

**Television Coverage and Outcome Uncertainty in Sports:  
Empirical Evidence from the NBA and WNBA**  
**Cobertura televisiva e incertidumbre en los resultados deportivos:  
Evidencia empírica en la NBA y la WNBA**

**Yubo Wang, Wright Hilsman, Steven B. Caudill**

Department of Economics, Rhodes College, Memphis, United States

**Franklin G. Mixon, Jr.**

Center for Economic Education, Columbus State University, Columbus, United States

**Abstract**

In an important paper, Price, Remer, & Stone (2012) introduce one manifestation of referee bias called "close" bias – the idea being that because close games are more valuable, referees might officiate to keep games close. Using 990 observations from the 2011-12 National Basketball Association (NBA) season and 442 observations from the 2010 and 2011 Women's National Basketball Association (WNBA) seasons, we test conceptual models of the impact of television coverage on close bias. Our empirical results indicate that the absolute score differential is about two points less for nationally televised NBA games and about three points less for nationally televised WNBA games, even after accounting for differences in team strength. Our results confirm and extend the earlier findings of Price, Remer, & Stone (2012).

**Key words:** close bias; television coverage, sports economics; referee bias; professional basketball.

**Resumen**

En un importante artículo, Price, Remer y Stone (2012) introducen una manifestación del sesgo arbitral llamada sesgo de "proximidad", el cual se refiere a que, dado que los partidos con marcadores ajustados son más valiosos, los árbitros podrían actuar intencionadamente para mantenerlos así. En nuestro estudio, y tras el análisis de 990 partidos de baloncesto de la temporada 2011-12 en la NBA, y de 442 partidos de las temporadas 2010 y 2011 en la WNBA, testamos varios modelos conceptuales sobre el impacto de la cobertura televisiva sobre el sesgo de proximidad. Los resultados indican que la diferencia absoluta en el marcador entre los equipos es alrededor de dos puntos menor para los partidos televisados a nivel nacional en la NBA, y sobre tres puntos menor para la WNBA, considerando las diferencias de potencial entre los equipos. De este modo, nuestros resultados confirman y extienden los hallazgos de Price, Remer y Stone (2012).

**Palabras clave:** sesgo de proximidad; cobertura televisiva; economía del deporte; sesgo arbitral; baloncesto profesional.

Correspondence/conrrespondencia: Steven Caudill  
Department of Economics, Rhodes College, Memphis, TN 38113, United States  
Email: caudills@rhodes.edu

## Introduction

Whether they are broadcasting legislative activities (Crain & Goff, 1988; Mixon, 2002; Mixon, Gibson, & Upadhyaya, 2003), judicial proceedings (Cohn & Dow, 2002) or even our real lives (Curtis, 2013), television cameras appear to have a transformative effect on human behavior. Nowhere is this more so than in the sporting world. Caudill and Mixon (1998), for example, explain how the importance of television led executives in the National Basketball Association (NBA) to restructure the format of the championship series. This restructuring increased the likelihood of a lengthier series, thus reaching the larger television markets that accompany the fifth, sixth and seventh games of each seven-game championship series.

Television coverage also plays an important role in the daily life of the NBA. Through this important medium, greater fan interest in the sport is created, provided that the league maintains a quality on-court product. Closer games often lead to more timeouts and a greater likelihood of overtime, both of which create additional advertising value. We test conceptual models of the impact of television coverage on product quality, as proxied by game closeness (absolute score differential), for both the NBA and the Women's National Basketball Association (WNBA), wherein outcome uncertainty is the concept that consumer demand depends, at least in part, on the expected closeness of the athletic contest (Peel & Thomas, 1988; Lee & Fort, 2008). As a practical consideration, close games tend to be longer, with more timeouts and a higher probability of overtime, leading to more commercial breaks. Maintenance of product quality, or outcome uncertainty, is a function of relative team skills and referee bias, which is an important facet of this study. Given recent research by Groot (2009), Price, Remer, & Stone (2012) and Evans, Yewell, Caudill, & Mixon (2013) indicating how referee bias is useful to various sports leagues in creating greater outcome uncertainty, tests conducted in this study extend the work of these authors by providing links between referee bias, television coverage and outcome uncertainty in professional basketball leagues in the United States.

Recent literature on the relationship between television coverage and live attendance is highlighted in the following section of the study. This is followed by conceptual models of outcome uncertainty and fan interest, in the form of both television coverage and live attendance, for both the NBA and WNBA. Following discussion of a number of econometric tests, we offer some concluding comments.

### Recent Literature on Fan Interest and Outcome Uncertainty

In examining the relationship between fan interest, referee bias and outcome uncertainty, this study proxies fan interest with variables capturing television coverage and live attendance. Before addressing our conceptual models of outcome uncertainty, we first provide a brief review of recent sports economics literature that has been concerned with uncovering the relationship between television coverage and live attendance of various athletics contests. For example, Fizel and Bennett (1989) investigated the impact of the general increase in telecasts on fan attendance in college football. Given conflicting evidence from prior research, these authors questioned whether telecasts are substitutes or complements for fan attendance, and, in either case, whether the relationship was significant. Fizel and Bennett (1989) conclude that the general increase in telecasts occurring after 1984 led to a decline in fan attendance, suggesting, therefore, that telecasts and attendance are substitutable.

Baimbridge, Cameron, & Dawson (1996) subsequently explored the demand for soccer in the presence of satellite television. More specifically, they examine the influence of satellite television coverage in the United Kingdom on match attendance in the English Premier League during the 1992-93 season. Of particular interest to Baimbridge et al. (1996) is whether any lost match revenue, which may occur from lower attendance due to the presence of television coverage, can be compensated by the revenue generated through that same television coverage. Holding constant differences in league position between home and away teams as a measure of seasonal uncertainty, this study finds no evidence that match attendance generally declines in the presence of satellite television coverage.<sup>1</sup>

Grant and Graeme (2008) examined the impact of live television coverage on soccer match attendance in the Scottish Premier League. This study partitioned the stadium attendance group into three sub-groups: season ticket holders, pay-at-the-gate home team supporters, and pay-at-the-gate visiting team supporters. They found a significantly negative impact of television coverage on match attendance, particularly with regard to pay-at-the-gate home team supporters. The implication of this result is important for smaller professional sports leagues where revenues from match-day attendance are more important, and/or for sports clubs that place a high value on their role in the community.

Buraimo (2008) addressed the issue of match attendance and television audience demand in professional sports by examining fan interest in English League Football from 1997-98 to 2003-04. Determinants of match attendance and television audience considered in the study are the distance between the teams, the historical significance of certain matches, and uncertainty of outcome. Despite the hypothesis that match attendance boosts excitement for television viewers, Buraimo (2008) finds that match attendance is negatively related to the televising of matches.

Buraimo and Simmons (2009) also test the impact of outcome uncertainty on fan interest (i.e., consumer demand) for both fans in attendance and television audiences.<sup>2</sup> In testing this impact, these authors examined *La Liga*, Spain's top soccer league. The data span the seasons from 2003-04 to 2006-07, a period during which all matches were televised.<sup>3</sup> Buraimo and Simmons (2009) estimate a joint match attendance-television viewership model, wherein match attendance and television viewership are each regressed on various fixed factors such as ticket prices, local income and market size. Their results indicate that fans who attend matches prefer a high probability of success for their (the home) team, while the television viewing audience typically favors greater outcome uncertainty, thus confirming the general belief regarding the differences in preferences across the two sets of spectators.

More recently, Paul, Humphreys, & Weinbach (2012) examine the relationship between uncertainty of outcome in college football and stadium attendance in smaller schools. These authors gathered data on point spreads, a measure of outcome uncertainty, from four smaller college football conferences, and find that outcome uncertainty does not increase stadium

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<sup>1</sup> Interestingly, Baimbridge et al. (1996) do find a negative association between attendance and satellite television coverage with regard to Monday night matches.

<sup>2</sup> It is generally believed that the fans in the stadium tend to be loyal supporters and want their home team to win while the TV viewers tend to focus more on the game itself and prefer to watch a close game.

<sup>3</sup> As Buraimo and Simmons (2009) note, the revenue generated from television broadcasting was the most important source of the Primera Division.

attendance.<sup>4</sup> Their results reveal that games with wider spreads attract more home fans, whether or not the home team is favored to win. This suggests that attendance depends largely on the difference in quality between the competing teams.

Finally, King, Owen, & Audas (2012) examined the relationship between playoff uncertainty, match uncertainty and match attendance in Australian National Rugby League over the 2004-08 seasons. Their results suggest that the probability of making the playoffs, home team success and consistent winning performances are more important determinants of match attendance than individual match uncertainty. Overall, fans are attracted to winning teams, and it is the combination of home team's past performances and playoff probabilities that improves match attendance.

The recent literature suggests, in general, that television viewers are attracted by outcome uncertainty, while live attendees may not be, at least not to the same degree. With regard to the relationship between television coverage and live attendance, the literature offers mixed conclusions. Some studies indicate that the two forms of fan interest are negatively related, while others suggest that television coverage and live attendance are not related to one another. In all, the recent literature offers a gap that the present study of fan interest, referee bias and outcome uncertainty aims to fill.

### **Referee Favoritism and Close Bias: Conceptual Models**

More in line with the current study, Groot (2009) discusses the impact of scoring, overtimes, and erring referees on outcome uncertainty in soccer. He points out that an errant referee creates greater outcome uncertainty than a theoretically infallible referee, given that flawless refereeing makes the game only about the relative skill of the competing teams. If a referee makes impartial but incorrect calls, then the weaker team may gain a competitive advantage from the fallibility of the referee, and if a referee is favoring a particular team (e.g., the weaker team), that favoritism will create a competitive advantage for that team (Groot, 2009). If the weaker team is the beneficiary of the favoritism, greater outcome uncertainty, and, ostensibly, greater fan interest results.

Evans et al. (2013) examine game logs from the fourth period of every game during the 2011 NBA playoffs, categorizing each possession as ending either with a referee's call against the leading team, a referee's call against the trailing team, or no call from a referee, meaning that the possession ended with either a shot or a turnover. This examination yielded almost 9,500 observations that were used to estimate a multinomial logit model to examine referee bias in the NBA. They find that the absolute value of the scoring differential is positively related to the probability of a referee's call against the leading team and negatively related to the probability of a referee's call against the trailing team, with both results reaching the .10 level of significance or lower (Evans et al., 2013). Similar results are obtained when the analysis is restricted to the final six minutes of each game, although only the negatively signed marginal effect described above is significant at the .10 level or lower.<sup>5</sup> This effect is, however, about 1.5 times larger (in absolute value) than its fourth period counterpart. As the authors conclude, ". . . these findings are consistent with the notion that officials may use their discretion to keep games close/competitive

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<sup>4</sup> Paul et al. (2012) calculate the absolute value of points spreads as an indicator of the expected competitiveness of a given college football game.

<sup>5</sup> This process yielded about 5,500 observations.

... [and they] support the unorthodox approach to promoting outcome uncertainty in professional sports leagues – that of intentional fallibility on the part of the referees – discussed in Groot ... (Evans et al., 2013: 243-244).”

Playoff games, like those analyzed by Evans et al. (2013), are accompanied by a high degree of fan interest, whether through large television audience or capacity crowds. Regular season games, however, may or may not be accompanied by similar fan interest. The conceptual models developed below for the NBA and its sibling league, the WNBA, address the impact of fan interest on outcome uncertainty during the regular season. More specifically, they focus largely on the impact of television and live crowds outcome uncertainty, which, as Groot (2009) explains, is at least partly a function of referee bias. The first conceptual model addresses aspect of the NBA, and is presented in (1) below:

$$Abdiff = f(AbwpDiff, NationalTV, Attp). \quad (1)$$

The dependent variable in (1) above, *AbDiff*, is, following the novel approach in Kent, Caudill, & Mixon (2013), equal to the absolute difference between the home team’s total points scored and the visiting team’s total points scored. This variable proxies outcome uncertainty, and it is a function of various dummy variables that measure the televised game effect.

There were 990 total games played during the 2011-12 season, and all of them appeared on some form of live television. The dummy variable *NationalTV* is equal to 1 for games played on national television networks (i.e., ESPN, ESPN2, ABC and TNT), and 0 otherwise.<sup>6</sup> Next, Another measure of relative quality, *AbwpDiff*, is equal to absolute difference between final overall winning percentages of the teams involved in each NBA game, expressed by decimal. Lastly, *Attp* is the attendance rate, measured as the number of fans in attendance divided by the total capacity of the arena.

In terms of statistical expectations, only *AbwpDiff* is expected to be positively related to *AbDiff*. That is, games involving disparate teams in terms of skill or quality will end with larger scoring margins than contests involving similarly-skilled opponents, *ceteris paribus*.

All of the other variables relate to fan interest, either via television exposure or live attendance. The greater the level of fan interest, the greater the incentive for NBA officials to produce outcome uncertainty. These officials exert some control over outcome uncertainty through intentional referee fallibility. Thus, each of these exposure variables – *NationalTV* and *Attp* – is expected to be negatively related to *Abdiff*, *ceteris paribus*. Whether fan interest via national television is a stronger motivator in producing outcome uncertainty than live attendance is an empirical question that is addressed by inclusion of *Attp*.

Table 1: Summary Statistics – NBA

Variables	Mean	Std. Dev.
<i>AbDiff</i>	11.13	8.03
<i>AbwpDiff</i>	0.18	0.13
<i>National 2</i>	0.13	0.34
<i>National 23</i>	0.10	0.30
<i>Attp</i>	0.89	0.14

<sup>6</sup> The broadcast information was obtained from the NBA’s official website.

Summary statistics for the NBA data are presented in Table 1. As indicated there, the mean value for *AbDiff* across the 990 NBA games (over the 2011-12 season) is 11 points. In terms of the variables related to relative quality of the teams involved in the typical NBA game, the absolute value of winning percentages is 18 percentage points, while there were six lead changes during the typical game. Lastly, 13 percent of all NBA games were played on national television, and the attendance rate for the typical NBA contest was almost 90 percent, attesting to a generally high level of fan interest.

Table 2: OLS Results – NBA (dep. var. = *AbDiff*)

Variables	1	2	3
constant	8.27* (4.50)	8.74* (4.87)	9.41* (20.31)
<i>AbwpDiff</i>	10.61* (4.61)	11.28* (4.96)	10.60* (4.60)
<i>NationalTV</i>	-1.47* (-2.29)		-1.34* (-2.22)
<i>Attp</i>	1.31 (0.65)	0.42 (0.22)	
nobs	990	990	990
$R^2$	0.04 <sup>f</sup>	0.03	0.04
<i>F</i>	10.26*	12.32*	15.30*

**Notes:** The numbers in parentheses are *t*-values.

\* denotes the .05 level of significance or lower.

OLS results for three versions of the NBA model above are presented in Table 2. It is encouraging that the team quality or skill variable, *AbwpDiff*, retains the expected sign (positive) and is significant at the .01 level. It is also interesting that, according to the OLS results, nationally televised games exhibit a scoring differential that is about 1.5 points below that of games that are not played on a national television stage. This greater degree of outcome uncertainty, which is equal to about 13.5 percent of the mean value of *AbDiff* and is likely prompted by referee bias, is appreciated by fans. At the same time, greater fan interest exhibited by live attendance does not appear to generate greater outcome uncertainty, at least as measured by *AbDiff*. Unlike the case of *NationalTV*, variations in attendance rates across the 990 NBA games examined do not explain differences in *AbDiff*.

Following Arkes & Martinez (2011), we re-estimated our model 1 above and replaced our team quality variable *Abwpdiff* with a new variable. Like Arkes & Martinez, we calculated home and away winning percentages for each team and then used the absolute value of the difference in these winning percentages, depending on where the game was played, in place of *Abwpdiff*. The use of this alternate measure did not change our conclusions about nationally televised games. The coefficient of *NationalTV* actually increased in magnitude to -2.15 and statistical significance (ABS *t* = 3.33). 10-11 and

7. The 90% confidence interval for this  $R^2$  measure is 0.020 to 0.060, following Steiger and Fouladi (1992)

We also conducted several specification tests for our largest model, Model 1, in the table above. We conduct the Breusch-Pagan/Cook-Weisberg test for heteroscedasticity and reject the null of no heteroscedasticity with a Chi-square value of 38.88. As a consequence, we use robust standard errors for the parameter estimates in Table 2. To investigate multicollinearity, we calculate variance inflation factors. The variance inflation factors for all variables are under 1.2, indicating that multicollinearity is not a problem. We also conducted two tests for normality: the Shapiro-Wilk W test, and the Shapiro-Francia W test. Both test results point to the rejection of normally distributed errors.

As a result of rejection of the null hypothesis of normality, we used the robust M-estimator to re-estimate our model parameters.<sup>8</sup> The results changed little. The coefficient of our variable of interest, *NationalTV*, fell to -1.00 but remains statistically significant at the  $\alpha = 0.10$  level. This finding provides additional support for our thesis.

We estimate two additional models, first omitting *NationalTV* and then omitting *Attp*. In Model 3 the coefficient of *NationalTV* is -1.34 with a t-ratio of 2.22, indicating that the Model 1 result is not likely a product of multicollinearity. In fact, the coefficients (and statistical significance) of the independent variables change little from Models 1 to 3, giving some reassurance of the robustness of our results.

For comparison, a similar conceptual model for the WNBA is tested. That model, described in (2) below, employs the same dependent variable, *AbDiff*, and the same measures of team quality or skill and fan interest in the form of live attendance. These measures are *AbwpDiff* and *Attp*, and they are, in this case for the WNBA, as defined above in the NBA model.

$$Abdiff=f(AbwpDiff, TV, National2, National23, Local,Attp). (2)$$

As in the NBA model, television coverage is an important vehicle for generating fan interest in the sport. In the WNBA case, we employed a number of dummy variables to capture this element.<sup>9</sup> The first dummy variable, *TV*, is equal to 1 for games that are on television, regardless whether they are nationally or locally televised, and 0 otherwise.<sup>10</sup> Next, *National2* is a dummy variable equal to 1 for games that are televised nationally, and 0 otherwise, while the dummy variable *National23* is equal to 1 for games that are on national television and those that are broadcast both on national and local television, and 0 otherwise. Lastly, the dummy variable *Local* is equal to 1 for games that are only televised locally, and 0 otherwise.<sup>11</sup>

In terms of statistical expectations, only *AbwpDiff* is expected to be positively related to *AbDiff*. That is, teams that are successful on their home court are likely to win home contests by larger scoring margins than are less successful home teams, *ceteris paribus*. All of the other variables relate to fan interest, either via television exposure or live attendance. The greater the level of fan interest, the greater the incentive for WNBA officials to produce outcome uncertainty. These officials exert some control over outcome uncertainty through intentional referee fallibility. Thus, each of these exposure variables – *National2*, *National23*, *Local*, *TV* and *Attp* – is expected

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<sup>8</sup> M estimators are robust to departures from normality and outliers and are based on minimizing  $\sum p(y_i - \beta_j x_{ij})$ . We use the *robreg* procedure in STATA for our M-estimation.

<sup>9</sup> The structure of women's professional basketball in the U.S. is quite different from the NBA. See Anthony, Caudill, & Mixon (2012), Edelman and Harrison (2010) and Grundy and Shackelford (2007) for more on women's professional basketball in the U.S.

<sup>10</sup> Among the total 442 observations, 148 games were not on television during the 2010 and 2011 seasons.

<sup>11</sup> The broadcast information was obtained from the WNBA's official website.

to be negatively related to *Abdiff*, *ceteris paribus*. In terms of coefficient magnitude, those regressors capturing nationally televised games (i.e., *National2*, *National23*, and *TV*) should exhibit larger coefficients than that for *Local*. Whether fan interest via television is a stronger motivator in producing outcome uncertainty is an empirical question that is addressed by inclusion of *Attp*.

Table 3: Summary Statistics – WNBA

Variables	Mean	Std. Dev.
<i>AbDiff</i>	10.19	7.81
<i>AbwpDiff</i>	0.20	0.17
<i>TV</i>	0.67	0.47
<i>National 2</i>	0.21	0.41
<i>National 23</i>	0.43	0.50
<i>Local</i>	0.21	0.41
<i>Attp</i>	0.48	0.19

In order to test the conceptual model for the WNBA, various data were collected from the WNBA’s official website. All 442 games from the 2010 and 2011 WNBA seasons are included in the regressions. As shown in Table 3, the mean value of the dependent variable in (2), *AbDiff*, is 10, quite similar to the mean value of *AbDiff* from the NBA sample. Also, the typical WNBA game generates an attendance rate (i.e., *Attp*) of just over 50 percent, while the absolute difference between the cumulative winning percentages of the contestants in a WNBA contest (i.e., *AbwpDiff*) averages 23 percentage points. Both of these figures differ from their NBA counterparts. Lastly, about two-thirds of all WNBA games are televised, with 21 percent reaching national audiences.

The WNBA regression results for three versions of (2) above are presented in Table 4. In all models presented *AbwpDiff* is positively and significantly related to *AbDiff*, as expected. It also consistently produces a coefficient just above 10, indicating that every 10-percentage point difference between the two teams’ winning percentages yields a one point difference, favoring the better team, in total points.

Table 4: OLS Results – WNBA (dep. var. = *AbDiff*)

Variables	1	2	3
<i>constant</i>	9.17* (7.33)	9.49* (7.60)	9.53* (7.67)
<i>AbwpDiff</i>	10.01* (3.91)	10.02* (3.86)	10.06* (3.86)
<i>TV</i>	—	—	-1.20 (-1.58)
<i>National2</i>	-2.60* (-2.35)	—	—
<i>National23</i>	-0.38 (-0.36)	-1.68* (-2.02)	—
<i>Local</i>	-0.79 (-0.80)	-0.86 (-0.87)	—
<i>Attp</i>	-0.17 (-0.09)	-0.82 (-0.43)	-1.18 (-0.64)
nobs	442	442	442
$R^2$	0.07 <sup>12</sup>	0.06	0.05
$F$	2.78*	6.70*	5.73*

Notes: The numbers in parentheses are *t*-values.

\* denotes the .05 level of significance or lower.

In terms of the fan interest regressors, the sign and magnitude of *TV* indicates that televised games conclude with a scoring differential that is 1.2 points smaller than that for non-televised games. However, this coefficient is significant at only the .12 level. The results for national television are quite different. As Model 1 of Table 4 indicates, *National2* is both negative and statistically significant (at the .05 level), indicating that nationally televised contests produce scoring differentials that are 2.6 points smaller than those not appearing on national television. This figure, 2.6 points, represents 26 percent of the point differential of the typical WNBA contest. Similarly, WNBA games that are broadcast on both national and local television networks generate greater outcome uncertainty, as the coefficient of about -1.7 from Models 1 and 2 in Table 4 indicate. These results for *National2* and *National23* support and augment the referee bias hypothesis described here and in Groot (2009), Price et al. (2012) and Evans et al. (2013).

<sup>12</sup> The 90% confidence interval for this  $R^2$  measure is 0.032 to 0.108.

Next, the coefficients in Table 4 for *Local* are generally negative, as expected. None of these, however, is statistically significant. This result is not surprising given that local television-only broadcasts do not reach wider markets, with an attending larger audience. As such, WNBA officials would not be expected to referee contests in a way that generates greater outcome uncertainty. Also, variations in live attendance rates do not explain variation in scoring differentials. Although consistently negative, ranging from  $-0.17$  to  $-1.18$ , none of the coefficients for *Attp* is statistically significant. Thus, in neither the NBA nor the WNBA is fan interest in the form of live attendance important in describing outcome uncertainty.

Again, following Arkes & Martinez (2011), we re-estimated our Model 1 above and replaced *abwpdiff* with a new variable based on the absolute value of the difference between home and away winning percentages for each team. This substitution changed our main result very little. The coefficient on *National2* went from  $-2.60$  to  $-2.69$  and the absolute value of the t-ratio changed from 2.35 to 2.45. These new results also support our conclusions about nationally televised games and closeness.

Several specification tests are conducted for our largest model, Model 1, in the table above. We conduct the Breusch-Pagan/Cook-Weisberg test for heteroscedasticity and reject the null of no heteroscedasticity with a Chi-square value of 20.45 leading us to use robust standard errors for the parameter estimates in Table 4. To investigate multicollinearity, we calculate variance inflation factors. The variance inflation factors for all variables are under 2, indicating that multicollinearity is not a problem. We also conducted two tests for normality. Both the Shapiro-Wilk *W* test and the Shapiro-Francia *W* test point to the rejection of normally distributed errors.

To investigate the implications of this departure from normality on our estimation results, we again use the M-estimator. The coefficient of *National2* is  $-1.94$  with a t-ratio equal to 1.91 in absolute value. This result is also statistically significant, providing additional support for our hypothesis.

### Concluding Comments

Referee bias has been the subject of much recent research in the sports economics literature. In an important paper, Price, Remer, & Stone (2012) introduce one manifestation of referee bias called “close” bias – the idea being that because close games are more valuable, referees might officiate to keep games close. There is empirical evidence indicating that this incentive is greater if games are televised, thus reaching a larger audience. Referee bias is not the only possible explanation for closer televised games. One obvious way to insure televised game closeness is to broadcast games between only teams of roughly equal quality. Using data on NBA and WNBA basketball games, we find that holding constant differences in team quality, nationally televised games have, on average, closer final scores. In particular, we find that nationally televised NBA games have a score differential about 1.5 points lower than games which are not televised. In the case of the WNBA, nationally televised games are, on average, 1.5 to 2.5 points closer. Thus, even holding constant strength differences between teams, there seems to be a bias in favor of “closeness” if the game is nationally televised.

Finally, let us state that we do not believe that what we have found is the Hawthorne effect, that is, players playing harder because they are on television. There are two reasons why we feel this is not a likely explanation. The first is that, if present, the effect should be felt on both teams

being televised so the net impact on game closeness is undetermined. In addition, all NBA games are televised, though some only locally.

One important limitation of our study is that we measure team strength by end-of-the-season winning percentage. Team strength can vary from game to game depending on which players are available. Occasionally, players and coaches take leaves of absence, or are injured. Players and coaches sometimes change teams which affects performance and team strength (see Martinez and Caudill, 2013). A more precise measure of team strength on a game-by-game basis would give us more confidence that we are finding a television effect and measuring it precisely.

The issue of the impact of television on sports and game closeness is relatively new and will be the subject of much more research the future. Most of this research will likely be based on sporting events outside North America. Next up will likely be the European sports leagues. The difficulty for this research in the US, in particular, is that almost every sporting event that matters at all is televised, and probably nationally, given the enormous growth in sports networks like ESPN. Consequently, there is still the possibility of measuring an effect on game closeness with data from the US, but the effect has to be large enough to be distinguished from a local television effect. The measurement problem is easier to solve if leagues have some games which are not televised. This should increase contrast and make the television effect easier to measure. However, the available research suggests that once the television cameras begin to be used for reviewing calls by officials, referee biases will diminish and possibly disappear completely.

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