Pay Discrimination in Major League Baseball: Are Darker-Skinned Players Still in the Hole?

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Abstract:

This paper aims to add to the literature on discrimination in Major League Baseball by examining how contract outcomes differ between players with different skin tones, nationalities, and native languages. Through running linear and logistic regressions, this paper examines whether players with darker skin tones are paid less than similarly performing lighter-skinned players, are less likely to sign contracts at all, or are more likely to sign Minor League contracts. This paper finds that while skin tone, nationality, and language have a negligible effect on the Average Annual Value of contracts, they do impact a player's likelihood to sign a contract and also the type of contract signed, holding performance constant. Most saliently, as a player's skin tone gets darker, their likelihood of signing a Minor League contract increases; this effect becomes more dramatic the darker said individual's skin tone is. Also, Mexican players are more likely to sign Minor League contracts. Additionally, Venezuelan and Asian players are more likely to sign contracts of any kind, while Nicaraguan and Panamanian players are less likely to. Possible avenues to further this research include increasing the sample size and using a wider variety of performance measures to evaluate players and their contracts.

1. Introduction

Since their advent, professional sports have served as a microcosm of the societies that have established them. This has manifested in positive ways, such as through athletic excellence and gestures of sportsmanship, as well as echoed serious social problems. One such issue that has historically pervaded professional sports is that of discrimination, especially based on race. From the establishment of different leagues based solely on the color of players' skin to the taunting and abuse endured by nonwhite players post-integration, racism has been prevalent in professional sports for quite literally over a century.

Major League Baseball has been no exception when it comes to the adverse treatment of minority players over its long history. Beginning with the development of the fledgling National League in the 1870s, de facto segregation was an unfortunate aspect of the game of baseball. However, this is not to say minority players were necessarily inferior or were excluded from playing entirely; rather, they funneled into other professional organizations, such as the now-famous Negro Leagues. Clearly, players of color were talented enough to play professional baseball, but owners were simply unwilling to offer them contracts for decades. Eventually, Jackie Robinson famously broke the color barrier in 1947, paving the way for other nonwhite players to finally take their talents to Major League Baseball. Discrimination continued after integration, however, as minority players were constantly harassed by fans, opposing players and managers, and even teammates for decades afterwards.

Oftentimes in labor markets, racial bias can lead to pay discrimination as those with hiring power choose employees who match them racially. The vast majority of MLB hierarchies are white, so therefore if discrimination exists, white players are likely to be favored. Interestingly enough, Major League Baseball players actually exhibit a more diverse

demographic than American society itself. Therefore, nonwhite players are not entirely being shut out from competing in the league. However, it may be possible that minority players are paid less for the value they contribute to their teams, or that they still make up a smaller proportion of rosters than they should simply based on talent. This is especially important to keep in mind considering pay discrimination in Major League Baseball has generally been abandoned as a research topic for the last decade or so.

Therefore, this paper attempts to analyze three questions: whether players of equal productivity with darker skin get paid less, whether players with darker skin are less likely to sign contracts, and whether players with darker skin are more likely to sign Minor League contracts than their lighter-skinned peers. In order to research these questions, contract and statistical data was collected through Spotrac.com, BaseballReference.com, and Fangraphs.com. Based on grouped linear and logistic regressions, the darker a player's skin, the more likely they are to sign a Minor League contract. Likewise, Mexican players are more likely to sign minor League contracts. In addition, Venezuelan and Asian players are more likely to sign contracts than their U.S.-born peers while Central American players are less likely to.

This paper is broken up into eight sections; the first being this introduction. The second is a literature review regarding discrimination in baseball, the third an explanation of the hypotheses driving this paper, and the fourth a description of the data collected to analyze them. The fifth describes the approach used to evaluate the hypotheses, the sixth includes the results of this analysis, and the seventh provides some concluding thoughts. Finally, the eighth section provides a number of tables referred to throughout the paper.

2. Literature Review

Unsurprisingly, racial discrimination has been present in major sports for centuries. The existing literature holds that at varying times post-Jackie Robinson's breaking of the color barrier in 1947 (representing the first integration of any major U.S. sport), nonwhite players have been treated differently and paid less for their contributions to their teams. Additionally, for Major League Baseball specifically, there is previous evidence that teams were slow to integrate for no reason other than discrimination, that consumer discrimination may play a part in salary differences, and that unequal pay has been demonstrated to exist even in recent studies.

Before discussing specific examples of studies of discrimination in sports literature, it is important to touch on the different types of discrimination commonly seen in labor economics. Becker (1957) identified three main forms thereof: employer, coworker, and customer. Employer discrimination will, under perfect circumstances, cease to exist as non-discriminatory employers hire better workers (since they have a wider pool from which to choose). Coworker discrimination will in theory lead to equally competitive segregated firms with equal pay and work. Customer discrimination differs because employers that cater to their customers' wants are rewarded; meanwhile, better workers who are not preferred by customers will have to accept lower pay. Professional sports contain the right conditions for employer and customer discrimination; team decision-makers can decide who to hire from a limited supply of workers and customers purchase tickets that indirectly lead to the payment of players' salaries.

Professional basketball has historically been the sport with the most evidence of racially-based pay discrimination. The NBA became a popular research topic in the 1980s, and several studies conducted during that decade found that salary for black players was between eleven and twenty-five percent less than that of other players, holding performance and market constant. For example, Kahn and Sherer (1988) found that black and white players earned similar

mean salaries, but after controlling for performance, market, and draft position, black players were subject to a compensation shortfall of 20% compared to white players. Additionally, they found that replacing a black player with an identical white player increased home attendance substantially, findings consistent with consumer discrimination. Studies from the next decade, however, found that evidence of discrimination was no longer apparent. Bodvarsson and Brastow (1998), for example, found that players who perform consistently are paid more, but there was no evidence that pay discrimination in the NBA lived on. Two more recent studies, Naito and Takagi (2017) and Harris and Berri (2016), found that white players have been paid 20% more than non-white players over the past 10 years in the NBA and that nonwhite players received less playing time (holding performance constant) than white players in the WNBA. A lack of playing time would lead to lower counting statistics, depressing salaries. Furthermore, in Kahn's (1991) review of the literature surrounding discrimination in professional sports, he cited studies that found positional segregation existed in baseball, football, and hockey, which also has the capacity to impact salaries if non-white players are pushed to less central positions.

Unsurprisingly, considering discrimination has manifested in the NBA, WNBA, NFL, and NHL, it has also historically been a part of the MLB as well. Lanning (2010) found that owner and possibly coworker discrimination led to Major League Baseball integrating post-1947 more slowly than non-white players' talent warranted. Because of lost revenue due to unimproved teams as well as foregone salary cuts (considering former Negro League players could be signed for less money than the players they replaced), the median team sacrificed $2.2 million in 1950 dollars (over $27 million in 2022 dollars) to remain segregated. There is also evidence of consumer discrimination in Major League Baseball; Hill (1982) found that attendance at Major League Baseball games decreased when there was a minority starting

pitcher. Specifically, he found that ticket sales decreased by 5 percent when a nonwhite pitcher started for the home team, and by 10 percent when the away team's starting pitcher was not white. Therefore, if Becker's ideas about consumer discrimination hold true, teams that employ more white players would reap benefits in the market, meaning nonwhite players would have to settle for lower salaries. However, the majority of literature on salary discrimination in the MLB in recent years has found it to be nonexistent, leading it to be de-emphasized as a research topic. As far back as Pascal and Rapping (1970), race was found to have no significant impact on salary, holding performance constant. Likewise, Christiano (1988) found no signs of salary discrimination in 1987's Opening Day rosters. Marburger (1996) asserted that the preponderance of studies on salary discrimination in Major League Baseball suggested it did not exist, which led him to look instead at whether contract length (in years) was in fact how nonwhite players were discriminated against; he also found no signs of racial bias.

This is not to say that discrimination no longer exists in any form in Major League Baseball. Holmes and Kane (2017) introduced two different categories of discrimination, as applied to professional baseball: per-unit and ad-valorem. Discrimination per-unit would mean that racists would take issue with the number of minority players employed, while ad-valorem would mean they would have a distaste for their value in employment (and pay them less for their contributions). The authors argue that any Major League Baseball discrimination is per-unit based, considering the implications of prior empirical research. This marries well with other research that found less obvious indicators of discrimination. Jiobu (1988) found that black players have shorter careers holding performance constant, suggesting the existence of an implied ceiling in the count of minority players. Bellemore (2001) demonstrated that black and Hispanic players were less likely to be promoted from the minor leagues to the MLB, an effect

that appears to have prevailed over time considering that Arthur (2020) discovered that minority players reach the Major Leagues on average 0.6 years later than their white counterparts, holding performance constant. Both of these stunt career earnings in a way that would not show up in typically-run salary discrimination regressions; shorter careers and more time spent in the minor leagues keep earnings over time lower, rather than minimizing salaries during a specific year. Additionally, Holmes (2010) found that black players in the lower half of the salary distribution earn significantly lower salaries than white and Hispanic players also in the bottom 50 percent. The difference is both statistically and economically significant. In the bottom salary quintile, black players earn up to 25 percent less than white and Hispanic players. Considering the magnitude of MLB salaries, this equates to hundreds of thousands or even millions of dollars' worth of forgone pay for some players.

Therefore, the existing literature on the topic evidences that pay discrimination in the MLB likely still exists, despite being largely abandoned as a research topic. However, it might not surface on an ad-valorem basis, through pure salary discrimination, but rather through per-unit discrimination. This would have an outsized effect on marginal players, who could be kept out of the Major Leagues with relatively little penalty for owners through shortened careers and/or Minor League contracts. This paper will advance the state of knowledge surrounding pay discrimination by testing for ad-valorem discrimination through regressions involving salary as well as testing for per-unit discrimination through separate regressions for a low-WAR, middle-WAR, and high-WAR group (to see if marginal players are affected more), for likelihood to sign a contract, and for likelihood to sign a Minor League contract.

3. Hypotheses

Based on knowledge of historically differing treatment between players of different races, this paper will attempt to shed light on three possible areas of continued discrimination. The first, and most obvious, would be outright, ad-valorem pay discrimination, which would be represented by equally-skilled players receiving unequal salaries because they differ in skin tone. This is represented by hypothesis one:

H_1 : Darker skin will have a significant, negative impact on the salaries of Major League Baseball players holding their performance constant.

This would be the most blatant demonstration of employer discrimination of the three; it would mean that players are immediately valued differently solely because of their skin color, and not because of what value they can bring to a team. However, it is possible that this could be too visible, and owners and general managers are no longer ostensibly biased enough to factor a player's race against him strictly when negotiating dollar values. For most players successful enough to earn a Major League free agent contract above the league minimum, it would be inefficient for decision-makers to hold their skin tone against them based on how rare acquiring an established big-league player truly is. However, it is possible that discrimination could occur in two other, more subtle (and per-unit) ways. This leads to hypotheses two and three:

H_2: Darker skin will have a significant, negative impact on the likelihood of signing any contract at all, whether Major or Minor League, holding performance constant.

H_3: Darker skin will have a significant, negative impact on the likelihood of signing a Major League contract, holding performance constant.

Hypothesis two holds that darker skin will cause a player to be less likely to sign a contract. If two players may or may not be good enough to sign a professional contract at all, there would be nearly no harm at all in signing a lighter-skinned player over a darker one, as each would add

little to the team anyway. Hypothesis three involves a similar idea: it holds that darker-skinned players may be more likely to sign Minor League contracts, holding performance constant. Minor League contracts differ from Major League ones in that they feature much lower pay and that they are non-guaranteed, meaning if a player does not get promoted or injures himself, he will make hundreds of thousands less per year than someone in the Major Leagues. This is a way in which discrimination may be alive in baseball, as it would be easier to penalize players on the fringes of the Major Leagues. It would do less harm to the team if a fledgling player was signed to a minor league contract rather than a major league contract because he had darker skin rather than if a solid player was not signed at all due to racism. Pay discrimination, if it exists in Major League Baseball, may be more likely to be subtle, considering the large spotlight on the league, its millions of viewers, and the financial rewards of winning. Therefore, in addition to examining differently-colored players' contract sizes, it could be valuable to also examine the relationship between their skin tone and the kind of contract they sign, or whether they sign one at all.

4. Data

List and Description of Variables - Table One

In order to investigate the effect of skin tone and nationality on contractual outcomes, data for all Major League free agents who played in the year preceding their free agency from the offseasons between 2017 and 2021 was collected. While data from the 2022 offseason (October 2021-April 2022) is available, it was omitted from the sample because of the impact the MLB lockout had on players' and teams' offseason behaviors and strategies. Data was collected from three sources in order to adequately represent all that was necessary to evaluate the fairness of pay in Major League Baseball, with all relevant variables being defined in Table One. First, contract data from the period 2017 to 2021 was collected from Spotrac.com, which accumulated its information

from Baseball Prospectus. Spotrac held information on each player's position and age as well as the terms of their contract in years, total dollars, and average annual value (abbreviated as AAV - it is the total dollar amount of the contract divided by the amount of years it spans). Before tackling the question of how skin tone and nationality influence these contracts, it was necessary to also collect statistics for the sample over that same period, as it goes without saying that they form the majority of the basis for contract terms. These statistics were collected from FanGraphs.com and featured a variety of both simplistic and advanced measures; most importantly, they included the Wins Above Replacement figure for each player. Wins Above Replacement (WAR) is this paper's fundamental statistic in evaluating the efficiency of Major League Baseball salaries in terms of player value. A replacement player is defined as a readily-available stand-in player who can be acquired for the league minimum salary and who is essentially AAA-quality (the highest level of the minor leagues). Therefore, WAR details just how much better a player is than someone right off of a AAA roster would be. WAR has been quickly accepted across baseball as an effective way to evaluate players because it is easily understandable, encompasses all facets of the game, and provides a level playing field for comparison between different positions.

From there, player photographs to be analyzed for skin tone as well as nationality data were accumulated from Baseball-Reference.com, as well as a composite 3-year WAR figure to add an element of historical performance. The question of race still remained, however; there is no available data on how each MLB player identifies his race, so skin tone was used as a proxy that should work as well, if not better, to highlight discrimination. In order to provide a quantitative, standardized measure of skin color, the Monk Skin Tone Scale was used. Google recently implemented the newly created Monk scale in its AI interface in order to represent

people of darker skin tones better; it features 10 shades, with 1 being the lightest and 10 the darkest. For the purposes of this research, the scale was simplified, with shades 1-3 representing tone 1, 4-6 tone 2, and 7-10 tone 3. Each player's official headshot was compared to the Monk scale to create a data point for the skin tone of each free agent. A degree of evaluation was necessary for a select few players; for example, Michael Brantley was right between a 6 and a 7 on the original Monk scale, or between a 2 and a 3 on the simplified scale used in this paper. That being said, he is observationally African-American; he was therefore classified as skin tone 3 because the darkest skin tone group included nearly all other African-American players and because he should be differentiated from the large number of white players who were classified as skin tone 2. Meanwhile, A.J. Pollock was between skin tone 1 and 2; he was evaluated to be in the first skin tone group because relative to the many Hispanic players in the second group, he was less likely to face racial discrimination based on his relatively fair skin and blue eyes (both observationally white traits).

5. Methodology

To test for the impact of race on salary in the MLB, this base Ordinary Least Squares regression was used:

$$AAV=\beta_0+\beta_1(Age)+\beta_2(WAR)+\beta_3(WAR3)+\beta_4(Medium)+\beta_5(Dark)+X+\varepsilon$$

AAV refers to the average annual value of each players' new free agent contract. WAR refers to the player's WAR figure in the year immediately preceding his free agency. WAR3 refers to the player's 3-year composite WAR, again in the years directly preceding his free agency. Medium and dark are each dummy variables made from the aforementioned simplified version of the Monk scale. The "X" variable is a stand-in for other independent variables that were controlled for, which were defensive position and year of free agency. Controlling for these variables was

important because they each had the capacity to confound the results of each regression; both position and offseason year are extraneous variables that greatly impact free-agent salaries. For example, some positions, like starting pitchers, are paid better because they greatly influence the makeup of a team. Other positions, like third basemen, tend to be somewhat less impactful, and therefore will generally be paid less money for their contributions for the team. Additionally, the year of free agency can also impact salaries. An example of this would be the 2020 offseason; the uncertainty of the COVID-19 pandemic and depressed ticket sales led owners to spend less on their free agents. This needed to be taken into account.

Stemming from that base regression, other variables were added and new regressions were run. The second regression added in each player's nationality, as that could also be an important factor that could be an additional source of discrimination. It is possible that the discrimination would not manifest purely in racism, but instead in xenophobia. This next regression took this form:

$$AAV=\beta_0+\beta_1(Age)+\beta_2(WAR)+\beta_3(WAR3)+\beta_4(Medium)+\beta_5(Dark)+$$

$$\beta_6(Nationality)+X+\varepsilon$$

However, there was one aspect that still was not included that could add to how different players are viewed by team decision-makers. That would be the language each player speaks; it is possible that language barriers cause general managers to value players less. Hence, a third regression was run:

$$AAV=\beta_0+\beta_1(Age)+\beta_2(WAR)+\beta_3(WAR3)+\beta_4(Medium)+\beta_5(Dark)+$$

$$\beta_6(Language)+X+\varepsilon$$

The nationality variable was removed from this regression to eliminate collinearity concerns; there are likely large contingents of players with the same skin tone from the same country

(depending on which country) who speak the same language. By including each of these additional variables, it minimizes the chance that any discrimination found solely based on skin tone in the first regression could be due to the contributing factors of nationality and the language.

From there, the same set of regressions was run, this time using the natural log of average annual value. This was done for two reasons: it minimizes the impact of outliers and puts the coefficient results of the regressions into percentage form. Because MLB contracts are so right-skewed, removing outliers is important for analysis of contract data. Also, linear regression results as percentages are far easier to read and interpret, which is valuable when attempting to communicate findings.

Next, players were stratified into three groups based on the WAR they accrued in the year prior to their free agency, called throughout the paper the lower third, middle third, and higher third; this was to examine whether discrimination manifested more obviously on the lower end of achievement (and therefore pay), where teams could more easily get away with giving darker-skinned players lower salaries and there may be less competition for their services. Then, the base regression was run for each of these three WAR groups to see if the impact of skin tone on salary was clearer in lower-performing individuals.

However, as previously hypothesized, the manifestation of discrimination may not be limited to the average annual value of MLB contracts. Alternatively, players of different skin tones may be less likely to be offered a Major League contract (as opposed to a Minor League one) or be less likely to be offered a free agent contract at all. Therefore, regressions were created to measure impacts on these outcomes as well. A contract dummy variable was created designating all players who signed one a value of 1 and all who did not a 0. A minor league

contract dummy variable was also created, with a 1 representing a minor league contract and a 0 representing a major league contract (and no value assigned to players who did not sign a contract). For the contract logistic regression, all players in the sample were included. For the minor league regression, only those players who signed a contract were included, so as to exclude the confounding effects of those who had not signed at all. The logistic regressions took the following forms:

$$Contract=\beta_0+\beta_1(Age)+\beta_2(WAR)+\beta_3(WAR3)+\beta_4(Medium)+\beta_5(Dark)+X+\varepsilon$$

$$Minor\ League=\beta_0+\beta_1(Age)+\beta_2(WAR)+\beta_3(WAR3)+\beta_4(Medium)+\beta_5(Dark)+X+\varepsilon$$

After those base regressions were run, the same steps were followed as with the linear regressions previously; in successive iterations of the regression, nationality was added and then taken out and replaced with language. In this manner, the effect of skin tone on likelihood to get offered a contract or offered a minor league contract could be elucidated, and then the two other factors could be added separately to see if they helped to explain the results found in the first regression.

Because these were logistic regressions, they only show the change in the underlying statistical distribution of each variable and do not place them in relative terms. Therefore, a marginal effects conversion was run after each regression to place each change in all variables in context as movement from the mean. This allows for relaying of results in percentage form starting from a common place, as change in a variable can mean many different things and have varying importance based on where it occurs along a logistic distribution. Standardization of the starting point gives these changes more meaning and context through which to analyze them.

6. Results

Summary Statistics - Table Two

Before analyzing the results of the regressions, it is important to share summary statistics in order to place them into context. There are quite a few items of note regarding the summary statistics found in Table Two. AAV is the first variable in the table, and it is important to recognize that AAV has a different sample size than the other variables because it contains only those 620 players whose contract terms were reported (versus 1,319 players in the sample overall), which were the only ones that could have been included in any regressions for AAV or its natural log. Therefore, the sample does not split equally between the thirds of WAR. Higher-profile free agents, who tend to have the terms of their contracts reported, are usually the better players who accrue more WAR. Therefore, the high third of WAR features roughly three times as many players with reported terms (and an AAV) as the low third (337 versus 113, respectively) and about twice as many as the middle third (337 versus 170). It has an average in the full sample (again, of the contracts with reported terms) of $5,095,147. It is interesting to note that between the low and middle thirds of WAR, the average AAV changes by less than $1 million (from $1,961,808 to $2,417,052). However, it jumps to $7,496,759 for the high third. This shows that MLB contracts are relatively bunched around "lower" values, with relatively few players receiving larger contracts. This shows why it was important to attempt to mitigate the effects of outliers using the natural log of AAV.

The percentage of players who signed a contract of any type in the entire sample was 71.9%; from the low third of WAR to the middle third it did not change much (from 60.5% to 68.5%). However, for the highest third of performers, it jumped to 86.2%, with a small portion of the remaining 13.8% being retirees. This makes sense, as the vast majority of players in the high third would make a significant positive impact on a new team, while the low and middle thirds may add negligible or negative (vs. replacement) value. MinorLeague, like AAV, also features a

different sample size than the rest of the variables; this is because it includes only those players who signed contracts (948 of the total sample of 1,319) in order to prevent those who did not sign a contract from clouding the results of its regressions. Since the MinorLeague sample size is all players who signed a contract, it logically follows that more of them land within the parameters for the high third of WAR (387 compared to 296 in the middle third and 265 in the low third). The percentage of minor league contracts was 49.8% for the entire sample; notably, it was much higher in the lower and middle thirds (76.6% and 66.6%, respectively) than in the higher third (18.6%). This makes sense, as in the lower third, all of the players are below replacement level, and in the middle third, all are right around replacement level. Therefore, teams tend to sign them to deals to play for their AAA team (in effect, to act as a replacement player). The average age was quite consistent across the entire sample and each third, never reaching lower than 32.069 or higher than 32.893. The average WAR throughout the sample was .343 and increased from -.488 in the lower third to .066 in the middle to 1.420 in the higher third. Similarly, the WAR3 average for the whole sample was 1.773 and went from .560 to 1.108 to 3.596.

Each of the three skin tone dummy variables remained relatively consistent across the three WAR segments, which is important as it shows that as a whole players of different skin tones do not significantly differ in talent across the entire distribution. It is also crucial to note that the majority of players had a medium skin tone (73.5%), while 17.8% had a dark skin tone and 8.6% a light one. In order to contextualize the skin tone variables, it is important to note the observational racial distribution across the three groups. Observationally white players made up the entirety of the light skin tone group and more than half of the medium skin tone group. The remainder of the medium group was almost solely Hispanic players, besides a negligible amount

of lighter-skinned, observationally African-American players. The dark skin tone group, meanwhile, was about half observationally African-American players, and half darker-skinned Hispanic players, mostly from the Dominican Republic, Venezuela, and Cuba. 71.6% of the players in the sample were from the U.S., which stayed relatively consistent across the three samples (slightly more in the middle group, slightly fewer in the high group). The same held for the Dominican Republic and Venezuela, the two other largest producers of MLB players (10.3% and 8.7% overall). Interestingly, all other countries combined to make up just 9.3% of the sample as a whole, but 12.5% of the high WAR group. English speakers dominated the sample at 73.2% overall, making up more of the middle group but less of the high group. Spanish speakers were 24.4% of the sample, conversely making up less of the middle group and more of the high group. Just 2.4% of the sample spoke a language other than English or Spanish, staying within a percentage point difference for each WAR subgroup.

Results from Regressions for AAV - Table Three[1]

First, the base regression was run following the previously mentioned three iterations, with the results in Table Three. In each iteration, age, WAR, and WAR3 all featured the strongest level of statistical significance. This means that age very strongly negatively impacts the AAV of free agent contracts, while unsurprisingly statistical performance is highly positively correlated with AAV. This makes sense, as teams may be wary that older players are beginning the decline phase of their career, and better players encourage more teams to be involved in bidding wars that increase contract sizes. Interestingly, in all three iterations of the regression, Medium and Dark skin tones each had no statistically significant effect on AAV. In the second regression in which nationality was included, some statistically significant results were found for the added variables.

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[1] In all regression results tables, statistical significance is denoted by asterisks. Three asterisks is the strongest level of significance, at a p-value of less than .01, followed by two asterisks for p<.05, and one for p<.10.

Cuban and Asian (Japanese, South Korean, or Taiwanese) players both had positive relationships with AAV statistically significant at the .05 level. The results show that Cubans sign for about $2,240,000 more per year than Americans on average holding performance constant, while Asians sign for $3,109,000 more annually. This is interesting considering players from each of these countries tend to sign after already accruing professional experience; however, international free agents were not included in the sample. It is possible that teams feel more comfortable paying these players more because they are more experienced than other players considering their foreign and domestic years of service. Also, being from Venezuela or the Caribbean (the Bahamas, Curacao, Jamaica, or the Virgin Islands) negatively impacted AAV with significance at the .10 level. The regression shows that Venezuelans sign for $771,515 less per year than Americans do, while Caribbeans sign for $2,457,000 less per annum. This is unexpected considering Venezuela sent the third-most players of any country to the MLB in this sample. In the third run of this regression, nationality was removed and replaced with language, but Spanish and other-language speakers saw no significant difference in AAV compared to English speakers. Even more interestingly, speaking Spanish had a weak negative impact on AAV while speaking another language other than English had a weak positive impact; this runs counter to logic as nearly all in a baseball dugout can speak Spanish, while speakers of other languages may need a translator, an extra expense for a team that may give a reason for a smaller contract.

Results from Regressions for Natural Log of AAV - Table Four

As previously stated, linear regressions using dollar values can often fall victim to outliers and do not express results in percentage form. To combat this, the same three regressions were run, this time using the natural log of AAV instead, identified in this paper as ln_AAV, with results

shown in Table Four. Again, age was negatively correlated and WAR and WAR3 were positively

correlated with ln_AAV at the strongest level of significance. Also, the two skin tone dummies,

Medium and Dark, each had no significant relationship with AAV in any of the three regressions.

Medium did have a very weak negative relationship with AAV in each of the regressions, but it

did not rise near even the 10% level. In the second regression with nationality included, there

were no statistically significant results; this was true even for players from Cuba, Asia,

Venezuela, and the Caribbean, who all had significant results in the previous regression with

AAV. This suggests that those results were likely due to outliers in the sample. Again, no

significant relationship was found between either Spanish speakers or other-language speakers

and ln_AAV. All this is to say that at least on the surface level, there is no evidence of outright

pay discrimination in Major League Baseball; those who sign contracts are not discriminated

against based on their skin color, nationality, or the language they speak.

Results from Regressions for Natural Log of AAV with WAR in Thirds - Table Five

It is possible that those on the lower end of the performance spectrum may be receiving less

money for the same performance, and it is just being hidden by those who sign large contracts.

The best players cannot possibly be discriminated against if general managers are to build

winning teams; it is much easier to discriminate when the results of that discrimination do not

mean a great player will be signed by another team. Therefore, the players were split into the

previously shown three groups of WAR: low (WAR≤-.2), medium (-.2<WAR≤.3), and high

(WAR>.3). Then, the base ln_AAV regression (including only skin tone of the three possible

discriminatory variables) was run three times, one for each WAR group, with the results

demonstrated in Table Five. In the low group, age and WAR both surprisingly lost their

significant relationships with ln_AAV, but it is important to keep in mind that the sample size

dropped to 113 due to the fact that fewer poorly performing players have their contract terms reported. However, the relationship with WAR3 remained significant at the 1% level, suggesting that marginal players are paid moreso for their past performance over a few years rather than only in the year preceding their free agency. Both Medium and Dark showed negative relationships with ln_AAV in the low group, but they were not statistically significant. It is possible that this is small-sample noise or that a larger sample would show stronger evidence of discrimination in the low-WAR group. In the middle group, the story is almost exactly the same, except this time, a dark skin tone had a weak positive relationship with ln_AAV. Again, it is important to note the reduced sample, as these free agents still are not quite as prominent and their terms may well go unreported; this group features only 170 contracts. The high group behaves more as expected, likely due to a more reasonable sample size of 337; age is negatively associated with ln_AAV and WAR and WAR3 are positively associated with it, all at the 1% level. A medium skin tone shows a weak positive correlation with ln_AAV, while a dark skin tone shows a weak negative correlation with it. This is not conclusive evidence that discrimination does not manifest differently in successful players versus marginal ones due to the sample size issues, but it also does not show any positive evidence of it either.

Results from Regressions for Contract - Table Six

Next, a set of three logistic regressions and subsequent marginal effects conversions was run to determine if the likelihood of being offered a contract differs between players for discriminatory reasons, with results appearing in Table Six. In all three regressions, age was significantly negatively correlated with signing a contract while WAR and WAR3 were significantly positively correlated with signing one. This also makes sense in that teams tend to have less faith in older players in that they may be less durable or have less development potential, in addition

to possibly declining as they age. Also, it makes sense that the better a player performs, the more likely he is to earn a contract. Again, skin tone had no statistically significant relationship with the likelihood of earning a contract in any of the three regressions; however, it is interesting to note that both Medium and Dark's coefficients were negative in each regression. Medium's coefficients all hover around 0, but in each of the iterations, players with dark skin were shown to be between 4.28% and 5.50% less likely to sign a contact. As for the second regression with nationalities included, players from Venezuela and Asia were more likely to sign contracts with significance at the 10% level. Venezuelan players were 6.55% more likely to sign contracts than Americans were, and Asian players were 12.8% more likely to. This is especially interesting considering Venezuelan players were shown to earn less holding performance constant than others; it is possible that they simply make up an outsized portion of the players who sign Major League-minimum contracts. Meanwhile, there was some evidence shown in the earlier regression that Asian players are paid more than American ones holding all else constant; now, there is evidence that Asian players are more likely to sign a contract too. Again, this could be due to the fact that Asian players tend to have more professional experience prior to the MLB than those from other countries; this may mean that teams feel more comfortable betting on them than other players who have less professional experience overall, even if they have spent the same amount of time in the MLB. Meanwhile, players from Central America (Nicaragua and Panama) were 43.7% less likely to sign a contract than a comparable American player, with statistical significance at the 10% level. This is a relatively large percentage, and must be due to the fact that all of the players from these two countries in the sample are marginal players at or near replacement level.

Results from Regressions for Minor League vs. Major League Contracts - Table Seven

A final set of regressions was run to see the impact of skin tone, nationality, and language on the likelihood of a player to sign a Minor League contract; the results are in Table Seven. Again, this is including only the players in the sample who signed a contract, so as not to confound the results with players who did not sign a contract at all. In all three regressions, WAR and WAR3 are negatively correlated with signing a Minor League contract at the 1% level. In each regression, the chances of signing one decreased by about 34% per unit increase in WAR and about 11% per unit increase in WAR3. Meanwhile, age was not as much of a factor in these regressions, having a slightly positive relationship with the likelihood of signing a Minor League contract in all three but only reaching the level of statistical significance, and only at the 10% level, in the third iteration. In all three regressions, players with a medium skin tone were 12% more likely to sign Minor League contracts than lighter-skinned players at a 10% level of significance. Even more significantly, in the first and third regressions, players with a dark skin tone were 22.5% more likely to sign Minor League contracts than light skin tone players at the 5% significance level, holding performance constant.

In the second regression, this was true at the 1% level of significance, with dark-skinned players 27.3% more likely to sign Minor League contracts than light-skinned players, all else equal. This is the first strong evidence of discrimination uncovered in this paper; it shows that as skin tone gets darker, players are significantly more likely to sign Minor League contracts rather than Major League contracts, even when holding position, year, age, and performance constant. This effect gets more dramatic the darker a player's skin tone gets. Referring back to the summary statistics, far more players sign Minor League contracts in the lower and middle thirds of WAR (76.6% and 66.6%) versus the higher third of WAR (18.6%) for obvious reasons, meaning that this discrimination occurs mostly in the most poorly performing players who are

paid less. As for nationality results from the second regression, only Mexican players saw a result with any statistical significance, which was at the 1% level to boot; they were 37.7% more likely to sign a Minor League contract than a comparable American player. This is a very large percentage, but is probably similar to Central America's results in the Contract regressions set; Mexico does not tend to produce many quality players and that could help to explain why this occurs. Although Asian players were more likely to sign contracts and were paid better than U.S.-born players, they were not statistically significantly less likely to sign Minor League contracts, with only a weak negative correlation shown. As for the results for language, Spanish speakers were slightly more likely to sign Minor League contracts than their English-speaking peers (1.1%) and other-language speakers were less likely to sign a Minor League contract (16.3%), but neither of these results rose to the level of statistical significance.

7. Conclusion

As previously stated, racism has a long, unpleasant history in the game of professional baseball. Because of previous evidence of pay discrimination in other professional sports as well as in the MLB, this paper aimed to update the academic literature on whether skin color causes differences in contract outcomes. Three specific questions were examined: whether skin tone and nationality/language had a significant impact on the average annual value of a player's contract, on whether a player received a contract, and on the likelihood of a player signing a Minor League contract. In the first group of regressions, no statistically significant results for any of the three discrimination variables were found. Even when the players were stratified into low-WAR, medium-WAR, and high-WAR groups, no significant evidence of discrimination was found. In the regressions for whether players were discriminated against through receiving a contract at all, Venezuelan and Asian players were more likely to sign contracts than American players, while

Central American players were less likely to. Skin tone, however, had no impact on the likelihood of a player to sign a contract. In the third group of regressions on the reception of Minor League contracts, much stronger evidence of discrimination was found. Medium-skinned players were significantly less likely than light-skinned players to sign Minor League contracts, and this was even more significantly true for dark-skinned players. This marries well with Holmes and Kane's (2017) per-unit discrimination idea; marginal players were the ones discriminated against, driving down the number of non-white players in the Major Leagues. Also, Mexican players were found to be more likely to sign Minor League contracts.

Given the challenge of acquiring each player's skin tone and nationality by hand, as well as the somewhat limited availability of contract terms, there are ways for this area of research to be furthered. Data over a longer term, which could include more contract signings with announced terms, could show more evidence of discrimination in bands based on quality of player. Additionally, more statistics could be added in addition to WAR to gain an even fuller picture of performance.

8. Tables

Table One - All Variables Used

Variable	*Definition*
AAV	*Average Annual Value of a contract - the total dollar amount divided by the number of years the contract spans*
Contract	*Dummy variable assuming a value of 0 if the player did not sign and a value of 1 if they did*
MinorLeague	*Dummy variables assuming a value of 0 if the player signed a Major League contract and 1 if they signed a Minor League contract - no value if no contract was signed*
Year	*Offseason in which the year was signed*
Position	*Player's primary position*
Age	*Age at beginning of free agent period in offseason year of signing*
WAR	*Wins Above Replacement - measures value a player adds to a team compared to a replacement player*
WAR3	*Composite 3-year WAR*
Light/Medium/Dark	*Skin tone variable created through a simplified version of the Monk skin tone scale*
Nationality	*Set of 12 dummy variables based on country of origin; certain countries were combined into regions*
Language	*Set of 3 dummy variables - English, Spanish, and Other - to identify a player's first language*

Table Two - Summary Statistics

Variable	Full Sample	Low Third of WAR	Middle Third of WAR	High Third of WAR
AAV*	5,095,147	1,961,808	2,417,052	7,496,759
Contract%	71.873%	60.502%	68.519%	86.192%
Minor League%**	49.789%	76.604%	66.554%	18.605%
Age	32.361	32.069	32.104	32.893
WAR	0.343	-0.488	0.066	1.420
WAR3	1.773	0.560	1.108	3.596
Light	8.643%	7.763%	9.722%	8.463%
Medium	73.541%	72.831%	75.000%	72.829%
Dark	17.817%	19.406%	15.278%	18.708%
U.S.	71.645%	71.918%	74.306%	68.820%
DR	10.311%	10.046%	10.417%	10.468%
Venezuela	8.719%	9.589%	8.333%	8.241%
Other Country	9.325%	8.447%	6.944%	12.472%
English	73.237%	73.744%	75.926%	70.156%
Spanish	24.412%	23.744%	22.685%	26.726%
Other Language	2.350%	2.511%	1.389%	3.118%
Observations	1,319	438	432	439

* Includes only those 620 players who received contracts with results that were reported; 113 in the low third of WAR, 170 in the middle third, and 337 in the high third.

** Includes only those 948 players who signed a contract, whether Major or Minor League; 265 in the low third of WAR, 296 in the middle third, and 387 in the high third.

Table Three - Results of Regressions for AAV

VARIABLES	1 AAV	2 AAV	3 AAV
Age	-202,715*** [44,812]	-232,803*** [45,593]	-203,297*** [44,842]
WAR	2,212,000*** [135,415]	2,138,000*** [136,838]	2,211,000*** [135,632]
WAR3	811,049*** [52,253]	842,641*** [52,915]	807,791*** [52,505]
Medium	332,970 [438,328]	429,954 [439,831]	319,952 [444,042]
Dark	53,689 [534,831]	55,929 [589,445]	-5,565 [583,642]
Canada		1,040,000 [1,840,000]	
Cuba		2,240,000** [910,641]	
DR		308,571 [498,592]	
Mexico		-1,780,000 [1,080,000]	
PR		1,090,000 [1,090,000]	
Venezuela		-771,515* [465,290]	
Caribbean		-2,457,000* [1,370,000]	
South America		-576,177 [1,620,000]	
Central America		-	
Asia		3,109,000** [1,230,000]	
Africa/Australia/Europe		1,590,000 [1,250,000]	
Spanish			-39,874 [339,330]
Other			935,524 [779,046]
Observations	620	620	620
R-squared	0.69	0.71	0.69

Table Four - Results of Regressions for the Natural Log of AAV

VARIABLES	1 Natural Log of AAV	2 Natural Log of AAV	3 Natural Log of AAV
Age	-0.025***	-0.026***	-0.025***
	[0.00868]	[0.00898]	[0.00869]
WAR	0.366***	0.362***	0.366***
	[0.0262]	[0.027]	[0.0263]
WAR3	0.134***	0.136***	0.133***
	[0.0101]	[0.0104]	[0.0102]
Medium	-0.048	-0.051	-0.052
	[0.0849]	[0.0867]	[0.0861]
Dark	0.005	0.014	-0.010
	[0.104]	[0.116]	[0.113]
Canada		0.242	
		[0.362]	
Cuba		0.083	
		[0.179]	
DR		-0.035	
		[0.0983]	
Mexico		-0.148	
		[0.213]	
PR		0.223	
		[0.215]	
Venezuela		-0.024	
		[0.0917]	
Caribbean		-0.086	
		[0.270]	
South America		0.322	
		[0.319]	
Central America		-	
Asia		0.172	
		[0.242]	
Africa/Australia/Europe		-0.171	
		[0.246]	
Spanish			0.006
			[0.066]
Other			0.122
			[0.151]
Observations	620	620	620
R-squared	0.62	0.62	0.62

Table Five - Results of Regressions for the Natural Log of AAV with WAR in Thirds

VARIABLES	1 Natural Log of AAV (Whole Sample)	2 Natural Log of AAV Low Third (WAR≤-.2)	3 Natural Log of AAV Middle Third (-.2<WAR≤.3)	4 Natural Log of AAV High Third (WAR>.3)
Age	-0.025***	-0.034	-0.024	-0.034***
	[-0.00868]	[-0.0245]	[-0.0152]	[-0.0118]
WAR	0.366***	0.170	0.335	0.302***
	[-0.0262]	[-0.203]	[-0.309]	[-0.0391]
WAR3	0.134***	0.133***	0.188***	0.119***
	[-0.0101]	[-0.0297]	[-0.0216]	[-0.0128]
Medium	-0.048	-0.318	-0.022	0.090
	[-0.0849]	[-0.195]	[-0.141]	[-0.12]
Dark	0.005	-0.214	0.261	-0.015
	[-0.104]	[-0.239]	[-0.189]	[-0.143]
Observations	620	113	170	337
R-squared	0.62	0.31	0.48	0.54

Table Six - Results of Regressions for Contract

VARIABLES	1 Contract	2 Contract	3 Contract
Age	-0.025***	-0.025***	-0.026***
	[0.00357]	[0.00363]	[0.00357]
WAR	0.080***	0.080***	0.080***
	[0.0182]	[0.0185]	[0.0182]
WAR3	0.051***	0.052***	0.051***
	[0.00702]	[0.00707]	[0.00702]
Medium	0.000	-0.006	-0.005
	[0.0426]	[0.0426]	[0.0424]
Dark	-0.043	-0.044	-0.055
	[0.0541]	[0.0604]	[0.0597]
Canada		-0.239	
		[0.153]	
Cuba		-0.098	
		[0.107]	
DR		-0.012	
		[0.0468]	
Mexico		-0.086	
		[0.11]	
PR		0.096	
		[0.0919]	
Venezuela		0.066*	
		[0.0384]	
Caribbean		-0.154	
		[0.328]	
South America		-0.135	
		[0.208]	
Central America		-0.437*	
		[0.258]	
Asia		0.128*	
		[0.0658]	
Africa/Australia/Europe		0.043	
		[0.0962]	
Spanish			0.010
			[0.031]
Other			0.145***
			[0.0463]
Observations	1,319	1,319	1,319

Table Seven - Results of Regressions for Minor League Contract

VARIABLES	1 Minor League	2 Minor League	3 Minor League
Age	0.012	0.012	0.012*
	[0.00713]	[0.00734]	[0.00716]
WAR	-0.340***	-0.341***	-0.341***
	[0.0333]	[0.0339]	[0.0332]
WAR3	-0.113***	-0.117***	-0.113***
	[0.0116]	[0.012]	[0.0116]
Medium	0.126*	0.122*	0.127*
	[0.0649]	[0.0667]	[0.0653]
Dark	0.226**	0.273***	0.225**
	[0.0897]	[0.0989]	[0.0978]
Canada		0.275	
		[0.301]	
Cuba		-0.186	
		[0.126]	
DR		-0.078	
		[0.0797]	
Mexico		0.377***	
		[0.134]	
PR		0.069	
		[0.18]	
Venezuela		0.027	
		[0.0795]	
Caribbean			
South America		-0.009	
		[0.302]	
Central America			
Asia		-0.185	
		[0.139]	
Africa/Australia/Europe		-0.083	
		[0.185]	
Spanish			0.011
			[0.0567]
Other			-0.163
			[0.11]
Observations	948	941	948

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