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Life on the Red Carpet: Star Players and Referee Bias in the National Basketball Association

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ABSTRACT *Fans of the National Basketball Association (NBA) have long considered the idea that NBA referees are biased in various ways, such as when certain "star players" benefit from so-called "phantom fouls" committed against them or are sheltered from calls against fouls they commit. Using two data sets, the first based on Wallace, Caudill, and Mixon (2013), and a second based on all player games during the 2011 NBA Playoffs series, including dozens of NBA All Stars, the present study empirically investigates this potential form of referee bias by examining both early- and late-game free throw shooting in these most critical games of any season for NBA players, coaches, owners, and fans. The empirical results suggest that marquee NBA players are the beneficiaries of referee bias that occurs near the end of NBA Playoffs contests. More specifically, through regression models with various fixed effects, we find that NBA All Stars are awarded with an additional 0.32 free attempts per minute during the fourth quarter of NBA Playoff games.*

Key Words: Sports Stars; Referee Bias; Professional Basketball.

JEL classifications: D03, L83.

1. Introduction and Background

Conspiracy theories aside, it's very clear that whether intentional or not, NBA referees do often show preferential treatment to star players. For every non-call that Joe Star may get, there's another two instances that they'll get to the free-throw line for being "fouled." Sometimes, it's a good thing, as it keeps the stars on the court for us, the fans, to see. (Swartz 2012, 1)

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The importance of star players has long been recognized by executives and owners in the National Basketball Association (NBA). Thomsen (2011, 12–13) perhaps best expresses the importance of stars to the league:

National audiences have made it clear they enjoy watching the league's have-not franchises feed [through free agency] talent to the haves. While the NFL thrives on parity, the NBA is marketed around a limited group of individual stars. Fans loved the NBA in the 1980s, when the deeply stocked Lakers, Celtics and 76ers dominated, and they loved it in the '90s, when they could count on seeing Michael Jordan in the Finals year after year.

The importance of stars to the league begs the question, then, about how the league's players are treated both off and on the court. In terms of off-the-court treatment, discourse regarding the relationship between player performance and player compensation has a rich history in the economics (and other) literature (e.g., Berri and Jewell 2004; Berri and Krautmann 2006; Hausman and Leonard 2001; Scott, Long, and Somppi 1985; Simmons and Berri 2011; Staudohar 1999; Stiroh 2007; Zimbalist 2010). The literature regarding on-the-court treatment, which is the focus of the current study, is relatively new. Outside of the many studies on the role race plays in the behavior of NBA officials (Abbott 2010; Price and Wolfers 2010), academic research regarding other factors relating to referee behavior has been, at best, scant. One recent example is a study by Price, Remer, and Stone (2012) that finds statistical evidence of referee bias in the NBA that favors the home team, the trailing team during a particular game, and the trailing team in a particular playoff series. As they indicate, all three biases increase consumer demand and league profits. The latter bias, in particular, supports earlier findings in Caudill and Mixon (1998), suggesting that longer playoff series result in added television revenues to the league.[1] Although some biases on the part of referees may have gone unnoticed by fans of the NBA until Price and Wolfers (2010) and Price, Remer, and Stone (2012), many NBA fans have long been aware that NBA referees appear to be biased, particularly with regard to their treatment of star players. Fans have observed "star players" benefitting from "phantom fouls" committed against them and no-calls when the stars themselves appear to have committed fouls. The epigraph above from Swartz (2012) expresses this sentiment quite clearly. In fact, Swartz (2012) goes further by listing who he believes to be those NBA superstars who receive the greatest degree of preferential treatment from NBA officials. The list is a veritable "who's who" of NBA superstars, including Chris Bosh, Josh Smith, Amar'e Stoudemire, Blake Griffin, Paul Pierce, Kevin Durant, Derrick Rose, Dwyane Wade, Kobe Bryant, and LeBron James (Swartz 2012).

The present study empirically investigates the sentiment expressed in Swartz (2012) by examining data from the NBA Playoffs – the most critical games of any season for NBA players, coaches, owners, and fans. Using data for both all-star caliber and common NBA players, we compare early- and late-game free throw shooting across the 2011 NBA Playoffs. The data and analysis provided by this study are explained in the following section. The final section of the study offers concluding comments.

2. Data and Analysis

We use two separate data sets in our empirical work. The first data set is the 2011 NBA Playoff performance data used in Wallace, Caudill, and Mixon

(2013) and gathered from official NBA game logs (see http://www.nba.com). This sample consists of all 2011 Playoff game performances by 48 different NBA players, resulting in 478 observations. These 48 players are listed in Table 1, wherein NBA All Stars from 2010 and/or 2011 are listed in bold font, and common players are listed in regular font.[2] Our second data set, which addresses what may be the arbitrary nature of the 48 players used by Wallace, Caudill, and Mixon (2013), consists of data on player performance, during both the first three quarters and the fourth quarter, for all NBA players participating in each Playoff game during the time period under consideration in this study. This collection process resulted in a data set containing 1,211 observations.

The study by Wallace, Caudill, and Mixon (2013), summarized in Table 2, compared a player's fourth-quarter performance to his performance in the first three quarters of the game in the areas of field goals attempted per minute, field goals made per minute, and field goal percentage. Wallace, Caudill, and Mixon (2013) find that none of the 48 players' performances in these areas increased in the fourth quarter. On the other hand, anywhere from four (8.3%) to six (12.5%) exhibited statistically inferior performances in the fourth quarter. In these cases, anywhere from 25% to 50% of the players were members of the 2010 and/or 2011 NBA All Stars, suggesting that all-star caliber players are not immune to being among those players whose performances actually fade in late-game situations. Of particular interest in this regard is the Wallace, Caudill, and Mixon (2013) finding that field goals attempted per minute diminish in the fourth quarter for 12.5% of the players sampled. As indicated in Table 2, 50% of those found to take significantly *fewer* field goals in late-game situations (i.e., the fourth quarter) are all-star caliber players. This particular group includes Carmelo Anthony, Chris Bosh, and Tim Duncan, three of the NBA's most recognizable stars.

The dependent variable in our models is excess free throws attempted per minute (*XFTA/min*). For each player, this variable is the difference between the number of free throws per minute played in the fourth quarter and the number of free throws per minute played in quarters one through three of each

Table 1. NBA players included in the Wallace *et al.* (2013) study

LaMarcus Aldridge	**Manu Ginobli**	Jameer Nelson
Ray Allen	Danny Granger	**Dirk Nowitzki**
Carmelo Anthony	Tyler Hansbrough	Tony Parker
Chris Bosh	Roy Hibbert	**Chris Paul**
Elton Brand	Jrue Holiday	**Paul Pierce**
Kobe Bryant	**Al Horford**	**Zach Randolph**
Darren Collison	**Dwight Howard**	Jason Richardson
Mike Conley	Andre Iguodala	**Rajon Rondo**
Jamaal Crawford	**LeBron James**	**Derrick Rose**
Luol Deng	Richard Jefferson	**Josh Smith**
Tim Duncan	**Joe Johnson**	**Amar'e Stoudemire**
Kevin Durant	**Jason Kidd**	Jason Terry
Danilo Gallinari	Ty Lawson	Hedo Turkoglu
Kevin Garnett	Nenê	**Dwyane Wade**
Marc Gasol	O.J. Mayo	**Gerald Wallace**
Pau Gasol	Andre Miller	**Russell Westbrook**

Notes: Names in bold represent players on any one of the 2010 or 2011 NBA All Stars rosters.

Table 2. Early- versus late-game performances: Wallace *et al.* (2013) results

Field Goals Attempted/min	Field Goals Made/min	Field Goal %
Significantly more:	*Significantly more*:	*Significantly higher*:
NONE	NONE	NONE
Significantly fewer:	*Significantly fewer*:	*Significantly lower*:
Carmelo Anthony	**Chris Bosh**	Elton Brand
Chris Bosh	Elton Brand	**Kobe Bryant**
Tim Duncan	Darren Collison	Darren Collison
Marc Gasol	Jason Terry	Jrue Holiday
Roy Hibbert		Jason Terry
Jason Terry		**Dwyane Wade**

Notes: The results from Wallace *et al.* (2013) are summarized here in terms of late-game performance being either significantly "more" or "fewer" (etc.) than early-game performance. For significance, $p \leq 0.05$. Names in bold represent players on any one of the 2010 or 2011 NBA All Stars rosters.

Playoff game. The minutes-played data from Wallace, Caudill, and Mixon (2013) that are used here were rounded to the nearest whole minute in order to simplify the calculations. The average *XFTA/min* is +0.053, with a minimum of −0.528 and a maximum of +1.182, creating an *XFTA/min* range of 1.71. To establish whether each player's fourth quarter playoff performances are *statistically* different from how he performed over the first three quarters in each game, an OLS regression is estimated including individual player fixed effects. The constant term was omitted from the regression in order to avoid couching all discussions as comparisons to an omitted player. Without a constant term, a positive coefficient indicates a positive *XFTA/min* for player *i* (i.e., more free throw attempts per minute in the fourth quarter as compared to the first three quarters), while a negative coefficient means just the opposite. The OLS estimation results, for only those regressors (NBA players) found to be significant at the 0.05 level or better, are presented in Table 3. There are 10 players that fit this description listed in Table 3, each of whom retains a *positive*

Table 3. Summary of OLS results: Excess free throws attempted/minute (*XFTA/min*)

Player	Coefficient	*t*-value	Wallace *et al.* (2013)
Chris Paul	+0.288**	+3.24	no significant difference in *XFGA/min*
Kobe Bryant	+0.270**	+3.92	no significant difference in *XFGA/min*
Manu Ginobli	+0.235**	+2.64	no significant difference in *XFGA/min*
Zach Randolph	+0.224**	+3.71	no significant difference in *XFGA/min*
Tyler Hansbrough	+0.200*	+2.06	no significant difference in *XFGA/min*
Dirk Nowitzki	+0.198**	+4.17	no significant difference in *XFGA/min*
Russell Westbrook	+0.157**	+2.98	no significant difference in *XFGA/min*
Jamaal Crawford	+0.155**	+2.47	no significant difference in *XFGA/min*
Mike Conley	+0.133*	+2.20	no significant difference in *XFGA/min*
Jason Kidd	+0.094*	+2.02	no significant difference in *XFGA/min*

Notes: Names in bold represent players on any one of the 2010 or 2011 NBA All Stars rosters. $^{**}p < 0.01$; $^{*}p < 0.05$.

coefficient estimate, indicating that, in each case, *XFTA/min* is significantly greater than zero. In other words, these players attempt more free throws per minute in the fourth quarter of NBA Playoff games than they do across the first three quarters of play in NBA Playoff games. Note also, however, that none of these players exhibits, in the Wallace, Caudill, and Mixon (2013) study (see Table 2), a significantly positive number of excess field goal attempts per minute across these same 2011 NBA Playoffs games. As such, these 10 players are shooting more free throws per minute in the fourth quarter than they are across the first three quarters, even though they do not attempt more field goals per minute in the fourth quarter. This combination of results suggests that NBA referees are perhaps "protecting" these players late in their respective Playoff contests.[3]

Another look at Table 3 reveals that 7 of these 10 players were named to the NBA All Stars in either 2010 or 2011, while the remaining three were not. Not only are 7 of these 10 players All Stars, they represent some of the biggest names in the league, such as Kobe Bryant, Dirk Nowitzki, Chris Paul, and Russell Westbrook. The difference in these ratios among the players listed in Table 3, or 0.400, is statistically significant at the 0.037 level. This finding suggests that a significantly greater portion of the protected players listed in Table 3 are all-star caliber, or marquee, players.

Next, the OLS results shown in Table 3 are expanded to include results for those players found in Wallace, Caudill, and Mixon (2013) to have exhibited a significant *decline* (at the 0.05 level or better) in *FGA/min* in the fourth quarter (i.e., a negative *XFGA/min*), yet exhibited no such decline in *FTA/min* (i.e., a negative *XFTA/min*) in this study. This expansion, which details a secondary form of potential referee bias, adds yet another five players to the results, as shown in Table 4. According to the Table 4 results, three of the five additional

Table 4. Summary of OLS results: Excess free throws attempted/minute (*XFTA/min*)

Player	Coefficient	*t*-value	Wallace *et al.* (2013)
Chris Paul	+0.288**	+3.24	No significant difference in *XFGA/min*
Kobe Bryant	+0.270**	+3.92	No significant difference in *XFGA/min*
Manu Ginobli	+0.235**	+2.64	No significant difference in *XFGA/min*
Zach Randolph	+0.224**	+3.71	No significant difference in *XFGA/min*
Tyler Hansbrough	+0.200*	+2.06	No significant difference in *XFGA/min*
Dirk Nowitzki	+0.198**	+4.17	No significant difference in *XFGA/min*
Russell Westbrook	+0.157**	+2.98	No significant difference in *XFGA/min*
Jamaal Crawford	+0.155**	+2.47	No significant difference in *XFGA/min*
Mike Conley	+0.133*	+2.20	No significant difference in *XFGA/min*
Roy Hibbert	+0.115	+1.18	Significantly *lower XFGA/min* (†)
Jason Kidd	+0.094*	+2.02	No significant difference in *XFGA/min*
Chris Bosh	+0.061	+1.29	Significantly *lower XFGA/min* (*)
Tim Duncan	−0.005	−0.06	Significantly *lower XFGA/min* (*)
Jason Terry	−0.007	−0.01	Significantly *lower XFGA/min* (†)
Carmelo Anthony	−0.116	−1.06	Significantly *lower XFGA/min* (†)

Notes: Names in bold represent players on any one of the 2010 or 2011 NBA All Stars rosters. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.10$.

players – Chris Bosh, Tim Duncan, and Carmelo Anthony – were not only named to the NBA All Stars during either 2010 or 2011, if not in both years, they also represent three of the biggest names in the modern NBA. Thus, 10 of the 15 protected players listed in Table 4 are all-star caliber or marquee NBA players, while only five are common players. The difference between these two ratios, 0.666 and 0.333, or 0.333, is statistically significant at the 0.034 level. This result supports our findings based on Table 3 that marquee NBA players, arguably the most important component of the NBA brand, are the beneficiaries of referee bias that occurs near the end of NBA Playoffs contests, which are viewed on television by millions of fans nationally and internationally (see Caudill and Mixon 1998).

Given that the tests above show that NBA stars appear to be the beneficiaries of referee bias in that they are attempting more free throws at the end of NBA Playoffs games than they are in earlier portions of these games – even when these players are attempting no more or even fewer field goals at the end of these games than in earlier portions – we further test the Wallace, Caudill, and Mixon (2013) data for differences in the number of fouls called on star players at the end of NBA Playoffs games and in earlier quarters of those same games. To do so, we employ the dummy variable ALLSTAR, which is equal to 1 for observations involving NBA All Stars (as defined above), and 0 otherwise. Although the coefficient for ALLSTAR is negative, suggesting that referees call fewer fouls on star players at the end of NBA Playoffs games as compared to earlier quarters of those same games, thus protecting the NBA's marquee players, this coefficient is not significant at the usual levels.

Next, using the new data set containing information on all participants in the NBA Playoffs game (n = 1,211), performance measures, such as excess field goals attempted per minute (*XFGA/min*), excess free throws attempted per minute (*XFTA/min*), and excess personal fouls committed per minute (*XPF/min*), were regressed on the ALLSTAR dummy variable described above, as well as on HOMEGAME and SHOOTER. The first of these new dummy variables, HOMEGAME, is a dummy variable equal to 1 if player i is a member of the home team during a given NBA Playoffs game, and 0 otherwise. The second, SHOOTER, is a dummy variable equal to 1 if player i is one of the NBA's top 20 free throw shooters, and 0 otherwise.[4] Unlike the models based on the Wallace, Caudill, and Mixon (2013) data employed earlier, these new models include intercept terms as well as player fixed effects (dummies). Inclusion of these additional regressors provides controls that assess the robustness of the results discussed earlier in this study.

OLS results for the five additional models are reported in Table 5. It is encouraging that both HOMEGAME and SHOOTER are appropriately signed in all five models presented in Table 5, given that favorable crowds and other aspects associated with playing at home likely lead to additional fourth quarter (compared to quarters one through three) field goal and free throw attempts by player i, and fewer fourth quarter (compared to quarters one through three) fouls committed by player i. However, the results indicate that neither the home game effect nor the shooter effect is a significant contributor to explaining excess field goals attempted, excess free throws attempted, or excess personal fouls committed.[5]

In terms of the variable of interest, ALLSTAR, the results suggest that star players attempt more free throws during the fourth quarter (compared to

Table 5. Summary of OLS results

	Dependent Variables				
Regressors	*XFGA/min*	*XFTA/min*	*XFTA/min*	*XFTA/min*	*XPF/min*
HOMEGAME	0.008	0.007	0.006	0.005	−0.018
	(0.48)	(0.36)	(0.28)	(0.28)	(−1.18)
ALLSTAR	−0.001	0.045**	0.320*	0.320*	0.146
	(−0.01)	(1.81)	(2.09)	(2.09)	(1.29)
SHOOTER				0.099	
				(0.53)	
Intercept included	Yes	Yes	Yes	Yes	Yes
Player fixed effects included	Yes	No	Yes	Yes	Yes

Notes: The dependent variables are Excess Field Goals Attempted/Minute (*XFGA/min*), Excess Free Throws Attempted/Minute (*XFTA/min*), and Excess Personal Fouls Committed/Minute (*XPF/min*). The numbers in parentheses are *t*-values.
*$p < 0.05$; **$p < 0.10$.

quarters one through three) of NBA Playoffs contests, while at the same time committing no additional personal fouls during the fourth quarter (compared to quarters one through three) of these important games. In fact, the unrestricted model (i.e., that containing HOMEGAME, SHOOTER, and player fixed effects) produces a coefficient for ALLSTAR, +0.320, that is larger than that for NBA star Chris Paul, or +0.288, from the models that follow the Wallace, Caudill, and Mixon (2013) approach (see Tables 3 and 4).[6] This result provides additional evidence, as stated above, that marquee NBA players, arguably the most important component of the NBA brand, are the beneficiaries of referee bias that occurs near the end of NBA Playoffs contests. Finally, our results, along with findings from a recent study by Evans et al. (2013) of an increased probability of a foul being called against the team with the lead and a reduced probability of a foul being called against the losing team (both in NBA games) are consistent with our conjecture about the incidence of "protective" fouls.

3. Concluding Comments

This study examines a potential form of referee bias in the NBA – that of "protecting" the league's star players – by comparing early- and late-game free throw shooting data from the NBA Playoffs, the most critical games of any season for NBA players, coaches, owners, and fans. Confirming a longstanding view held by many NBA fans, our results indicate that such a bias does exist. We find that star players are shown to be placed by referees at the free throw line more frequently than common players in late-game situations throughout the NBA Playoffs. Star protection by referees may be an attempt to protect the league's main brand and increase consumer demand.

Notes

1. Caudill and Mixon (1998) show that mid-1980s changes in the NBA's playoffs format led to a lengthier playoff series.

2. Across the entire sample of 48 NBA players, 25 were named to one or more of these two All Stars teams (2010 and 2011), while 23 were not. The difference between the ratio of All Stars (0.521) and that of common players (0.479) is, at 0.042, relatively small. In fact, this difference is not statistically significant (one-tailed z-prob = 0.386) at any conventional level, indicating that this sample is evenly divided between all-star caliber NBA players and common NBA players.
3. We do recognize the mechanical relationship wherein if a player is fouled while shooting and the shot attempt is unsuccessful, then the play is not counted as a field goal attempt. This relationship should, however, affect *all* players in *all* quarters of a game. It is also worth noting here that there are perhaps two types of end-of-the-game fouls from which stars might benefit. The first we refer to as "protective" fouls. These are the subject of our study, and they represent fouls called by officials to minimize defensive effort and allow the stars to perform. The other type of foul we refer to as "strategic." The fouls are intentional and made with the hope that sending the other team to the free throw line will result in missed free throws and regaining possession of the ball. Whereas protective fouls are called against defenders of the star players, the strategic fouls may be committed against any player, with a strong preference for a poor foul shooter. The main empirical difference between the two is that strategic fouls are committed (usually) by players of teams that are losing, while protective fouls may be called against players whose team is leading. This "fouls typology" represents an interesting empirical issue, investigation of which requires much more detailed data. In the meantime, we do provide some circumstantial evidence that what we are finding in this paper is protective fouling.
4. Inclusion among this group means that player i's regular season free throw shooting percentage was among the top 20 free throw shooting percentages during the NBA's regular season, provided that player i also attempted 200 or more free throws during the NBA's regular season.
5. To restate the latter result, the insignificant coefficient estimate for SHOOTER suggests that good free throw shooters are not taking appreciably more free throws in the fourth quarter of NBA Playoffs games. Anecdotally, the top two players in terms of number of free throw attempts during the season are Dwight Howard and Blake Griffin, both of whom are being fouled because they are poor free throw shooters.
6. The All Stars in the sample attempt an average of 0.394 field goals per minute and an average of 0.213 free throws per minute, both during the fourth quarter, for a ratio of 1.850. Our dummy variable coefficient on ALLSTAR indicates an additional 0.320 free throw attempts per minute. Using free throws attempted during quarters one through three as a base yields 0.460 free throw attempts per minute, which, if multiplied by 1.850, indicates a required field goals attempted per minute (during the first three quarters) of 0.850. Only 5 of 255 cases of All Star player-games reach this level: Derrick Rose (1), Kobe Bryant (2), and Russell Westbrook (2). These calculations provide some circumstantial evidence that this study's findings relate to "protective" fouling.

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