Players retired 1970-2004	
Variable	Coefficient	p-value	Coefficient	p-value
Age	0.08491 ***	0.001	0.22528 ***	0.001
Age Squared	-0.00047 **	0.025	-0.00173 ***	0.006
Performance	-0.43512 **	0.033	-0.29397	0.267
All-Star	0.19949	0.131	0.29365 *	0.084
Black	-0.58868 ***	0.000	-0.44565 ***	0.009
Hispanic	-0.18093	0.251	-0.03386	0.837
P Games	-0.00157 ***	0.004	-0.00182 **	0.011
C Games	0.00082 ***	0.000	0.00069 ***	0.000
1B Games	0.00046 ***	0.004	0.00028	0.168
2B Games	0.00065 ***	0.000	0.00050 ***	0.008
3B Games	0.00054 ***	0.000	0.00041 **	0.018
SS Games	0.00078 ***	0.000	0.00066 ***	0.000
OF Games	0.00029 **	0.024	0.00011	0.517
DH Games	0.00086 **	0.022	0.00073 *	0.061
n	5914		4742	

***significant at the 1% level

**significant at the 5% level

*significant at the 10% level

As discussed earlier minority status was not able to be identified for approximately 13 percent of the sample. This is the case for any player for which a baseball card was never printed. It is also the case for any player for which a baseball card was printed but was unable to be located. It is reasonable to believe that the lack of baseball cards for certain players may not be a random process. For example, it may be the case that players with less experience are less likely to have a baseball card printed. This seems to be supported by the fact that the unidentified players average less than one tenth of a season of experience. It may also be the case that older players may be less likely to have their cards located due to the decreased likelihood of their cards surviving to this time.

In either of these cases, the nonrandom availability of baseball cards will lead to a sample which is not randomly selected. A nonrandom sample may lead to biased estimates and therefore unreliable results. For example, if older players are less likely to have baseball cards then they will be less likely to be included in the sample. This will lead to older players being underrepresented in the sample. This in turn can lead to biased estimates.

In order to correct for this potential bias the previous models are also estimated using sample selection correction based on the work of Heckman (1979). Heckman sample selection correction uses information from a probit regression of the likelihood of inclusion in the sample in order to correct for sample selection bias. Therefore, in addition to the model previously specified a selection equation must be specified.

It is reasonable to assume that selection for inclusion in a set of baseball cards is a function of player performance and experience. The more games a player participates in the more likely baseball card companies are to notice them. Additionally, the better a player performs the more likely card companies are to include them in response to customer demand.

Therefore, a player's experience at each position and the measure of performance previously discussed are included as independent variables in the selection model.

Additionally, inclusion in the sample may be dependent on the availability of a baseball card. Newer cards are more likely to be located than older cards. This is due to both the larger production runs of recent baseball cards and the fact that older cards would have to survive a longer time period. Therefore, the year during which a player played their last game is included as an independent variable in the selection model. This will capture the decreased likelihood that older cards will be available for analysis. This leads to the following selection model where Selection is a dummy for being included in the sample, E is the vector of performance, experience, and last season variables, and u is a normally distributed random component.

$$Pr(Selection = 1) = f(E_i) + u_i$$

The previous four model specifications are estimated again with a sample selection correction based on the above selection model. The results of these models are presented in Table 4 and Table 5 and are discussed in detail in the next section. Additionally, the results of a likelihood ratio test of whether rho is equal to zero is included for each model. The large chi squared for each model implies that the use of selection correction is appropriate.

Table 4

Probit regression with sample selection: Dependent variable = Managed

	Players retired 1955-2004		Players retired 1970-2004	
Variable	Coefficient	p-value	Coefficient	p-value
Age	0.09595 ***	0.000	0.23280 ***	0.001
Age Squared	-0.00056 ***	0.006	-0.00179 ***	0.003
Performance	-0.55225 ***	0.008	-0.31358	0.225
All-Star	0.24724 *	0.055	0.33503 **	0.041
Black	-0.55888 ***	0.000	-0.41539 ***	0.008
Hispanic	-0.24740	0.115	-0.10510	0.518
P Games	-0.00197 ***	0.000	-0.00232 ***	0.001
C Games	0.00070 ***	0.000	0.00054 ***	0.005
1B Games	0.00044 ***	0.004	0.00026	0.181
2B Games	0.00053 ***	0.001	0.00034 *	0.083
3B Games	0.00050 ***	0.001	0.00029 *	0.099
SS Games	0.00070 ***	0.000	0.00056 ***	0.000
OF Games	0.00016	0.219	-0.00006	0.714
DH Games	0.00083 **	0.026	0.00067 *	0.083
n	5914		4742	
Selection Model				
Performance	0.04416	0.615	-0.00879	0.933
P Games	0.03124 ***	0.000	0.03101 ***	0.000
C Games	0.03043 ***	0.000	0.02953 ***	0.000
1B Games	0.03102 ***	0.000	0.03235 ***	0.000
2B Games	0.02012 ***	0.000	0.02085 ***	0.000
3B Games	0.02391 ***	0.000	0.02543 ***	0.000
SS Games	0.02562 ***	0.000	0.02748 ***	0.000
OF Games	0.03195 ***	0.000	0.03195 ***	0.000
DH Games	0.02516 **	0.038	0.03137 **	0.015
Last Season	0.03588 ***	0.000	0.05064 ***	0.000
n	6778		5267	
rho	-0.40131		-0.43858	
	LRTest of independent equations: Chi2(1) = 8.88, p-value = 0.0029		LRTest of independent equations: Chi2(1) = 5.80, p-value = 0.0161	

Table 5

Probit regression with sample selection: Dependent variable = Managed 50 Games

	Players retired 1955-2004		Players retired 1970-2004	
Variable	Coefficient	p-value	Coefficient	p-value
Age	0.08718 ***	0.001	0.22638 ***	0.001
Age Squared	-0.00048 **	0.020	-0.00175 ***	0.005
Performance	-0.54215 **	0.012	-0.33468	0.218
All-Star	0.23676 *	0.073	0.32670 *	0.054
Black	-0.59644 ***	0.000	-0.45573 ***	0.007
Hispanic	-0.19725	0.210	-0.04948	0.763
P Games	-0.00186 ***	0.001	-0.00210 ***	0.005
C Games	0.00073 ***	0.000	0.00060 ***	0.002
1B Games	0.00040 **	0.013	0.00023	0.277
2B Games	0.00057 ***	0.000	0.00043 **	0.028
3B Games	0.00048 ***	0.001	0.00035 **	0.049
SS Games	0.00072 ***	0.000	0.00060 ***	0.000
OF Games	0.00022 *	0.089	0.00005	0.790
DH Games	0.00085 **	0.025	0.00069 *	0.078
n	5914		4742	
Selection Model				
Performance	0.04277	0.626	-0.01239	0.906
P Games	0.03137 ***	0.000	0.03117 ***	0.000
C Games	0.03034 ***	0.000	0.02938 ***	0.000
1B Games	0.03110 ***	0.000	0.03224 ***	0.000
2B Games	0.02001 ***	0.000	0.02064 ***	0.000
3B Games	0.02403 ***	0.000	0.02571 ***	0.000
SS Games	0.02567 ***	0.000	0.02758 ***	0.000
OF Games	0.03203 ***	0.000	0.03206 ***	0.000
DH Games	0.02491 **	0.040	0.03103 **	0.016
Last Season	0.03590 ***	0.000	0.05060 ***	0.000
n	6778		5267	
rho	-0.33444		-0.33643	
	LRTest of independent equations: Chi2(1) = 5.46, p-value = 0.0195		LRTest of independent equations: Chi2(1) = 2.80, p-value = 0.0942	

Experience Effects

In all model specifications the coefficients on age and age squared are statistically significant. The positive coefficient on age implies that older players are more likely to have managed at the Major League level. This is not surprising as older players who desire a management position are likely to have had more opportunities to become a manager. This greater number of opportunities will make them more likely to have been chosen. Additionally, older players are expected to have established greater social networks which will also increase

their likelihood of becoming a manager. Similarly, as one ages they are likely to refine the interpersonal and communication skills which are essential to success as a manager.

The negative coefficient on age squared implies that the positive effects of age diminish as one gets older. This is to be expected as a player that is not chosen as a manager over several years will eventually give up and move on to other opportunities. It is also possible that with time a player's personal connections in the baseball community may start to deteriorate. Additionally, as retired players age they may be less able to relate to the current players making them less desirable as a manager. It is expected that over time these negative effects of age will increase causing the positive overall effect of age to diminish.

In addition to age, one's experience during his playing career also affects his likelihood of becoming a manager. It is expected that playing baseball at the Major League level will provide a player with skills that are applicable to a future managing position. In addition to gaining a general understanding of baseball strategy players may also learn personal skills that prove beneficial as a manager. For example, players may develop the ability to work well with others, leadership skills, or even the ability to communicate appropriately with umpires. All of these skills are necessary to be successful as a Major League manager.

As can be seen in the regression results games played at different positions have different effects on the likelihood of a player becoming a manager. Therefore, experience at certain positions must provide a player with more management skills than others. A ranking of the experience variables in terms of their effects on the likelihood of becoming a manager is presented in Table 6.

Table 6

Ranking of experience variables: 1970-2004 model with Managed 50 Games as the dependent variable and sample selection. (Full results are presented in Table 5)

Rank	Variable	Coefficient		p-value
1	DH Games	0.00069	*	0.078
2	C Games	0.00060	***	0.002
3	SS Games	0.00060	***	0.000
4	2B Games	0.00043	**	0.028
5	3B Games	0.00035	**	0.049
6	1B Games	0.00023		0.277
7	OF Games	0.00005		0.790
8	P Games	-0.00210	***	0.005

The coefficients on games played at catcher and shortstop are positive and significant at the one percent level under all model specifications. The only position with a larger positive coefficient is designated hitter. However, this coefficient is only marginally significant in the later sample. Therefore, it is concluded that experience at catcher and shortstop have the greatest positive impact on a player's likelihood of becoming a manager.

Catcher is a unique position in that it is involved in more plays that any other position on the field. The catcher is responsible for relaying signals to the pitcher on every pitch. In many cases the catcher is even responsible for choosing what pitch the pitcher is to throw. Therefore, catchers must have an intimate understanding of game strategy and a familiarity with the tendencies of individual batters. Additionally, the catcher is responsible for keeping the other team's base runners from stealing bases. This requires a catcher to recognize in what situations a team is most likely to steal.

Based on these substantial decision making requirements it is not surprising that catchers are likely to become managers. In addition to experience batting and fielding, catchers will have an understanding of pitch selection, base running strategies, and the ability to recognize weaknesses in other team's players. These skills will all prove useful as a manager making strategic decisions and therefore lead to the positive coefficient observed in this analysis.

Shortstops are also involved in more decision making than other positions. This is due in part to the fact that shortstops are responsible for handling the majority of throws which come in from the outfield. Generally, any time a ball is hit to left or center field the shortstop must determine what base the ball should be thrown to and position himself accordingly to receive the throw. Therefore, a shortstop must always be aware of the game situation and where the ball should be thrown for all the potential scenarios.

Additionally, the shortstop is responsible for coordinating with the second basemen on who will cover second base on a steal or a pickoff play. This involves making decisions based on knowledge of the situation, the batter, the pitcher, and the base runner. The shortstop also has the authority to call off any other infielder if he feels he has a better chance of catching a fly ball. This level of decision making is not expected of any other position besides catcher. Therefore, it is not surprising that games played at shortstop have the only coefficient as large and significant as games played at catcher.

The only other position with a significant coefficient at the one percent level under all model specifications is pitcher. This is the only experience variable that actually has a negative effect on the likelihood of becoming a manager. This is likely due to the fact that pitchers have very limited participation in many aspects of the game. For example, pitchers do not have significant involvement in the offensive side of the game. In the American League pitchers do not bat at all. In the National League pitchers have fewer at bats than players at other positions and little is expected of them in terms of offensive production. Therefore, it is unlikely that a pitcher will be qualified to give batting instruction or to make decisions on offensive strategies.

Additionally, pitchers are not involved in many defensive decisions. Most pitchers are told what pitch to throw by the coach or catcher. Pitchers are also not involved in many plays

after the pitch is thrown. Their role on defense mainly consists of backing up bases in case of an errant throw. Other fielders have priority over the pitcher on any batted ball and pitchers are even discouraged from catching infield fly balls. It is clear that relative to other positions a pitcher's baseball knowledge is very specific to the task of throwing pitches. As a manager, pitchers will have to make offensive, defensive, and base running decisions in addition to having a knowledge of pitching. The task specific nature of pitching will likely lead former pitchers to become pitching coaches rather than managers. This likely explains the significant negative coefficient on games played as a pitcher.

Games played at second and third base have positive coefficients which are smaller than that of catcher and shortstop. These coefficients are only marginally significant for several model specifications. The positive effects for these positions are to be expected as these positions are involved in both offense and defense. Being involved in both sides of the game provides these players with an understanding of general baseball strategy. However, neither of these positions involves as much decision making as does shortstop or catcher. Second and third basemen take throws from the outfield but far less often than a shortstop does. Third basemen also have less involvement in preventing base runners from stealing. This slightly lower level of decision making may be responsible for the smaller coefficient on these two variables.

Games played at first base or in the outfield have the smallest positive coefficients. These coefficients are also insignificant for the majority of model specifications. This is to be expected as these positions involve the least amount of decision making. The outfield positions generally consist of catching or getting to the ball as fast as possible and then throwing that ball to whichever infielder has their hands up. While being able to catch the ball may require a great deal of speed and talent most would agree that the position does not require much strategic

decision making. Therefore, it is not surprising that games played as an outfielder do not significantly increase ones probability of becoming a manager.

On the majority of plays first basemen are expected to cover first base and catch the ball when it is thrown to them. With the exception of occasionally covering second base or being the cutoff for home plate there is a relatively low amount of strategy involved in playing first base. Even a first baseman's involvement in preventing steals is much less complicated than that of a shortstop or second basemen as the first baseman is usually just asked to stay on the bag until the pitch is thrown. Given this relatively low level of decision making the small and insignificant coefficient on games played at first base is appropriate.

The largest coefficient of all experience variables is for games played as designated hitter. However, this coefficient is only marginally significant for all model specifications. This large positive coefficient is surprising as designated hitters do not participate in the defensive side of the game. One would expect that this lack of experience in the field would make a player less likely to become a manager which would lead to a negative coefficient. However, the positive coefficient estimated in these models may not imply that experience as a designated hitter increases the likelihood of becoming a manager. Rather it may reflect the type of person who ends up being a designated hitter.

Traditionally, players who can still hit well but are no longer mobile enough to play a field position become designated hitters. It is likely that any player who chooses to continue playing baseball after they are no longer able to play their original position must be very reluctant to leave baseball or must have a great love of the sport. If a player is willing to change positions to prolong their career it is likely that that player will also wish to become a manager in order to continue to be a part of Major League baseball. Therefore, it is possible that the positive

coefficient on designated hitter actually reflects the attitudes of designated hitters towards the game rather than any skills acquired while being a designated hitter.

Performance Effects

For players, a better understanding of baseball strategy is likely to result in better on the field performance. Therefore, if managers are selected based on their understanding of baseball strategy it is expected that good player are more likely to be selected as managers than bad players. However, while good players may make better managers they are also less likely to desire a management position. As noted, good players will likely face a greater set of alternatives after their playing careers have ended. Additionally, good players make more money and therefore are more likely to retire after their playing career is over.

The coefficient on performance is negative for all model specifications. However, it is not statistically significant for the 1970 to 2004 sample. This negative coefficient implies that better players are less likely to become managers. Therefore, the decreased likelihood of wanting to manage must offset any positive correlation between playing skills and managing skills.

All Star status is based on voting by other players or fans and therefore should measure not only how good a player is but also their interpersonal skills or likeability. The coefficient on All Star status is positive for all model specifications and significant at the 10 percent level for most specifications. The effects of performance should be captured by the performance variable and therefore the All Star variable should capture the residual effects of a player's popularity. This positive coefficient implies that popular players are indeed more likely to manage than unpopular players.

The insignificance of the performance variable and marginal significance of the All Star variable are likely due to the high correlation between these two measures. Performance and All Star status have a correlation coefficient of .42. When either of these variables is eliminated from the model the other variable becomes significant for most model specifications. Based on these coefficients it appears that popular players rather than good players are the most likely to become managers.

Race Effects

In order to determine if minorities are less likely to become managers dummy variables for Black and Hispanic players are included in the model. For all model specifications the coefficient on Hispanic is negative. However, for all model specifications this coefficient is insignificant at any conventional level. Therefore, it is concluded that being Hispanic has no statistically significant impact on the likelihood of becoming a manager.

The coefficient on the Black dummy variable is also negative for all model specifications. However, unlike Hispanic, the coefficient on Black is statistically significant at the one percent level for all model specifications. This implies that being black does have a significant negative effect on the likelihood of a player becoming a Major League manager. The marginal effects of being black for each model are calculated and presented in Table 7. These marginal effects are calculated with all other variables equal to their means and Black and Hispanic equal to zero. Therefore, the marginal effects represent how much less likely a black player is to become a manager than an identical white player.

Table 7

Marginal effects of Black = 1 from models with sample selection correction

Dependent Variable	Sample	Predicted Probability Dependent Variable = 1	Marginal Effect (% Points)	p-value
Managed	1955-2004	1.75%	-1.37	0.000
Managed 50 Games	1955-2004	1.50%	-1.23	0.000
Managed	1970-2004	0.89%	-0.62	0.008
Managed 50 Games	1970-2004	0.73%	-0.54	0.007

The marginal effects of Black range from -0.54 to -1.37 percentage points depending on the model specification chosen. These marginal effects are very large when compared to the low predicted probability that an average player becomes a manager. With all variables evaluated at their means black players are 70 to 82 percent less likely to become a Major League manager than are white players. These large effects are significant at the one percent level.

When measured in percentage points the marginal effects appear to decrease significantly for the post 1970 sample. However, in terms of the percentage decrease in the predicted probability of managing the marginal effects are only slightly smaller for the post 1970 sample. In order to determine whether the effects of being black have changed over time an interaction term of Black and Age is added to the sample. If the effect of being black has decreased over time this variable should have a negative coefficient as older players should have faced more discrimination than younger players.

The results from a model including an interaction of Black and Age are presented in Table 8. As can be seen the coefficient on BlackAge is negative but insignificant with a p-value of over 0.5. The insignificance of this interaction term is confirmed by a likelihood ratio test comparing this model to the same model excluding BlackAge. Based on the insignificance of this interaction term it is concluded that the effect of Black has not changed over time.

Table 8

Probit regression with sample selection: Dependent variable = Managed

	Players retired 1955-2004		Players retired 1955-2004	
Variable	Coefficient	p-value	Coefficient	p-value
Age	0.09733 ***	0.000	0.09945 ***	0.000
Age Squared	-0.00057 ***	0.006	-0.00059 ***	0.004
Performance	-0.55078 ***	0.008	-0.55499 **	0.010
All-Star	0.24837 *	0.053	0.24810 *	0.067
Black	-0.11255	0.876	-0.84619 *	0.079
Hispanic	-0.24356	0.121	-0.24063	0.127
P Games	-0.00197 ***	0.000	-0.00193 ***	0.001
C Games	0.00070 ***	0.000	0.00075 ***	0.000
1B Games	0.00044 ***	0.004	0.00054 ***	0.002
2B Games	0.00052 ***	0.001	0.00052 ***	0.004
3B Games	0.00050 ***	0.001	0.00054 ***	0.000
SS Games	0.00070 ***	0.000	0.00073 ***	0.000
OF Games	0.00016	0.221	0.00016	0.279
DH Games	0.00082 **	0.028	-0.00090	0.366
BlackAge	-0.00723	0.534	-	-
BlackPerformance	-	-	0.57277	0.512
BlackAll-Star	-	-	-0.03069	0.945
BlackP Games	-	-	-0.01777	0.835
BlackC Games	-	-	-0.00124	0.460
Black1B Games	-	-	-0.00042	0.353
Black2B Games	-	-	-0.00003	0.951
Black3B Games	-	-	-0.00008	0.896
BlackSS Games	-	-	-0.00021	0.609
BlackOF Games	-	-	-0.00006	0.853
BlackDH Games	-	-	0.00223 **	0.042
n	5914		5914	
Selection Model				
Performance	0.04419	0.615	0.04397	0.616
P Games	0.03124 ***	0.000	0.03125 ***	0.000
C Games	0.03043 ***	0.000	0.03042 ***	0.000
1B Games	0.03103 ***	0.000	0.03102 ***	0.000
2B Games	0.02012 ***	0.000	0.02012 ***	0.000
3B Games	0.02391 ***	0.000	0.02391 ***	0.000
SS Games	0.02562 ***	0.000	0.02562 ***	0.000
OF Games	0.03194 ***	0.000	0.03196 ***	0.000
DH Games	0.02515 **	0.038	0.02521 **	0.038
Last Season	0.03589 ***	0.000	0.03587 ***	0.000
n	6778		6778	
rho	-0.40137		-0.39888	
	LRTest of independent equations: Chi2(1) = 8.91, p-value = 0.0028		LRTest of independent equations: Chi2(1) = 8.56, p-value = 0.0034	

Given the large negative effect of Black on the likelihood of becoming a manager it is possible that experience and performance measures have different effects for black and white

players. In order to test this hypothesis a model is also estimated including interaction terms of Black with Performance, All Star, and the games played at each position. The results of this model are also presented in Table 8. As can be seen all the interaction terms are insignificant with the exception of Black DH Games which is significant at the five percent level. A likelihood ratio test is conducted comparing this model to the same model with the interaction terms excluded. This test concludes that the interaction terms are jointly insignificant at any conventional level. Therefore, it is concluded that the effects of performance and experience are not significantly different for black players.

Conclusions

The likelihood of former baseball players becoming managers has been analyzed using data from 1955 to 2007. The models presented control for the effects of age, performance, popularity, race, and experience at different positions. The probit models estimated also correct for possible sample selection bias.

It has been shown that black former players are 70 to 82 percent less likely to become managers than white former players. This effect is statistically significant at the one percent level and appears robust to changes in model specification. The effect is also shown to be persistent over the sample period.

This negative effect is based on a model of the overall probability of becoming a manager. There is no way to distinguish whether this decreased likelihood of managing is the result of discrimination in the hiring process or black players being less likely to desire a management position. However, if black players face discrimination outside of baseball one would expect that they are more likely to stay within the baseball industry than white players. Additionally, the models control for differences in player performance, popularity and

experience. These variables should capture differences in post career opportunities. Based on this logic it is concluded that black players face at least some level of discrimination in the market for Major League managers.

Additionally, the analysis has shown that being Hispanic has no significant impact on the probability of becoming a manager. It is also shown that Catchers and Shortstops who are popular but not necessarily good players are most likely to become managers.

Works Cited

Andersen, Torben and Sumner J. La Croix. "Customer Racial Discrimination in Major League Baseball." *Economic Inquiry*, Vol. 29, (1991), pp. 665-677.

Evans, Arthur S. Jr. "Blacks as Key Functionaries: A study of Racial Stratification in Professional Sport" *Journal of Black Studies*, Vol. 28, No. 1, (1997), pp. 43-59.

Gabriel, Johnson, and Stanton, "An Examination of Customer Racial Discrimination in the Market for Baseball Memorabilia." *Journal of Business*, Vol. 68, No. 2, (1995).

Hanssen, Andrew and Torben Andersen. "Has Discrimination Lessened Over Time? A Test Using Baseball's All-star Vote." *Economic Inquiry*, 37, (1999), pp. 326-352.

Heckman, James J. "Sample Selection Bias as a Specification Error." *Econometrica*, Vol. 47, No. 1, (1979), pp. 153-161.

Jewell, R. Todd, Robert W. Brown, and Scott E. Miles. "Measuring Discrimination in Major League Baseball: Evidence from the Baseball Hall of Fame." *Applied Economics*, 34(1), (2002), pp.167-177.

Jiobu, Robert M. "Racial Inequality in a Public Arena: The Case of Professional Baseball." *Social Forces*, Vol. 67, No. 2, (1988), pp. 524-534.

Medoff, Marshall H., "Racial Discriminationi n Professional Baseball." *Atlantic Economic Journal*, (1975), pp. 37-44.

Singell, Larry D. Jr. "Baseball-Specific Human Capital: Why Good but Not Great Players Are More Likely to Coach in the Major Leagues." *Southern Economic Journal*, Vol. 58, No. 1, (1991), pp. 77-86.

Volz, Brian. "Minority Status and Managerial Survival in Major League Baseball" *Journal of Sports Economics*, (2009), doi:10.1177/1527002508330860.