International Discrimination in NBA

Sports Economics

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Abstract

Entering the 21st century, the National Basketball Association(NBA) has become increasingly globalized and gained overseas markets. There are also four times more foreign players in the league in the 2017 season than in 2000. Despite the large influx of players, the NBA discrimination issue is rarely studied. In this paper, we conduct empirical experiments on the relation between player salary and their country of origin. We do not find evidence of nationality discrimination of salary in the NBA but we find that a NBA player's age and true shooting percentage have the largest effects on his salary, ceteris paribus

Introduction

In the past 20 years, under the efforts of former commissioner David Stern, the National Basketball Association(NBA) has become a highly competitive sports market and gained substantial global recognitions, especially with the number of foreign players increased drastically in the 21st century. According to Business Insider, In the season 1999-2000, there were only 35 foreign-born players. The number has doubled nearly four times by 2016, reaching nearly 29% of the overall NBA players (see chart 1). These international players are bringing in audiences and attention from all over the world and generating large amount of TV revenue for the league (Groves 2015). However, with the large influx of foreign players and growing overseas markets, the treatment of international players in the NBA has remained a puzzle. There are players who are well-known and become super stars like Dirk Nowitzki and Yao Ming, but there are also surprising busts like Yi JianLian who played extremely well in China but cannot fit in the league due to language barriers and social issues. As the NBA becomes more global, nationality discrimination issues have risen up to the surface.

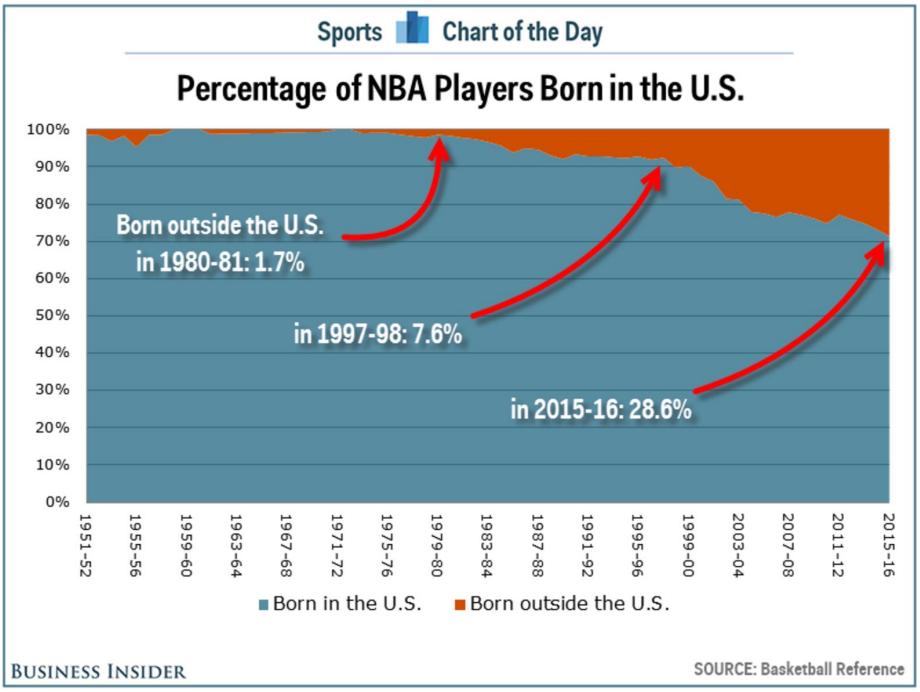
Discrimination in sports has long been a controversial topic. In the past, Szymanski (2010) showed that racial discrimination exists in the English soccer league and black players are in general paid less than white players with similar playing talent. Kahn and Sherer (1988) also found that in the National Basketball Association, African-American players receive a compensation shortfall of around 20% compared to identical white players. However, the presence of nationality discrimination is relatively less studied. Given that the NBA has recently received critical acclaims for its non-prejudicial racial hiring practices (Lapchick & Guiao, 2015), we are intrigued to find out whether the the league is as unbiased towards foreign players as it is towards minority players, so in this paper we propose to exam the nationality discrimination issue in NBA through the following questions.

- First, do foreign players in the recent years on average receive less salaries than native-born players, ceteris paribus.
- Second, does the GDP of a foreign player's origin affect his salary in the NBA, holding other things constant?

With increasing globalization and market liberalization, movement of labor between countries is no longer a rare thing. However, for foreign workers, the adaptation to a new working environment can be painful, especially with language barrier and cultural difference. Although the professional basketball league is an unique job market, our findings and results can still provide directions for future studies on foreign workers.

In section II, we talk about past literatures and studies related to our topic. In section III, we discuss our data acquisition and cleaning process. Section IV presents our main summary statistics and empirical results. Section V shows our interpretations and discussions for the results. In the last section, we conclude our findings on the topic and provide suggestions on future research directions.

Chart 1



Literature Review

In the past, some studies have investigated nationality discrimination and social issues in professional sports. Tainsky and Winfree(2010) have addressed the nationality issue in Major League Baseball and they found the presence of consumer discrimination against foreign-born players during the 1980s and early 1990s, but since 1992, the marginal game attendance turned positive with additional international player on the field. The positive correlation between foreign players and game attendance kept increasing until 2005. The authors think that MLB has been actively trying to gain global markets during the early 90s, so their promotions led to the change in consumer preferences in baseball. Pedace's (2008) paper on the English professional soccer also exams the nationality discrimination issue. He tests the effect of team nationality composition on attendance using a market test approach, which compares team revenue with team nationality composition. He found that there is a positive effect between the number of South American players and home game attendance.

As for professional basketball, Yang and Lin (2012) discussed that international players are discriminated against in the NBA with lower salaries than their US-born counterparts, ceteris paribus, although players from large economies receive better labor market treatment. Hoffer and Freidel(2014), on the contrary, showed that foreign players, despite their on-court performance, receive more compensations than native-born players. However, the studies above either used a old dataset prior to 2009 or adopted a small dataset consisting of only one regular season. The results can be much more different if we look at the most recent dataset with a long span of years. Also, Hoffer and Freidel used PER as one of variables, which inspired us to see what are the relations between advanced player statistics and player salaries. These statistics might better reflect a player's game performance than traditional stats such as points,

rebounds and assists.

In this paper, we aim to revisit Yang and Lin's experiment and analyze whether there is presence of omitted-variable bias such as team game attendance. Yang and Lin's study generates interesting results but the dataset used ranged from 1999 to 2007, which ends right before the great recession, so things might have been changed in the past 10 years given the growing connections between countries and the increasing openness of domestic audience towards foreign players.

Data Acquisition

We have three datasets which all span from the early 2000s to present. The first dataset has 5156 observations including player, season, team, team attendance measured in tickets sold, yearly salary measured in dollars, age, games played, scores, assists, steals, blocks, all other traditional measurements of a player's game performance, a dummy variable which is 0 if a player is domestic and 1 if he is international, player's country of origin, and the country's GDP etc. The key data we observe is the earning of a player each year. For simplicity, we are using player's yearly salary to represent his average earning, and ignore other revenues related to commercials or jersey sales. We are able to scrape player information and statistics from Basketball-reference.com, and both player salary and team attendance from ESPN. We also obtained country GDP from World Bank. After merging all data sources together and dropping outliers, we formed one dataset with all the features listed above for each NBA player. This dataset is similar to the one used by Yang and Lin except we include extra variables like team attendance. It is also more recent with a more seasons.

The second dataset we use was obtained from ESPN Hollinger NBA Player Statistics which includes 4526 observations. This dataset is a little smaller than the first one because instead of normal player statistics, it includes advanced player data like True Shooting Percentage, Assist Ratio, Turnover Ratio, Usage Rate etc. Those stats are not recorded for every player during the early 2000s. One of the important variables included in this dataset is PER. It is the Player Efficiency Rating introduced by John Hollinger(Calculating PER, n.d.) to rate player abilities. PER boils down all of a player's contributions into one number using a detailed formula. Its effectiveness to rank the NBA players has been proved by various authorities. Since each player is given a PER per season, we propose to combine a player's advanced statistics listed above and PER to evaluate a player's game performance. Of course we also include player yearly salary and their country's GDP in the dataset. In order to investigate the first question in the paper, we will use both the first dataset and the second dataset to analyze potential contributors to a player's yearly salary by running linear regressions. We will also use the dummy "foreign" to help address our question that whether a foreign player is earning less when controlling other factors and the variable country GDP can help us delve deeper into nationality discrimination issues in the NBA.

The third dataset we use in the paper is team attendance which is scraped from ESPN team attendance section. It contains 370 observations which include team, season, number of home games per season, total home game attendance measured in number of tickets sold and average home games attendance. The only data we need from this dataset is team total game attendance, which we will incorporate into our regressions to study player salary.

In order to mitigate the effect of extraneous factors, we adopt fixed effect model for all three regressions to separate out the average change over time for each player and team.

Methodology

The first regression we run has player yearly salary as dependent variable and player's season total stats as right hand side variables

$$In(salary_{it}) = \beta_{age} * age_{it} + \beta_{age_s quared} * ageSq_{it} + \beta_{minutes} * minutes_{it} + \beta_{assist} * ast_{it} + \beta_{steal} * steal_{it} + \beta_{turnOver} * to_{it} + \beta_{twoPoint} * twoPoint_{it} + \beta_{threePoint} * threePoint_{it} + \beta_{block} * block_{it} + \beta_{fouls} * fouls_{it} + \beta_{teamGameAttendance} * ta_{it} + \beta_{76er} * 76er_{it} + \beta_{Rockets} * rockets_{it} + \ldots + \beta_{knicks} * knicks_{it} + \beta_{ageForeign} * (age * foreign)_{it} + \beta_{minForeign} * (minute * foreign)_{it} + \ldots + \beta_{attenForeign} * (attendance * foreign)_{it} + e$$

All the game stats are measured in total numbers per season. For example, "two points" represents the number of two pointers made by a player in one season. Most of the variable names are straight forward except a few things. Salary and team game attendance are measured in thousands and we use In(salary) to exam the percentage change of salary for a player in one season. We also include age-squared in the regression because age can have a diminishing positive effect on a player's salary. We add dummies for each team in the league to separate out team effects on player compensations as some teams are more generous than others in terms of offering contracts. We also incorporate team-attendance since home game attendance directly affects a team's revenue, which on the other hand impacts player salaries. As for points, we break down types of player scorings into number of two-pointers, three-pointers and free-throws. In order to avoid multicollinearity, we do not include points as one of the variables. One of the problems we encountered is that in fixed-effect model, time-invariant variables such as being foreign player are often omitted, so in order to capture the effect of being foreign on a player's salary, we add interaction terms of dummy "foreign" with all the game statistics to measure whether a foreign player receives different compensations on playing games.

In the second linear regression, we use advanced player statistics from ESPN.

$$In(salary_{it}) = \beta_{games} * games_{it} + \beta_{mpg} * mpg_{it} + \beta_{assistR} * astR_{it} + \beta_{turnOverR} * to_{it} + \beta_{trueShooting} * trueShooting_{it} + \beta_{usage_{it}} * u_{it} + \beta_{offensiveReboundR} * ofR_{it} + \beta_{deffensiveReboundR_{it}} * deR_{it} + \beta_{PER} * per_{it} + \beta_{valueAdded} * va_{it} + \beta_{estimateWinAdded} * ewa_{it} + \beta_{teamAttendence} * ta_{it} + \beta_{76er} * 76er_{it} \ldots \beta_{knicks} * knicks_{it} + \beta_{mpgForeign} * (mpg * foreign)_{it} + \ldots + \beta_{attenForeign} * (attendance * foreign)_{it} + e$$

It is similar to the first regression except most player statistics are replaced with advanced stats calculated by ESPN. The explanation of each advanced statistics is in chart 1. Again we added team-attendance, interaction terms with dummy "foreign", all game statistics, and team dummies.

Chart 1

True Shooting Percentage	A player's shooting percentage would be if we accounted for free throws and 3-pointers
Assist Ratio	the percentage of a player's possessions that ends in an assist
Turnover Ratio	the percentage of a player's possessions that end in a turnover
Usage Rate	the number of possessions a player uses per 40 minutes
Offensive rebound rate	the percentage of missed shots that a player gets offensive rebound
Defensive rebound rate	the percentage of missed shots that a player gets defensive rebound
Player Efficiency Rating	the overall rating of a player's per-minutes statistical production
Value Added	the estimated number of points a player adds to a team's season total above what a 'replacement player' (for instance, the 12th man on the roster) would produce
Estimated Wins Added	Value Added divided by 30, giving the estimated number of wins a player adds to a team's season total above what a 'replacement player' would produce

In the third regression, we are looking at foreign players' salaries only and exam whether a player's country GDP will affect his salary in the NBA, holding other things constant.

$$In(salary_{it}) = \beta_{age} * age_{it} + \beta_{age,squared} * ageSq_{it} + \beta_{minutes} * minutes_{it} + \beta_{assist} * ast_{it} + \beta_{steal} * steal_{it} + \beta_{turnOver} * to_{it} + \beta_{twoPoint} * twoPoint_{it} + \beta_{threePoint} * threePoint_{it} + \beta_{block} * block_{it} + \beta_{fouls} * fouls_{it} + \beta_{teamGameAttendance} * ta_{it} + \beta_{76er} * 76er_{it} + \beta_{Rockets} * rockets_{it} + \ldots + \beta_{knicks} * knicks_{it} + \beta_{GDP} * gdp_{it} + e$$

We use the same kind of game statistics in this regression, but add GDP as one of the variables in the regression. Also since all the players in this test are international players, we exclude the interaction terms.

The last regression is looking at whether different percentages of foreign players on teams.

Results

Table 1

Summary statistics for player statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
age	4,566	26.82654	4.317382	18	42
games	4,566	58.8099	21.94218	1	83
game_started	4,566	31.22164	30.14089	0	82
field_goal	4,566	224.638	174.974	0	978
two_point (num)	4,566	186.7659	155.0283	0	813
three_point (num)	4,566	37.8721	48.43113	0	402
free_throw (num)	4,566	112.4299	111.783	0	756
ast	4,566	131.6927	142.8435	0	925
steal	4,566	45.65856	35.66476	0	217
block	4,566	30.71113	37.61332	0	285
turn_over	4,566	84.22317	63.98696	0	374
points	4,566	599.578	477.9151	0	2832
salary (thousand)	4,566	4762.67	4626.196	9.281	30453.81

Table 1 summarizes player statistics from the first dataset. we can see that for salary, the lowest salary received by player in the past 16 years is around $9,200 but the highest yearly wage is around $30million. The lowest salary might be a record of temporary contract

instead of yearly salary. As for age, most players are around 26 years old but there are also young talented players who joined the NBA at the age of 18 like LeBron James in 2003, and veterans who still play the game at 42. Chart 2 illustrates the average salary changes for both domestic players and international players in the past 16 years. One thing interesting is that before 2009, the start of the financial crisis, domestic players on average had higher salaries than foreign players, but after 2009, the situation turned to the other way. However, average salary alone does not indicate whether nationality discrimination exists in the NBA. Empirical experiments are needed to generate valid results.

Chart 2

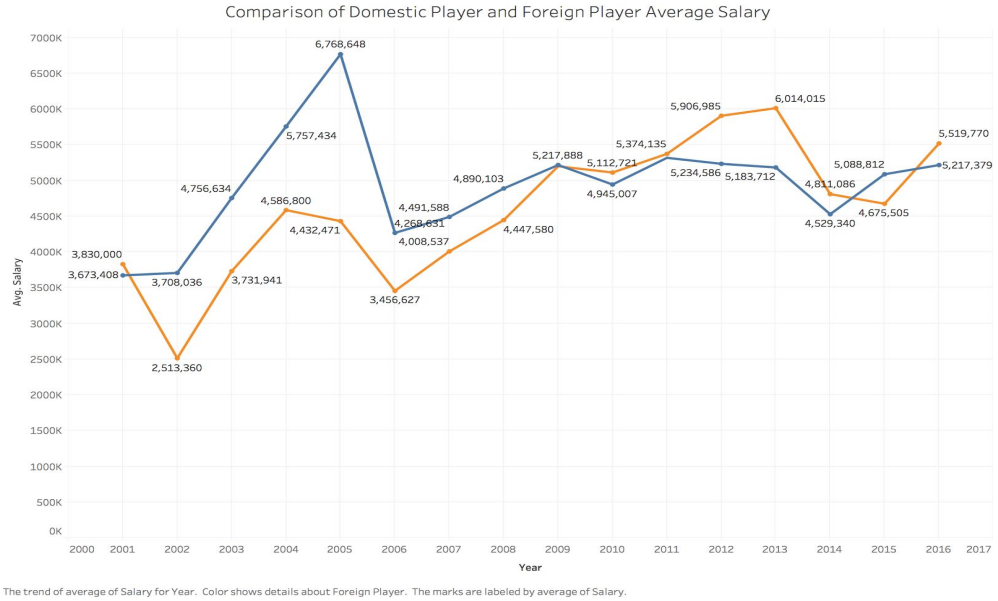


Table 2 shows the empirical results from our first regression. Both the second column and the third column are estimated using the fixed-effect model. The only difference is that the third column includes all interaction terms of dummy “foreign” and game stats. team dummies are not shown in the result because most of them their coefficients are either insignificant or extremely small. Age in both columns has a positive effect on player salary. It shows that one more year of experience is associated with more than 100% increase in player salary, certeris paribus. It also has a diminishing effect as age-squared is significantly negative. Total minutes played, number of two pointers made both have positive effects on player salary but the effects are relatively small compared to age. The coefficient of number of three pointers made is significant in the second column but the effect disappeared after we add additional variables in the third column. Same as Yang and Lin’s paper(2012), steal has an unexpected negative impact on player compensation. Based on the age-foreign interaction term in the third column, we can see that the positive age effect on foreign player is more prominent than the effect on domestic players, disapproving the nationality discrimination we hypothesized. However, the interaction term two pointers-foreign is negative, which means that on average foreign players receive 0.1% less than domestic players for each additional two pointers they make in a season. However, the effect is not obvious given the small coefficient. It seems that there is a wage premium for foreign

players given the age-foreign interaction term, but the effect is not strong and there is no evidence of nationality discrimination as we hypothesized so far. In additional, conventionally game performances should be most related to a player's salary but the results only show slight positive effects of two pointers on salary while seniority is a lot more important in wage determination.

Table 2

Game performances and nationality on player salary		
VARIABLES	Fixed Effect	Fixed Effect with Interacting foreign
age	1.0647 (0.0348)***	1.0571 (0.0349)***
minutes	0.0002 (0.0000)***	0.0001 (0.0000)**
number of two points	0.0005 (0.0003)*	0.0008 (0.0003)***
number of three points	0.0004 (0.0005)***	0.0007 (0.0005)
number of free throws	-0.000 (0.0002)	-0.000 (0.0002)
assists	-0.000 (0.0002)	-0.000 (0.0002)
steals	-0.005 (0.000867)***	-0.005 (0.0009)***
blocks	-0.000 (0.0006)	-0.000 (0.0007)
turnovers	0.0009 (0.0007)	0.0009 (0.0007)
fouls	-0.000 (0.0004)*	-0.000 (0.0005)
game total attendance(thousand)	-0.000 (0.0009)	-0.000 (0.0009)
age squared	-0.017 (0.0006)***	-0.017 (0.0006)***
team dummies	.	.
ageForeign	.	0.0221 (0.0097)***
minForeign	.	0.0003 (0.0001)**
twoPForeign	.	-0.001 (0.0006)**
threePForeign	.	-0.001 (0.0013)
assistForeign	.	-0.000 (0.0006)
stealForeign	.	-0.001 (0.0023)
blockForeign	.	0.0011 (0.0014)
turnForeign	.	0.0003 (0.0017)
foulForeign	.	-0.001 (0.0011)
attenForeign	.	0.0006 (0.0003)*
Constant	13.414 (0.1661)***	-7.318 (0.8715)
Observations	4566	4566
R-Squared	0.2125	0.1678

Standard Errors in Parenthesis
*** p<0.01, **p<0.05, *p<0.1

Table 3 displays the results from our second regression using advanced player statistics. It also has two columns with the third column including interaction terms. The results are in general more interesting than the previous regression as most game performances become relevant to a player's salary. In the second column, we can observe that minutes played per game, true shooting rate, assist ratio and usage rate all have positive effects on a player's salary. The largest effect comes from true shooting rate which is a player's shooting percentage including free throws, two pointers and three pointers. One percentage increase in a player's true shooting rate will increase the player's salary by 150%, ceteris paribus. On the other hand, games played, turnover ratio and surprisingly player efficiency

rating all have negative impacts on player compensations. A one point increase for a player's PER is associated with 6.7% decrease in his salary, holding other things constant. A team's total game attendance has a slight negative effect on salary but its p-value is only a little below 10% level, which means the result is still likely to be insignificant. With interaction terms, nothing substantial has changed but we do observe that the usage ratio-foreign variable is negative, which indicates that for foreign players, the additional minutes they play on the court give them lower rate of return compared their US-counterparts. Overall, no strong evidence is found for nationality discrimination in the NBA.

Table 3

Game performances (advanced stats) and nationality on player salary		
VARIABLES	Fixed Effect	Fixed Effect with Interacting foreign
games	-0.0019 (0.00087)**	-0.0008 (0.0009)
minutes per game	0.03003 (0.0029)***	0.02860 (0.0032)***
true shooting percen	1.52802 (0.47759)***	1.32911 (0.5428)**
assist ratio	0.02030 (0.00371)***	0.01686 (0.0044)***
turnover ratio	-0.0349 (0.00636)***	-0.0310 (0.0072)***
usage rate	0.05887 (0.00692)***	0.06529 (0.0077)***
offensive rebound rate	-0.0833 (0.04451)*	-0.1077 (0.0503)**
defensive rebound rate	-0.0488 (0.04460)	-0.0714 (0.0503)
rebound rate	0.10542 (0.08925)	0.15011 (0.1008)
player efficiency rating	-0.0623 (0.01111)***	-0.0562 (0.0127)***
value added	-0.0098 (0.01446)	0.00181 (0.0164)
estimated wins added	0.32004 (0.43363)	-0.0336 (0.4940)
foreign_player	.	.
total_attendence(thousand)	-0.0003 (0.00020)*	-0.0002 (0.0002)
teamDummies	.	.
gameForeign	.	-0.0055 (0.0021)**
mpgForeign	.	0.00261 (0.0070)
tsForeign	.	1.29734 (1.1642)
astForeign	.	0.00747 (0.0086)
turn_overForeign	.	-0.0191 (0.0153)
usgForeign	.	-0.0327 (0.0170)*
orrForeign	.	0.13725 (0.1030)
drrForeign	.	0.13569 (0.1037)
rebrForeign	.	-0.2623 (0.2067)
perForeign	.	-0.0308 (0.0259)
vaForeign	.	-0.0503 (0.0342)
ewaForeign	.	1.53289 (1.0257)
total_attendenceForeign	.	-0.0002 (0.0003)
Constant	6.83233 (0.28602)***	6.84119 (0.2888)***
Observations	3977	3977
R-Squared	0.1707	0.1152

Standard Errors in Parenthesis
*** p<0.01, **p<0.05, *p<0.1

Table 4 summarizes country GDP effects on a foreign player's wage. GDP is measured in million dollars. Although most of the coefficients are significant, their values are extremely low except the value of age, indicating a small effect of these variables on foreign player salaries. we can only conclude from the results that GDP does not play a strong role in international player's compensation because the effect is almost negligible.

Table 4

Foreign player and GDP on salary	
VARIABLES	Fixed Effect
age	0.9390 (0.0764)***
minutes	0.0003 (0.0001)**
number of two points	-0.000 (0.0006)
number of three points	-0.000 (0.0011)
number of free throws	-0.000 (0.0007)
assists	-0.000 (0.0005)
steals	-0.003 (0.0019)**
blocks	0.0010 (0.0011)
turnovers	0.0016 (0.0014)
fouls	-0.001 (0.0009)*
game total attendance(thousand)	-0.000 (0.0002)***
age squared	-0.014 (0.0014)
gdp(million)	-0.000 (0.0000)***
team dummies	.
Constant	1.2272 (0.9968)*
Observations	803
R-Squared	0.2125

Standard Errors in Parenthesis

*** p<0.01, **p<0.05, *p<0.1

Table 5 below is also investigating the effect of GDP on foreign players except both GDP and total game attendance take the logarithmic form. Age, minutes, steals and fouls are still statistically significant as table 4 but the effect of game attendance changes from highly significant to insignificant. Age squared becomes significant with player salary so there is a diminishing positive effect of age on salary, holding other things constant. Country GDP is still negatively correlated with salary and it indicates that a 1% increase in a country's GDP will decrease the foreign player's salary by 7.6%, ceteris paribus. It is surprising to see that players coming from more developed countries are actually discriminated in the NBA,

contradicting with the results found in Yang and Lin's paper (Yang and Lin 2012).

Table 5

Foreign player and log(GDP)	
VARIABLES	Fixed Effect
age	0.98230 (0.0750)***
minutes	0.00042 (0.0001)***
number of two points	-0.0001 (0.0006)
number of three points	-0.0005 (0.0011)
number of free throws	-0.0001 (0.0007)
assists	-0.0007 (0.0005)
steals	-0.0040 (0.0019)**
blocks	0.00040 (0.0011)
turnovers	0.00135 (0.0014)
fouls	-0.0021 (0.0009)**
game total attendance	-0.7176 (0.1941)
age squared	-0.0152 (0.0013)***
gdp	-0.0767 (0.1219)***
team dummies	.
Constant	-1.214 (2.2503)
Observations	803
R-Squared	0.2271

Standard Errors in Parenthesis
*** p<0.01, **p<0.05, *p<0.1

Conclusion

The results above have rejected our hypothesis that international players are discriminated against in the NBA, and there is a small negative correlation between a foreign player's country GDP and the player's wage. The results seem to contradict with Yang and Lin's findings and are consistent with Hoffer and Freidel's results. It might be a recent change that the NBA starts to treat players with similar playing talent equally, despite their nationalities or races.

Our results also show that seniority and a player's true shooting percent play the largest positive role in determining a NBA player's salary and player efficiency rating is shown to have a negative effect on player salary, holding other things constant.

It is certainly a good sign to see the NBA has become the leading force among professional sports in eliminating sports discriminations. However, the races of NBA players are still limited to mostly black and white players with a combination of 98% (Lapchick, Richard and Guiao 2015). In the future, it would certain be interesting to see when more latino players and asian players entering the league, whether discrimination issues will rise again.

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