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Do Sports Fans Really Value Uncertainty of Outcome? Evidence from the English Premier League

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Abstract

After controlling for a number of plausible influences on matchday attendance in the English Premier League, and with appropriate recognition of the censoring problem in stadium capacities, we find clear evidence that an increase in uncertainty of outcome is associated with reduced gate attendance. The conventional uncertainty of outcome hypothesis proposes precisely the opposite effect. We interpret this as suggesting that fans at EPL games, who are predominantly supporters of the home team, prefer to see their team play a much inferior team (and beat that team) rather than attend a game that is predicted to be close in score. Essentially, home fans prefer to see their team win rather than watch a draw or see the home team defeated.

Keywords: attendance, outcome uncertainty, tobit

Introduction

League commissioners and league authorities often invoke outcome uncertainty as a rationale for intervention measures. For example, in the National Football League, it is claimed that ticket revenue sharing, equal sharing of broadcast revenues, and a hard salary cap combine to equalize playing strengths across teams. Similarly, Major League Baseball has a luxury tax ostensibly designed for a similar purpose. The aim in North American sports leagues is, apparently, to prevent large market teams, such as the New York Yankees, from acquiring excessive talent relative to the rest of the league. In European soccer, intervention measures are less apparent. For example, in the English Premier and Football Leagues, revenue sharing is confined to sharing of gate receipts in the secondary knockout FA Cup competition and further to equal sharing of some of the revenues from sales of broadcast rights (Buraimo et al., 2006; Forrest et al., 2005). Even in the context of broadcast revenues, a tranche of money is set aside for payments by league standings in a convex tournament-style structure and for number of televised appearances, which will also tend to depend on team performance. An argument that has surfaced in fan and media discussion in England is whether there is too much competitive imbalance and too little revenue sharing in English football.

Of course, there is considerable theoretical and practical discussion of whether various league intervention measures are likely to be effective in reducing perceived competitive imbalances in sports leagues (see Fort & Quirk, 1995; Késenne, 2007; Solow & Krautmann, 2007; Szymanski, 2003; Szymanski & Késenne, 2004 for just a selection of analyses covering various sports). That is not our concern in this paper. We shall pose what we regard as the fundamental question of whether fans actually desire increased uncertainty of outcome at all. If they do not, then the application of policy intervention measures, if designed to raise fan (consumer) welfare, is not warranted and would have to be justified by other means.

Outcome uncertainty is a concept that requires careful definition. Knowles et al. (1992) stated that the uncertainty of outcome hypothesis "is predicated on the assumption that fans receive more utility from observing contests with an unpredictable outcome, and posits that the more evenly team playing abilities are matched, the less certain the game's outcome and the greater the game's attendance will be" (p. 72). Similarly, Forrest and Simmons (2002) defined uncertainty of outcome as "a situation where a given contest within a league structure has a degree of unpredictability about the result" (p. 229).

Our research investigation is prompted by the lack of available consensus in published empirical studies. The literature covers all possibilities: increased outcome uncertainty raises attendance demand, has no effect, and reduces attendance demand (see Borland & Macdonald, 2003; Szymanski, 2003 for surveys). According to Szymanski (2003), out of 22 published articles considered, 10 offered evidence in favor of the outcome uncertainty hypothesis, seven provided "weak" support, and the remaining five cases gave no support. This lack of agreement in itself makes the outcome uncertainty hypothesis a fragile argument on which to base policy interventions. Further empirical analysis is needed to clarify the picture.

In an effort to resolve the lack of consensus on empirical support for the outcome hypothesis, it is useful to compare evidence from North American major leagues and European soccer. Knowles et al. (1992) used ex ante betting odds to measure probability of a home win in Major League Baseball (MLB) games in the 1988 season. From this, the probability of a home win that maximized game attendance in their sample was 0.6, although the quadratic term in home win probability was only significant at 10% (t statistic = 1.77). More recently, Meehan et al. (2007) examined impacts of what they termed "competitive balance," defined as absolute difference between winning percentages of home and visiting team, on game attendance in MLB over three seasons. They found a negative effect of what was effectively an uncertainty of outcome measure on attendance, after controlling for a wide variety of influences. Hence, games that might be predicted to be uneven, as evidenced by a large absolute difference in pre-game win percent, generated lower attendances compared to those that would be expected to be more even. For the National Basketball Association, Rascher and Solmes (2007) used the squared difference between constructed home win probability and away win probability as a measure of outcome uncertainty in a study of National Basketball Association gate attendance over the 2001-02 season. Their results show that an increase in squared difference (a less uncertain game) was significantly associated with lower attendance, which appears to give support to the conventional uncertainty of outcome hypothesis. Hence, these North American studies do offer some support for the uncertainty of outcome hypothesis, and it is worthwhile to consider whether such support can be found for European soccer leagues.

Our chosen subject of study is the English Premier League (EPL). We focus on this league for several reasons. The EPL has, from inception in 1992 as a breakaway from the English Football League, established itself as a global brand with games viewed by telecasts worldwide and with a pool of player talent of considerable quality with a high proportion of players drawn, for example, from national World Cup squads. Based on revenues and fan interest, the Premier League is currently matched in international soccer only by Spain's La Liga.[1] We do not claim that our empirical findings will generalize into other sports but evidence on impacts of outcome uncertainty will be more impressive and carry greater weight coming from one of Europe's largest soccer leagues than if it comes from a lower tier of soccer in England or a smaller, less prestigious league.

One fact points against a positive impact of outcome uncertainty on gate attendance in the EPL. First, in a context of trend growth in gate attendances since 1992, around two-thirds of the 20 EPL teams regularly play to capacity crowds in a given season (Buraimo et al., 2006). But this may conceal micro-variations in both outcome uncertainty and gate attendance that might add up to significant consumer welfare impacts. In this paper we shall be concerned with *match uncertainty of outcome.* That is not to deny the importance of seasonal uncertainty (e.g., a season in which a single team emerges as champion very early in the schedule) or championship dominance (e.g., the sequence of EPL championship titles won by Manchester United, until that dynasty was broken, first by Arsenal and then by Chelsea). As of the 2007-08 season, there were only four credible title-chasing teams out of the 20: Arsenal, Chelsea, Liverpool, and Manchester United. Even if this state of affairs is acknowledged and accepted by EPL fans, there remains a potential role for outcome uncertainty at match level as a possible determinant of gate attendances, club and league revenues, and fan welfare.

The existence of capacity constraints in most EPL games presents a challenge for econometric analysis. The existence of censored attendances means that estimation of a standard attendance demand equation by ordinary least squares is liable to bias and false inferences. But estimation methods, principally tobit estimation, do exist to deal with the censoring problem.

In Europe, betting on soccer games is legal and is easily accessed, through private and/or State bookmakers and via the Internet. Clearly, the same cannot be said for North American sports (Simmons, 2008). The existence of sophisticated fixed-odds betting markets for soccer results gives the econometrician an excellent opportunity to construct a measure of outcome uncertainty that is based on *ex ante* predictions of latent team strengths. As Forrest, Goddard, and Simmons (2005) have shown, bookmakers have a far greater incentive to forecast outcomes of soccer games as precisely as information permits than do other experts, such as journalists and media pundits. In terms of forecasting capability, bookmakers also outperform sophisticated econometric models. Bookmakers are able to incorporate private information (e.g., details of player form and morale) that are hidden in the blunt indicators of league standings and streaks.

A formal test of the relevance of a bookmaker-based measure of outcome uncertainty is offered by Buraimo et al. (2007). They assessed the ability of three measures of outcome uncertainty to predict match results in the Spanish top division. The bookmaker-based measure is the absolute difference of probability of home win and probability of away win, taken as reciprocal of decimal betting odds but scaled for bookmaker commission. This measure outperformed two measures based on league standings, although the explanatory power of the model was low, reflecting dominance of white noise in match outcomes. Based on these findings, and the attractiveness of an *ex ante* measure capable of capturing private information, we shall proceed to establish a measure of outcome uncertainty based on bookmaker betting odds.

Data and Empirical Model

This study uses data across six seasons of the EPL from 2000-01 to 2005-06. We are constrained to six seasons by the availability of reliable and consistent betting odds data. We note that although six seasons does not facilitate a study of seasonal outcome uncertainty, it does represent a longer panel than is usually covered in the match attendance literature (e.g., Meehan et al., 2007).

A feature of the EPL is that a significant number of matches regularly sell out. In some instances, there may be a small number of unoccupied seats. This is for safety and security reasons, enabling the segregation of the home and away teams' fans. In the six seasons that make up the dataset, 54.7% of matches were constrained by the stadium capacities. In our model, stadium capacity is the censoring point, and attendance data are deemed to be censored if attendance is at or more than 95% of the stadium capacity. Security and policing arrangements at English soccer games entail segregation between home and away fans. Typically, since away fans are congregated in a small section of the stadium, an area of seating is left unoccupied for segregation. Our assessment of stadium information provided by Premier League clubs is that around 5% of seats are set aside in this way. Only data lower than the censoring point can be used for estima-

tion, and the dependent variable therefore has a truncated normal distribution. The statistical distribution that is relevant for the attendance data is a mixture of discrete and continuous distributions representing the probability of a sellout crowd and the attendances for games that are not sold out. Following Greene (2003), we can analyze this mixed distribution by defining a random variable, A, which is derived from "true" demand, D, as:

$$A = C \text{ if } D \geq C$$
$$A = D \text{ if } D < C \quad (1)$$

Suppose that true demand is normally distributed with mean μ and constant variance σ^2. Let $D = x\beta + \varepsilon$ where ε is a random error term. Then the first component of the tobit model is the probability of a sellout crowd, which is given by:

$$Pr\{A = C\} = Pr\{D \geq C\} = \Phi((x\beta - C)/\sigma) \quad (2)$$

The second component of the tobit model is the distribution of A given that it is below capacity. This is a truncated normal distribution with expectation:

$E\{A|A < C\}$ = xb + conditional expectation of a mean-zero normal variable given that it is less than xb – C.

As can be seen, it would be inappropriate to restrict attention to games that do not sell out. The conditional expectation of A is not equal to $x\beta$ as it depends on x in a nonlinear relationship.

Two extensions can readily be made to fit the purpose of this study. First, the censoring values can be made to vary across clubs as these have different stadium capacities. Secondly, a random effects tobit model can be estimated. This specifies that true demand for game i hosted by team j at time t as

$$D_{it} = x_{it}\beta + \alpha_j + \varepsilon_{it} \quad (3)$$

The random effects model specifies a set of team-specific constant terms that are randomly distributed across teams. The assumption is that team-specific effects are strictly uncorrelated with the regressors.

Attendance data were compiled from various editions of the *Sky Sports Football Yearbook* (previously the *Rothmans Football Yearbook*). Financial data were obtained from various editions of *Deloitte's Annual Review of Football Finance.* It is apparent that matchday attendances are widely dispersed, so there is considerable variation in the dependent variable to be explained by our model. Allowing for some small amount of missing information on financial and other data, we have a sample size of 2,120 of which 1,227 games are designated as being censored, a ratio of 58%, somewhat higher than would be found in other European soccer leagues.

In modeling attendance, this study controls for a number of factors including habit persistence by fans; the home and away teams' current forms; team quality; scheduling, which controls for the effects of different days of the week; different periods within the season; and the impact of satellite broadcasting. Attendance is estimated using the following function:

Log attendance = F(Previous home attendance, previous away attendance, home points per game, away points per game, home relative wage, away relative wage, derby, distance, public holiday not televised, weekday not televised, month, season, Sky Sunday, Sky Monday, Sky other, Sky public holiday, home team's exposure on Sky Television, probability home win and probability of home win squared, or Theil measure) (4)

In the above function, *previous home attendance* and *previous away attendance* are the log of home and away teams' mean attendances in the previous season. These are intended to captures fans' habit persistence. The home and away teams' current performances, *home* and *away points per game*, as measured by the ratio of points to games played prior to the match, are included to control for current form. In the EPL, three points are awarded for a win, one for a draw, and zero for a loss. As points per game cannot be computed for the first set of matches in each season, these matches are excluded from the analysis.

In line with previous literature on baseball, we test the effects of uncertainty of outcome on match attendance by first using *probability home win* and *probability of home win squared.* Betting odds on match outcomes were extracted from files in http://www.football-data.co.uk and transformed into probabilities for each match outcome. The correlation of odds between bookmakers is very high (around 0.95) and we opt for the odds supplied by bookmaker William Hill as our source as that gives us the greatest coverage of matches. The sum of these probabilities will always exceed unity due to the bookmaker's

margin. This margin, or "over-round," is typically around 12%. We adjust the probability of each match outcome by dividing by the sum of probabilities. The advantage of using betting odds is that these should capture characteristics that are not easily observed, such as player injuries, suspensions, and dressing room morale. If the betting market is efficient, then betting odds should incorporate all relevant public and private information on the two teams in a match.

As noted above, another common measure of outcome uncertainty used in the literature is the absolute difference in home and away win probabilities (see Buraimo et al., 2007, for a review of different measures of outcome uncertainty). Given that there are three possible outcomes, this measure implicitly assumes that the probability of a draw is constant. This is a reasonable assumption, as the mean value of the draw probability in our dataset is 0.27 with a standard deviation of 0.03. Nevertheless, we deal explicitly with the slight variation in the draw probability by adopting a measure of outcome uncertainty, the Theil measure, previously used by Peel and Thomas (1992) and Czarnitzki and Stadtmann (2002). The Theil measure explicitly incorporates variations in all three probabilities and is computed as follows:

$$\sum_{i+1}^{3} p_i \cdot \ln\left(\frac{1}{p_i}\right)$$

Since an increase in the Theil measure is associated with increased outcome uncertainty, we shall proceed to label this below as *outcome uncertainty.*

The strength and quality of the teams is controlled for by using their annual payroll. Team payroll is an appropriate measure of the quality of teams' playing talent, particularly as the markets for players in Europe and in the EPL are largely driven by competition and monopsony elements are absent. For example, reserve clauses and other restrictions on free agency are absent in European soccer. To secure the services of a player, a team must generally outbid other teams who are also interested in the player. The team willing to pay the highest wage, combined with an appropriate transfer fee to the selling team (if applicable), will normally secure the player's services. Even in circumstances where a team has been responsible for developing the player's talent from an early age, it often has to pay an appropriate market wage for his services or it is likely to lose the player to another team once his contract binding him to the team expires. As a result, team wage is an accurate reflection of team quality and is a strong predictor of performance in English soccer (Hall et al., 2002). Although total payroll includes both playing and non-playing staff, a significant proportion belongs to playing staff. Given that payroll is an appropriate measure of player talent, one problem associated with its use is the level of inflation that occurs season by season. Since the 2000-01 season, average wages in the EPL have increased from £28.4 million to £45.3 million in 2005-06. This represents an annual average increase of 11.9% per season over the period of the dataset. To control for this dramatic rate of inflation and avoid problems associated with unbounded variance, a relative wage measure is constructed. Relative wage is the team's seasonal payroll divided by the season's average payroll. Therefore, the average relative wage is 1. The use of relative wage is similar to that used by Forrest, Simmons, and Buraimo (2005) in their analysis of television audience demand in English Premier League soccer. *Home relative wage* and *away relative wage* are the respective home and away teams' relative wages.

Derby is intended to capture matches of historical rivalry. Previous studies (Forrest & Simmons, 2002; Forrest, Simmons, & Szymanski, 2004) have shown that such matches tend to attract greater audiences, *ceteris paribus,* and the coefficient on *derby* is therefore expected to be positive and significant. *Distance* represents the distance between the home and away teams' stadia to control for the distances traveled by fans of the away teams. A dummy variable, *public holiday not televised,* is included and takes the value of 1 for non-televised matches played on public holidays and 0 otherwise. This is intended to capture the effects of a greater abundance of leisure time. Similarly, *weekday not televised* is a dummy variable that takes the value of 1 if the match took place during the week and was not televised, and 0 otherwise. *Month* and *season* are vectors of dummy variables for different months and seasons.

To capture the effects of BSkyB's live satellite telecast that take place on Sundays and Mondays, *Sky Sunday* and *Sky Monday* are dummy variables taking the value of 1 if the match was televised on these respective days and 0 otherwise. *Sky others* captures the impact of BSkyB's telecasts on

other days besides Sunday and Monday while *Sky public holidays* captures the impact of telecasts on public holidays. Using this array of broadcasting variables disaggregates the impact of BSkyB's telecast so as to provide greater insight into how stadium goers respond to live satellite transmission. A distinction between satellite transmission on Sundays and Mondays from other days is made as these are the regular telecast days promoted by the broadcaster and therefore merit separate analysis. Matches broadcast on other days often occur because of rescheduling due to overcrowding in the fixture list. Telecast on public holidays is intended to capture any effects resulting from increased leisure time. Table 1 shows the descriptive statistics of the variables described above.

Empirical Results

Table 2 shows the results of the random-effects tobit model for the EPL, using alternative outcome uncertainty measures. In the first column, we use *probability of home win* and its square. In the second column, we report results using the Theil measure. To test for the presence of heteroscedasticity in the disturbance term, the Goldfeld-Quandt test is used (Greene, 2003). The result of the test does not reject the null hypothesis of constant variance. The coefficients on the control variables are signed appropriately. The results suggest that habit persistence is a strong determinant of attendance in the EPL and the home team's attendance is positively influenced by persistence amongst its own as well as that of the away team's fans. The results show that both teams' current performances are highly significant with fans responding more to the home team's current performance. Improved performances by the home team is in effect a positive externality that benefits the home team through improved matchday attendances and corresponding increases in matchday revenue.

The results also show that team quality, as controlled for by team payroll, influences attendance with quality of the home team being more significant than the away team's quality. An improvement in talent, as reflected in

Table 1. Descriptive statistics for dependent and explanatory variables.

Variable	Mean	Standard deviation	Minimum	Maximum
Matchday attendance	34,456.59	11,661.24	13,981	73,006
Previous home attendance	33,231.90	11,835.36	11,563	67,871
Previous away attendance	33,327.11	11,936.39	11,563	67,871
Home points per game	1.36	0.53	0	3
Away points per game	1.40	0.54	0	3
Home relative wage	1.00	0.50	0.30	2.83
Away relative wage	1.00	0.50	0.30	2.83
Derby	0.04	0.20	0	1
Distance	143.71	85.64	0.90	347
Public holiday not televised	0.07	0.25	0	1
Weekday not televised	0.15	0.36	0	1
Sky Sunday	0.09	0.28	0	1
Sky Monday	0.04	0.20	0	1
Sky other	0.07	0.25	0	1
Sky public holiday	0.01	0.12	0	1
Home team's exposure on Sky Television	3.06	2.02	0	8
Probability home win	0.45	0.15	0.06	0.81
Theil measure	1.01	0.10	0.60	1.10

Table 2. Random Effects Tobit Model for EPL, 2000-01 to 2005-06.

Dependent variable is Log attendance				
Explanatory variable	Coefficient	t statistic	Coefficient	t statistic
Previous home attendance	0.504	14.84	0.506	15.02
Previous away attendance	0.095	7.01	0.094	7.00
Home points per game	0.054	5.34	0.057	6.12
Away points per game	0.025	2.61	0.022	2.61
Home relative wage	0.047	2.24	0.050	2.38
Away relative wage	0.040	2.51	0.035	2.85
Derby	0.064	2.84	0.062	2.79
Distance	2.0×10^{-4}	-4.18	2.0×10^{-4}	-4.17
Public holiday not televised	0.071	3.72	0.071	3.73
Weekday not televised	-0.045	-4.00	-0.045	-3.98
Sky Sunday	-0.052	-3.85	-0.053	-3.93
Sky Monday	-0.096	-5.54	-0.097	-5.59
Sky other	-0.022	-1.21	-0.023	-1.24
Sky public holiday	0.016	0.40	0.015	0.38
Home team's exposure on Sky Television	-0.008	-2.61	-0.008	-2.54
Probability home win	-0.653	-3.29		
Probability home win squared	0.939	4.44		
Theil measure			-0.306	-4.57
Constant	4.137	11.16	4.344	11.70
Home team fixed effects		Significant		
Month dummies		Significant		
Season dummies		Significant		
Number of observations		2120		
Constrained observations		1227		

greater payroll, does improve gate attendances. A question that team owners need to address is how the cost of improving team quality compares with improvements in gate revenue and any increases in prize funds that may result from any improvement in sporting performance from extra (relative) payroll. Furthermore, given that the broadcasters also select teams for telecast based, in part, on the quality of their team roster (Forrest et al., 2005), this is another consideration for team owners. As with away team's performance, the quality of the away team's players acts as an externality that benefits the home team. Historical rivalry matters, and the coefficient on *derby* is positive and significant. *Derby* matches on average attract around 6.4% more spectators than other matches, *ceteris paribus*. The impact of distance on attendance is negative. As expected, public holidays boost attendances by 7.1% if the match in question is not televised, indicating the strong influence of leisure time in the consumption of English league soccer. Matches played from Monday to Friday inclusive and not televised impact negatively and reduce attendances by 4.5%.

With respect to the variables intended to capture the influence of broadcasting by BSkyB on its satellite platform, matches televised on its regular Sunday slot impact negatively, causing gate attendances to fall by 5.2%, *ceteris paribus*. Matches shown on Monday night's live telecast also have a negative and significant impact, but more so, reducing attendance by 9.6%, *ceteris paribus*.

Matches televised on other days, as well as those televised on public holidays, have no significant impact on matchday attendance. A feature that has been omitted in the analysis of the impact of broadcasting on matchday attendances is the exposure that teams experience. In addition to estimates of broadcasting's impact is the estimate of the impact that greater television exposure of the home team has on its attendance. The number of times that the home team's match was selected for by BSkyB for telecast as the home team in the previous season is included as an explanatory variable. Rather than being a promotional tool in which exposure on BSkyB's satellite platform in the previous season improves attendance, the impact is negative. For every occasion in which the home team had been screened in the previous season as the home team, match attendances decline by 0.8%.[2] Given that the home team is screened on average on three occasions, this represents a 2.4% fall in attendance, or a fall of 827 spectators at the mean attendance level.

Finally, our focus variables are *probability of home win* and *probability of home win squared*, which capture the effects of match outcome uncertainty, controlling for home team strength via *home points per game*. The coefficients are negative on the level term and positive on the quadratic term, indicating an inverted U-shaped relationship between *probability of home win* and attendance in the EPL. We stress two points here. First, the turning point of this quadratic relationship is at a *probability of home win* of 0.35, within our sample and slightly below the mean value of 0.45. Second, our finding of a U-shaped relationship between *probability of home win* and match attendance is not confined to the EPL. In a companion paper, Buraimo and Simmons (2008), we report a similarly shaped relationship from estimates of matchday attendance in the Spanish top division, La Liga. Hence, we have evidence from two major soccer leagues that point in the opposite direction to the suggestion by Knowles et al. (1992) that MLB matchday attendance rises with probability of home win at decreasing rate.

Our alternative measure of match outcome uncertainty is the *Theil measure*. This has a significant (at 1% level) but *negative* coefficient. This goes against the theory that fans prefer close contests. The results strongly support the notion that fans prefer contests in which the home team is favored to win. The greater support for matches that are more certain is driven by the composition of the crowd in attendance. The majority of those present in the stadia are supporters of the home team and their demand is driven by a preference for matches in which a home team win is more likely compared with an away win or a draw. This should also be noted in light of having additionally controlled for the probability of a home win through the explanatory variable *probability home win*. We stress that replacement of the Theil measure by absolute difference in probabilities of home and away win, not reported here but available by request, delivers the same qualitative result of negative association of outcome uncertainty with gate attendance. Given the statistical significance of the results, what are the economic implications? The implications are assessed by simulating an improvement in our measure of outcome uncertainty by one standard deviation. The consequence of this improvement is a reduction in stadium attendance at the mean by 984 spectators per match. Put in another context, if the mean matchday expenditure of £35 for the 2005-06 season is used, this is a reduction of £34,440 per match.

Conclusions

After controlling for a large number of plausible influences on matchday attendance in the English Premier League, and with appropriate recognition of the censoring problem in stadium capacities, our principal empirical finding is that an increase in uncertainty of outcome is associated with *reduced* gate attendance. The conventional uncertainty of outcome hypothesis proposes precisely the opposite effect. We interpret this as suggesting that fans at EPL games, who are predominantly supporters of the home team, prefer to see their team play a much inferior team (and beat that team) than attend a game that is predicted to be close in score. Essentially, home fans prefer to see their team win rather than watch a draw or see the home team defeated.

Turning to the U-shaped relationship estimated between gate attendance and home win probability, we find that attendance (comprised overwhelmingly of home fans in EPL) seem to prefer to pay to watch games that have either a very high probability or very low probability

of a home victory. The attraction of a low probability win outcome for home fans conceivably lies in a "David versus Goliath" effect, in which home fans desire to be present on the rare occasion that David beats Goliath. Most of the time, as one U.S. NFL commentator put it, "Goliath shows up,"[3] but this is known to and accepted by soccer fans in the EPL. Despite the overwhelming strength of a highly positioned opponent, a weak home team still has some positive probability of winning.

We want to emphasize two directions for further research. First, does our "perverse" result contradicting the uncertainty of outcome hypothesis carry over to other leagues? As far as soccer is concerned, a companion paper on impact of outcome uncertainty on audiences for Spanish football (Buraimo & Simmons, 2008) finds similar results for La Liga to those presented here. However, recent analysis by Rascher and Solmes (2007) for the National Basketball Association presents evidence supporting the uncertainty of outcome hypothesis, albeit with a different measure of game outcome uncertainty and different model design. Further work is needed on other North American sports to investigate impacts of outcome uncertainty. At present, our evidence from English Premier League soccer and the available evidence from North American literature on baseball and basketball seem to point in divergent directions. English soccer fans do not appear to value increased outcome uncertainty while North American baseball and basketball fans do (subject to a number of caveats). One explanation of these conflicting results could lie in the contrast between open league design, with promotion and relegation, in European soccer leagues and the closed league design, with franchises and conferences, in North American sports leagues.

It does not follow from our results that leagues are incorrect to install interventionist measures to improve competitive balance. This is because the television audience may have rather different preferences to fans inside the stadium. Broadly speaking, we would expect television viewers to be less partisan and more interested in watching closer games than stadium attendees. A growing literature supports this notion. Paul and Weinbach (2007) found that National Football League television audiences rose as *ex ante* outcome uncertainty increased across games. Their measure of outcome uncertainty was, like ours, generated from betting market information. A similar finding was observed by Alavy et al. (2006) and Forrest, Simmons, and Buraimo (2005) in studies of EPL television audience ratings. Garcia and Rodriguez (2006) and Buraimo and Simmons (2008) offer corroborating evidence for television audiences for Spanish soccer. As far as European soccer is concerned, we predict that balancing divergent preferences of stadium fans and television viewers will be an increasingly important part of policy-making thinking by league authorities over the next few decades.

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Endnotes

[1] It appears that Germany's Bundesliga can match the EPL for gate attendance but not broadcast viewership. Italy's Serie A has been beset by corruption scandals, which led to stripping of a championship and enforced demotion for Juventus and various penalties imposed on this and other clubs implicated in corrupt practices.

[2] The levels of exposure from other seasons besides that of the most recent one were included in the regression; however, the correlation coefficients between the different lags of exposure were high and therefore the lagged exposure from other seasons besides that of the most recent season were dropped.

[3] Tony Kornheiser on ESPN Monday Night Football.

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