Journal of Economics and Business 61 (2009) 326–338

Contents lists available at ScienceDirect

Journal of Economics and Business

A tale of two audiences: Spectators, television viewers and outcome uncertainty in Spanish football

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ARTICLE INFO

Article history:
Received 9 January 2008
Received in revised form 15 October 2008
Accepted 19 October 2008

Keywords:
Demand
Sport
Broadcasting
Attendance

ABSTRACT

This paper tests for the impact of match outcome uncertainty on two types of audience for Spanish football, fans at the stadium and television viewers. We find that fans inside the stadium prefer games that are less and not more likely to finish with a close score. This is contrary to much theoretical literature in sports economics which argues that fans prefer close contests and imposes this assumption in formal modelling. We also find that television viewers prefer close contests to more predictable contests. The different preferences of fans inside the stadium and television viewers need to be reconciled by the league when considering the effectiveness of policies to redistribute resources amongst teams in the league. We use our empirical model to consider how this tension might be resolved so as to maximise total audience and total league revenues.

1. Introduction

Sports leagues in both Europe and North America have often employed policies to redistribute playing resources amongst teams. These policies have included revenue-sharing, taxation of teams with large revenues and salary caps on total payrolls. The declared motive for this kind of intervention offered by league administrators is to raise the level of competitive balance in a league. Hence, in the National Football League, folklore has it that 'on any given Sunday' any one team can beat another.

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doi:10.1016/j.jeconbus.2008.10.002

Championship winning dynasties are largely absent and turnover of divisional, conference and World Championship winners is considerable (Leeds & von Allmen, 2005). In Major League Baseball, the league commissioned a special report, the Blue Ribbon report, which essentially endorsed measures to redistribute income from richer large-market clubs to poorer small-market clubs. The Blue Ribbon report concluded first, that there was insufficient competitive balance in baseball and second, that policy measures to improve competitive balance were desirable. Both claims have been contested by economists (see the special issue on Baseball Economics, *Journal of Sports Economics*, November 2003).

In European football, leagues broadly moved away from gate revenue-sharing in the 1990s as the bigger large-market teams insisted on retaining a larger proportion of their revenues to reinvest in talent acquisition. In 1992, the English Premier League was formed as a separate entity to the Football League. Coincident with this breakaway, the Premier League clubs agreed a new, more lucrative broadcasting package which led to substantially increased broadcast revenues (Buraimo, Simmons, & Szymanski, 2006; Dobson & Goddard, 2001). Within the Premier League, broadcast revenues are distributed in a complex structure, which comprises a shared element, a prize component with revenues returned in a convex relationship to league standings, and a per-match appearance fee. Outside England, the biggest teams in European football such as AC Milan, Inter Milan, Juventus, Real Madrid and Barcelona secured enhanced revenues from sales of broadcast rights. In Italy, in particular, some teams broke free of centralised league-level broadcast arrangements and forged their own deals.

Coverage of European football games has grown considerably over the last 15 years. More games, although not all, are televised either on free-to-air terrestrial television or by cable or satellite with subscription. This means that fans can often choose to watch games at the stadium or on television. Stadium fans tend to be loyal supporters, mostly of the home team. A large proportion of home fans will have purchased season-tickets for a whole season. In contrast, television viewers will tend to comprise less-committed fans and many who have no particular loyalty to either participating team. Given these properties, it is likely that stadium and television audiences will have different preferences, especially with regard to their responses to uncertainty of outcome of a match. Home fans inside the stadium want their team to win, and a big win is preferred to a close win. Television viewers may well prefer a close game to a contest that is effectively over as one team takes an early commanding lead.[2]

The responses of stadium fans and television viewers to match outcome uncertainty will be examined empirically in this paper using four seasons of match data for Spain's Primera division. Previous literature on gate attendance has delivered mixed results on the direction of impact of match outcome uncertainty on attendances (Szymanski, 2003). According to the Borland and Macdonald (2003) survey of 18 empirical studies covering several leagues worldwide, 'the majority of studies find that there is either no significant relationship between difference in team performance and attendance, or more directly contradictory, that attendance is monotonically increasing in the probability of a home team win' (p486). Only three studies out of the 18 found strong evidence in favour of a positive impact of match outcome uncertainty on gate attendance (for a similar conclusion, see Szymanski, 2003).[3] Studies of television audiences are much rarer, due to lack of data availability. Forrest, Simmons, and Buraimo (2005) found a significant positive relationship between outcome uncertainty and size of television audiences in English Premier League football between 1993 and 2003. In Spanish football over the period 2000–2003, and using the same measure of outcome uncertainty as Forrest et al., Garcia and Rodriguez (2006) obtained a significant positive association between closeness of contest and broadcast audience on a terrestrial free-to-air channel, but not for a rival subscription platform. Recently, Buraimo (2008) has estimated a joint attendance-television audience model for the second tier of English football (the Championship) and finds no significant impact of match outcome uncertainty on either gate attendance or television audience.

[2] A study of within-game television audience ratings in American football by Paul and Weinbach (2007) found that viewers preferred games with two high quality teams, high levels of outcome uncertainty and high levels of scoring.

[3] Since 2003, some further studies have cast doubt on the relevance of measures of match outcome uncertainty for gate attendance. For example, Owen and Weatherston (2004) found no statistically significant effect of their measure of outcome uncertainty on New Zealand rugby union attendances, although their measure is probability of home win not difference in probabilities. Morley and Thomas (2007) find no significant impact of differences in betting odds on attendance demand in English 1-day cricket.

Table 1
Primera division's revenue by sources and season (€m) (Source: Deloitte, various years.).

Season	Match day	Broadcast	Commercial
2003–2004	276	391	286
2004–2005	288	412	329
2005–2006	324	405	428

We shall estimate a joint gate attendance-television audience model for Spain's Primera division. Our choice of Spain's top league is relevant for three key reasons. First, unlike the National Football League or the English Premier League, gate attendances in Spanish football are rarely constrained by stadium capacity. This means that we do not need to adopt censored regression estimation methods and can adopt more conventional fixed effects models. Second, Spanish football is dominated by two large teams, Barcelona and Real Madrid in terms of a number of indicators: playing success, wage bills, team revenues and market size. Given this dominance, we expect to see a substantial number of games where a large-market team plays a small-market team and outcome uncertainty would be low. The substantial variation in outcome uncertainty in Spanish football presents an excellent opportunity to test for responses of the two types of audience. Third, the games for which we have audience data were broadcast on free-to-air terrestrial television which has a much bigger audience reach than cable and satellite channels. Hence, we can observe the responses of a high proportion of the football-watching television audience in Spain to varying game characteristics. Overall, Spanish football offers the potential to deliver more definitive conclusions about the validity of the outcome uncertainty, at least as far as European football is concerned.

The remainder of the paper proceeds as follows. In Section 2, we set out the context of television broadcast coverage in Spanish football. Section 3 sets up our empirical models and describes our data set. We emphasise, in particular, our choice of outcome uncertainty measure as one based on *ex ante* betting odds. Section 4 reports our empirical results. In Section 5, we use our empirical models to calibrate impacts of policies aimed at reducing inequality of team strengths in Spain. We then check for compatibility of our estimates with received theory. Section 6 concludes with some policy implications.

2. Broadcasting of Spanish football

Advances in broadcast technology that have occurred during the 1990s have significantly influenced Spanish football. The emergence of direct-to-home (DTH) broadcasters offering both pay-television and pay-per-view services have created much needed competition within the sports rights market, one that has previously been dominated by incumbent terrestrial broadcasters (Noll, 2007). Consequently the rights fees generated by sports leagues, particularly the Liga National de Fútbol Profesional (LFP), the Primera division and individual teams have increased significantly over the seasons (see Ascari & Gagnepain, 2006). In 1992–1993, the broadcast revenue that accrued to the Primera division was approximately €34 million. By the 1999–2000 season, this had grown to €250 million. With respect to broadcasting's contribution to total revenue, this has since the mid-1990s dominated those from other sources including gate, sponsorship and other commercial sources. Only in more recent seasons has the combined revenue from all commercial sources (excluding match day receipts) dominated that from broadcasting, but in the main, television remains the single most important source of revenue to the Primera division. Table 1 shows revenues from the various sources from 2003–2004 to 2005–2006 inclusive.

Although advances in broadcast technology created competition within the sports rights market, another important change affecting the sale of sports rights has been government legislation. Up until the 1995–1996 season, clubs in the LFP collectively sold their broadcast rights. Pressure from the league's wealthier clubs meant that for the 1996–1997 season, individual selling of rights was introduced, although existing long-term contracts, some of which did not expire until 1998, were allowed to run their natural course. The individual selling of rights saw the creation of a number of broadcaster-club alliances, which has contributed to the widening revenue gap that exists within the

Primera division. For example, in 2005–2006, Barcelona's and Real Madrid's share of revenue generated from the broadcast market was 46% and this is set to increase further (Deloitte, 2007).

Another feature of the football rights market is that by law, matches in the Primera division are listed and consequently, a portion of matches must be broadcast on free-to-air terrestrial television.[4] In practice, the Primera division has, in recent seasons, broadcast one match from each of the 38 rounds, on terrestrial television. These have been transmitted by a consortium of regional broadcasters allowing access by households with television sets. To complement those matches on free-to-air television, another 38 matches (one match per round) are broadcast on pay-television. Access to this is normally through monthly subscriptions to the broadcaster's service. The remaining matches are televised on a pay-per-view basis. Consequently, all matches in the Primera division are televised.

Between 2003–2004 and 2005–2006 inclusive, the transmission of matches on free-to-air terrestrial television was by the consortium Forta, the Federation of Regional Television and Radio Organizations. As the free-to-air rights holder, it showed seven first-choice matches out of the 38 match weeks that were available. The remaining matches were selected as second-choice matches after the pay-television rights' holder, who during this period was Canal Plus, had selected its first-choice matches. Forta's audience reach was not 100% since its coverage was only in those autonomous communities that had regional television companies. The rest of Spain received football match coverage via the 'La 2' channel. Forta, in 2006–2007, lost the free-to-air rights package to a national private broadcaster, LaSexta. LaSexta's audience reach was lower than Forta's, due to the inability of some regions to receive the LaSexta coverage. Consequently, average audience ratings for LaSexta matches in 2006–2007 was lower compared with those of the previous three seasons under Forta. The mean audience rating for 2006–2007 was 2.5 million viewers compared with a mean audience rating of 4.2 million viewers in the three previous seasons.

3. Data and empirical model

Data on gate attendances and television audiences in Spain's Primera division were collected from various issues of *TV Sports Markets*. The data span seasons 2003–2004 to 2006–2007.[5] The first model to be estimated is of gate attendance for all games. Previous studies of gate attendance have highlighted the habitual nature of fan support (see, e.g. Forrest, Simmons, & Szymanski, 2004; Forrest & Simmons, 2006 on English football). We capture fan persistence by *previous home attendance*, defined as log average home attendance of a given team in the previous season. The attractiveness of away teams will vary and is proxied by *previous away attendance*, defined as log average home attendance of the away teams in the previous season. The current season performance of teams is modelled using *home points per game* and *away points per game* as covariates, where points per game is accumulated points up to the game observation divided by number of games played thus far.

Matches between teams located in the same city or province are likely to raise fan interest, regardless of team standings or outcome probabilities. We combine these matches plus matches between Barcelona and Real Madrid to form the dummy variable, *derby*. Estimation of the home gate attendance model includes home team fixed effects and these are assumed to control for a variety of unobserved characteristics such as ticket prices, local incomes and market size. These are variables that would normally be found in single-season or OLS attendance demand studies (see, e.g. Garcia and Rodriguez (2002) on gate attendance in Spanish football) but would be conflated with fixed effects in panel estimation. The largest teams may have particular interest for home fans, and will also tend to send larger numbers of travelling fans to away matches. We have two dummy variables, *Barcelona away*, *Real Madrid away* to capture the top two Spanish teams in terms of revenue.

[4] In some European countries, such as Spain and United Kingdom, laws are in place that guarantee access of particular listed major sports events, such as World Cup finals and Olympic Games, to the domestic population via free-to-air terrestrial television coverage.

[5] Our sample period post-dates that used in a study of Spanish audiences for televised football by Garcia and Rodriguez (2006). Two key differences between the present study and Garcia and Rodriguez are first, that we model television audience and gate attendance jointly and second, we use betting odds as the basis for our measure of outcome uncertainty.

Live television coverage of games can lead to lower match attendances. In a previous study of match attendance in Spain covering the seasons 1992–1993 to 1995–1996, Garcia and Rodriguez (2002) found substantial negative impacts on gate attendance of 45% and 33%, from free-to-air and satellite television, respectively. In contrast, a study of gate attendance in the English Premier League by Forrest et al. (2004) found negligible impacts. Here, we denote four dummy variables: *Public TV weekday*, *Public TV weekend*, *Subscription TV weekday* and *Subscription TV weekend* to capture potentially different impacts of live TV coverage of games by free-to-air and subscription channels and as between midweek and weekend games. We also include a *weekday not televised* dummy variables for midweek games not broadcast. It is a weakness of some previous literature on effects of live broadcasting on matchday attendance that studies have confounded a midweek scheduling effect with a potentially adverse broadcast effect (Baimbridge, Cameron, & Dawson, 1996).

To capture relevant aspects of team performance and strength we use the probability of the home team winning, as shown by the bookmaker fixed-odds betting market (*probability home win*). The advantage of using betting odds is that these should capture characteristics of the two teams that are not easily observed such as player injuries 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.

Betting odds on match outcomes were extracted from files in 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 internet bookmaker, Interwetten, 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.

For the television audience, our measure of outcome uncertainty is the absolute difference between home and away win probabilities derived from the betting odds (*absolute probability difference*). Here, we shall proceed on the assumption that betting markets are efficient and the probabilities of match outcomes derived from bookmakers are the best available predictors of match outcomes.

There is now a considerable literature on attendance demand that uses betting odds as the basis for measuring outcome uncertainty. Knowles, Sherony, and Haupert (1992), for baseball, and Peel and Thomas (1988 and 1992 on English football, 1996 on Scottish football and 1997 on English rugby league) each used home team win probability as an indicator of outcome uncertainty in their studies. Knowles et al. (1992) find an inverted U-shaped relationship between attendance and probability of a home win. For these authors, the home win probability that maximises attendance is 0.6. However, the estimated relationship is linear, not in logs, and the quadratic term is only marginally significant.[6] Peel and Thomas (1992) find a U-shaped relationship between home win probability and attendance in English football. This is not usually how the outcome uncertainty effect on attendance is portrayed. The uncertainty of outcome hypothesis is usually taken to mean that attendances rise with home win strength (or win probability) at decreasing rate (see Késenne, 2007; Rascher, 1999).

In Peel and Thomas (1992), the home win probability that *minimises* attendance is in the range 0.49–0.67, depending on which division is being analysed. This is an ambiguous result; in the sample of games used by Peel and Thomas, attendances could rise or fall with probability of home win. Moreover, the regressors used by Peel and Thomas included team quality indicators. It is hard to interpret empirical effects of probability of home win on attendance, where team quality is also varying.

Comparing the results from Peel and Thomas and Knowles et al., we see that the empirical literature does not give clear guidance on the likely sign and form of the relationship between gate attendance and outcome uncertainty. This suggests that further empirical work may be useful. In our case, we shall follow Knowles et al. and Peel and Thomas by adopting probability of home win as our variable

[6] In a more recent study of attendance demand in Major League Baseball, Meehan, Nelson, and Richardson (2007) find, in line with conventional theorizing, a negative relationship between gate attendance and absolute difference in win per cent as their measure of outcome uncertainty. They also find evidence of an asymmetric effect of outcome uncertainty: when the home team has higher win per cent than home team, the impact of outcome uncertainty is negative but an insignificant coefficient is found when the away team has larger win per cent than the home team.

to capture the impact of outcome uncertainty on gate attendance. Across our sample, and in European football generally, the probability of a draw shows little variation. This means that probability of away win is effectively one minus a constant minus probability of home win. The probability of away win is then negatively and linearly related to probability of home win. The difference in probability of home win and away win is $2ph - 1 + pd$ where ph is probability of home win and pd is probability of a draw. Hence, the difference in outcome probabilities is positively and linearly related to probability of home win. Therefore, we can posit the outcome uncertainty hypothesis as predicting a positive coefficient on probability of home win and negative coefficient on squared probability of home win. As the probability of home win rises, gate attendances (the vast majority of which will be home fans) are hypothesised to increase but at decreasing rate as 'boredom with winning' sets in. A caveat is needed at this point; it is not possible to clearly distinguish fans' preferences for home win from fans' preferences for outcome uncertainty.

Of course, alternative measures of match outcome uncertainty are available. In a recent study of Spanish football, Buraimo, Forrest, and Simmons (2007) compared the predictive properties of three measures of outcome uncertainty, asking which was superior in predicting the actual match scores. The inherent noise in football results meant that all measures had low goodness-of-fit values but the outcome uncertainty variable taken from betting odds had the greatest predictive content. A further issue addressed by Buraimo, Forrest and Simmons is the potential for inefficiency in the betting market. Forrest and Simmons (2008) find some evidence of inefficiency in the betting market for Spanish football match outcomes, whereby bets on large Spanish teams to win against small teams appeared to generate lower than normal losses. Addressing this point in our analysis, with measures of outcome probabilities adjusted for inefficiency, does not alter our results and so we retain the efficiency-based measure.

To summarise, we have two variables that capture outcome uncertainty in our analysis. For television audiences, we use absolute difference in home and away probabilities. Television viewers are not necessarily partisan in favour of the home team. The absolute difference in *ex ante* outcome probabilities is then the relevant measure for determining whether television viewers respond positively to the prospect of a close contest. For gate attendances, the overwhelming majority of the crowd comprises fans of the home team. There, the probability of a home win and its square are the relevant measures for a test of the outcome uncertainty hypothesis. The use of different measures of outcome uncertainty for the two types of audience is not inconsistent. The two types of audience are very likely to respond to different measures of outcome uncertainty because one is predominantly partisan and the other predominantly neutral.

With season and home team dummy variables inserted[7], we have the following specification for log gate attendance:

$$\begin{aligned} \textit{Log attendance} = F(&\textit{previous home attendance}, \ \textit{previous away attendance}, \ \textit{home points per game}, \\ &\textit{away points per game}, \ \textit{probability home win}, \ \textit{probability of home win squared}, \\ &\textit{derby}, \ \textit{Barcelona away}, \ \textit{Real Madrid away}, \ \textit{Public TV weekday}, \ \textit{Public TV} \\ &\textit{weekend}, \ \textit{Subscription TV weekday}, \ \textit{Subscription TV weekend}) \end{aligned} \quad (1)$$

Estimation is by the Prais–Winsten panel regression method in which error terms are contemporaneously correlated across panels, here home teams. This is particularly important as there is likely to be further habit persistence among fans in their attendance at successive home matches. As well as being heteroskedastic, disturbances are assumed to be autocorrelated and we estimate a common AR(1) parameter. With some betting odds unavailable and round one in each season deleted, we have 1469 matches for analysis. Descriptive statistics for all our continuous variables are shown in Table 2.

Television viewers do not have the same commitment to home teams as fans at the stadium and the mix of viewers between home fans, away fans and neutrals is likely to be very different to the

[7] Home team dummy variables capture a set of unobservable influences on match attendance. In the absence of reliable ticket price data, price effects are subsumed under the home team fixed effects.

Table 2
Descriptive statistics for gate attendance and television audience models.

Variable	Mean	S.D.	Minimum	Maximum
Panel A: Gate attendance ($N = 1469$)				
Attendance (000)	28.97	18.19	2.50	98.20
Previous home attendance (000)	28.27	17.39	5.17	72.96
Previous away attendance (000)	28.22	17.30	5.17	72.96
Home points per game	1.35	0.51	0	3
Away points per game	1.38	0.52	0	3
Probability home win	0.46	0.13	0.10	0.82
Absolute probability difference	0.25	0.18	0	0.78
Panel B: Television audience ($N = 151$)				
Television audiences (in millions)	3.77	1.54	1.19	9.29
Attendance (000)	39.03	19.73	9.95	98.20
Barcelona × absolute probability difference	0.07	0.17	0	0.72
Real Madrid × absolute probability difference	0.07	0.16	0	0.70
Probability home win	0.44	0.15	0.11	0.78
Absolute probability difference	0.25	0.19	0	0.72

composition of gate attendance. When modelling television audience, we need to account for the selection of matches by the broadcaster. If the television company is concerned with maximising its audience, and hence advertising revenue, it will prefer games that have larger gate attendances to those with smaller audiences. The complexity of Spanish football coverage on televisions means that the public broadcaster has only limited choice in its match selection. It cannot simply show Barcelona and Real Madrid on alternate weekends. On the other hand, some matches involving these teams will appear in its schedule. We proceed to model television audience for 151 live broadcasts by treating match attendance as an endogenous variable in a two-stage least squares model.

In the first stage of the model we have log gate attendance given by a slightly modified version of (1):

$$\begin{aligned} \textit{Log attendance} = G(&\textit{previous home attendance}, \textit{previous away attendance}, \textit{absolute difference in} \\ &\textit{probability}, \textit{derby}, \textit{Barcelona home or away}, \\ &\textit{Real Madrid home or away}, \textit{weekend}) \end{aligned} \tag{2}$$

The specific team dummies have been amended to refer to appearance in any game, whether as home or away team. The television coverage dummies are now redundant. The *midweek not televised* dummy is replaced by a *weekend* dummy. The use of absolute difference in probability in the first stage equation is intended to ensure consistency in the two stage least squares model.

In the second stage of the model, *log television audience* is given by

$$\begin{aligned} \textit{Log television audience} = H(&\textit{home attendance}*, \textit{absolute difference in probability}, \textit{Barcelona home} \\ &\textit{or away}, \textit{Real Madrid home or away}, \textit{Barcelona} \times \textit{absolute difference} \\ &\textit{in probability}, \textit{Real Madrid} \times \textit{absolute difference in} \\ &\textit{probability}, \textit{weekend}) \end{aligned} \tag{3}$$

where * denotes the instrumented variable and *previous home attendance*, *previous away attendance*, *probability home win* and *derby* are instruments.

Barcelona home or away and *Real Madrid home or away* are dummy variables denoting the appearance of these teams in televised matches. The role of outcome uncertainty is taken by *absolute difference in probability*. Since viewer interest might respond differently to closeness of contest when Barcelona and/or Real Madrid appear in a televised game, we interact *absolute difference in probability* with the dummy variables for the biggest two teams.

Table 3
Gate attendance model using Prais–Winsten regression with panel corrected standard errors.

Explanatory variables	Coefficient	*t*-Statistic
Dependent variable is ln(attendance)		
Previous home attendance	0.851***	37.70
Previous away attendance	0.037***	3.15
Home points per game	0.025	1.48
Away points per game	0.046***	3.50
Derby	0.130***	6.79
Barcelona away	0.147***	5.17
Real Madrid away	0.141***	5.11
Public TV weekday	−0.182***	−3.92
Public TV weekend	−0.033*	−1.88
Subscription TV weekday	−0.076	−1.41
Subscription TV weekend	−0.017	−1.01
Weekday not televised	−0.072***	−3.96
Probability home win	−0.588**	−2.34
Probability home win squared	0.759***	3.15
Constant	1.191***	4.96
Autocorrelation parameter	0.426	
R-squared	0.926	
N	1469	
Panel	Home team	
Month dummies	Yes	
Season dummies	Yes	

* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

4. Empirical results

Table 3 shows the results of a Prais–Winsten regression of log attendance with allowance for correlations of errors across teams, panel-corrected standard errors and a common autocorrelation parameter. The first round of matches in any season is dropped to allow for creation of the points per game performance variables. As is standard in the literature (see, e.g. Forrest & Simmons, 2006) there is substantial habit persistence by home fans as shown here by an elasticity of home attendance with respect to last year's average attendance of 0.85. Away teams with greater support generate higher home attendances with large extra impacts of 14.7 and 14.1%, respectively, when Real Madrid or Barcelona are the visitors. Increased current season performance measures of away teams also generate higher home gate attendances, over and above size of core support. Habit (previous season's attendance), tradition (matches with keen rivalry) and away team attractiveness stand out as key determinants of gate attendance.[8] As is conventional, derby matches with strong rivalry generate extra fan interest with a point estimate of 13.0% higher gate attendance, *ceteris paribus*. Non-televised midweek games attract fewer fans, again a conventional result of scheduling games when it is more inconvenient for fans to attend.

Of the broadcast dummy variables, public television coverage on weekdays significantly lowers gate attendance at the 5% level. Where this occurs, the adverse effect on gate attendance is quite large, at 18.2%, and this is over and above the 7.2% point estimate of reduction in gate attendance from midweek scheduling. The size of this effect is larger than that found for the English Premier League by Forrest et al. (2004) and Buraimo and Simmons (2008). Moreover, given that gate attendance includes season-ticket holders, an 18.2% fall in attendance when a match is televised in midweek is likely to conceal a larger impact on individuals' ticket demand and therefore a larger impact on club revenue.

A smaller, and marginally significant, reduction in gate attendance (3.3%) is also found for public television broadcasts on weekends. There is no evidence of a statistically significant adverse impact of

[8] Owen and Weatherston (2004) arrive at similar conclusions in their study of New Zealand rugby union.

private subscription broadcasts on gate attendance. Larger and significant adverse impacts of television coverage on gate attendance tend to be found for free-to-air broadcasters with larger audience reach. This is consistent with the findings of Garcia and Rodriguez (2002) for gate attendance in Spanish football. Smaller or statistically insignificant effects tend to be found for satellite or cable providers with smaller audience penetration.[9]

Our focus is on outcome uncertainty, as captured by home win probability and its square. The coefficients on these variables are negative and positive, respectively. In an alternative specification with difference in home and away probability and difference squared the former had an insignificant coefficient while the squared term had a significant positive coefficient, consistent with the results shown in Table 3. These results are contrary to the outcome uncertainty hypothesis as specified in the theoretical literature (Késenne, 2007). Our estimated turning point of home win probability that *minimises* gate attendance is 0.39. The mean value of home win probability of 0.46 occurs just to the right of the attendance-home win probability turning point. With a range from 0.10 to 0.82, it is clear that sample observations exist either side of this turning point. It seems that Spanish football fans prefer games with low home win probability and high home win probability to games with mean home win probability.

One reason why fans might prefer games with low home win probability to mean home win probability is a 'David and Goliath' effect. Fans like to attend games where the away team is overwhelmingly predicted to win so as to enjoy after-match tales to friends and relatives following the rare occasions that the home team emerges victorious from the predicted uneven contest. Note that our model already controls for the identity of the largest teams in Spain, Barcelona and Real Madrid, as visitors. On the other side of the relationship, we have evidence that fans inside the stadium, predominantly home fans, prefer less close contests in favour of their teams to closer contests. In cases where the home team is overwhelmingly predicted to win, fans may enjoy the prospect of a large victory, not just the win.

Do television audiences exhibit different preferences to fans inside the stadium in relation to closeness of contest? In our television audience model shown in Table 4, instrumented home attendance has a positive and significant coefficient, indicative of a selection effect. Appearance of Barcelona and Real Madrid in any televised game leads to increased audiences (of 28% and 54%, respectively).[10] The coefficient on *absolute difference in probability* is negative and significant, in contrast to the results for impact of outcome uncertainty on gate attendance and in support of the outcome uncertainty hypothesis. If Real Madrid appears in a televised game, the impact of our measure of outcome uncertainty is no different to when any other team appears, with the notable exception of Barcelona. The interaction term involving Real Madrid is statistically insignificant while the term involving Barcelona is significant at the 10% level and positive. Moreover, the coefficient on the Barcelona interaction is almost exactly equal and opposite to the coefficient on *absolute difference in probability*. Thus, any improvement in outcome uncertainty for televised games involving Barcelona does not enhance television audience while viewership will rise when any other team appears.

This set of results suggests that, leaving Barcelona aside, television viewers respond positively to improvements in outcome uncertainty. This seems quite plausible. Television viewers will contain a large group of spectators who have at best a loose affinity to either team and prefer to see a close game.[11]

5. Model simulation

We can use our empirical models to assess the implications of policies that raise the level of match outcome uncertainty. First, consider a policy to generate contests where each team has equal strength.

[9] Buraimo and Simmons (2008) find a smaller adverse effect of broadcasting on English Premier League gate attendance, correcting for capacity-constrained games, on Sunday afternoon (5.2%) compared to Monday night (9.6%).

[10] We estimated the audience equation with a full set of team fixed effects for both home and away teams. The only significant fixed effects were for Barcelona and Real Madrid as shown.

[11] Alavy, Gaskell, Leach, and Szymanski (2006) analyse television audience ratings for English Premiership matches, minute-by-minute. They find that viewers prefer close contests that are not likely to end in a 0–0 stalemate. Audiences appear to like closeness of a match combined with goals scored.

Table 4
Television audience ratings regression using two-stage least squares regression.

Explanatory variables	Coefficient	*t*-Statistic
First stage, dependent variable is ln(attendance)		
Previous home attendance	0.860***	16.18
Previous away attendance	0.014	0.27
Derby	0.110**	2.40
Barcelona home or away	0.364***	4.10
Real Madrid home or away	0.284***	3.19
Weekend	0.165***	2.58
Probability home win	−0.125	−0.54
Absolute probability difference	0.623***	3.61
Barcelona × absolute probability difference	−0.892***	−3.77
Real Madrid × absolute probability difference	−0.624***	−2.73
Constant	1.025	1.29
Adjusted *R*-squared	0.849	
N	151	
Month dummies	Yes	
Season dummies	Yes	
Second stage, dependent variable is ln(television audience rating)		
Home attendance[a]	0.107***	2.70
Absolute probability difference	−0.335**	−2.54
Barcelona home or away	0.280***	3.92
Real Madrid home or away	0.538***	8.10
Barcelona × absolute probability difference	0.374*	1.90
Real Madrid × absolute probability difference	−0.072	−0.38
Weekend	−0.105**	−1.99
Constant	13.975***	35.09
Adjusted *R*-squared	0.828	
N	151	
Month dummies	Yes	
Season dummies	Yes	

[a] Home attendance is the instrumented variable.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

This will not imply that the away team has the same probability of winning as the home team, as home advantage is an important factor determining outcomes of football matches. In our simulation, we first estimate the fitted values of attendance using our model in Table 3. Having estimated the fitted values, we then fix the probability of home win at 0.45. Given that the probability of home win is correlated with home and away teams' points per game and the identities of the teams involved in the contest, points per game should be adjusted accordingly. We run a subsidiary fixed effects model in which the probability of home win is a function of both teams' points per game and the various slopes dummies for the home and away teams. The estimates of this fixed effects model were, with *t*-statistics in parentheses:

$$\text{Probability home win} = \underset{}{0.453} + \underset{(11.07)}{0.057}(\text{home points per game}) - \underset{(-10.52)}{0.052}(\text{away points per game})$$
$$\text{Significant home and away team fixed effects, } R_2 = 0.857 .$$

Using the above model with probability of home win set to 0.45 and home team's points per game retaining their current values, the away team's points per game are re-estimated. New fitted values of attendance can now be estimated. On this basis, gate attendances for all matches in our sample *fall* by an average of 593 per match.

As a result of the quadratic functional form for probability of home win in the gate attendance model, our simulation implies that some matches would become less uncertain (because currently

the weakness of the home team is exactly offset by its home advantage, making the contest equal) and some (those where the home team is currently very strong) more uncertain. Moving all matches to the middle will have implications for seasonal totals that will vary through the functional form. We find that the dominant effect in the simulation, given the functional form of the specification, is for attendances to fall slightly, on average.

To simulate the above effects on television audiences, we again obtain the fitted values of television audience ratings for the televised games. We then set the absolute difference in probability equal to the mean value of 0.18. This value corresponds to the simulated value of 0.45 for mean home advantage in our sample. The endogeneity of gate attendance is also accounted for in our simulation. As stadium attendance in the television audience ratings model is an index of how attractive a game is, the newly generated fitted values from the attendance model simulation are used. Noting these changes and estimating newly fitted values for television audience ratings, the mean match television audience rating rises by 92,544 viewers per game. We note that even the negative effect of a more balanced contest on stadium attendance, and the consequent follow-on effect that lower stadium attendance have on reducing television audience rating, is dominated by the television audiences' greater appreciation of contests with improved outcome uncertainty.

The reported changes in gate attendance and television audience rating are statistically significant but their economic significance should also be highlighted. We use estimates of the average revenue per gate attendee (€27 per fan) and per television viewer (€2.5 per viewer), based on revenues from the total Forta package of 38 games per season from 2003–2004 to 2005–2006. For broadcasting, we confine attention to the revenues from the Forta channel only. Then improvements in outcome uncertainty across all 380 games will cause stadium revenue to decrease by €6.1 m per season. Revenue from the broadcast market would improve by €8.8 m per season, even with just 38 games televised by the free-to-air broadcaster, Forta. This will be an understatement of the broadcast revenue increase if pay TV audiences also respond positively to outcome uncertainty. On the other hand if, as Garcia and Rodriguez (2006) suggest, rival pay TV broadcasters (Canal Plus in their empirical study) have audiences that are indifferent to outcome uncertainty, then the beneficial impacts of increased outcome uncertainty on broadcast revenues will be confined to the Forta platform. Overall, on the basis of this simulation exercise, policy initiatives to improve outcome uncertainty do appear to be justified. Per-match broadcast audience figures rise following the simulated improvement in outcome uncertainty and these generate sufficient extra revenue to offset the reduction in gate revenues that follow from lower attendances.

6. Conclusions

The analysis in the paper has tested the importance of outcome uncertainty within Spanish football. It contributes to the literature by assessing the effects that outcome uncertainty has on the size of attendances in the stadium and of television audiences. The outcome uncertainty hypothesis proposes that as the expected outcome of a contest becomes closer, audience demand will increase. The analysis of gate attendance shows that the outcome uncertainty hypothesis is rejected. As the home win probability increases, the number of spectators in the stadium rises at an increasing rate beyond a turning point just to the left of the sample mean home win probability. The relationship between gate attendance and probability of home win is found to be U-shaped. This is precisely the opposite of the functional relationship between attendance and home win probability proposed in the theoretical literature, and asserted in discussions of policy measures to redistribute teams' resources so as to make team strengths less unequal. Rather than value close contests, the majority of spectators in the stadium have preferences for outcomes which either strongly favour the home team or strongly favour the away team. Both our empirical analysis and our simulation exercise show that policy initiatives designed to equalise the playing strengths of the home and away teams will actual reduce stadium attendances and gate receipts, *ceteris paribus*.

Contemporary professional sports, however, are not only influenced by spectators in the stadium. Many major sports leagues derive the bulk of their revenue from the broadcast market and gate receipts are generally dominated by revenue from television. For this reason, television audiences from an economic perspective are as important as and arguably more important than their counterparts in

attendance at the stadium. Given the importance of this market, how do television audiences respond to close contests? Our analysis shows that, unlike their stadium counterparts, television audiences have a preference for close matches over games in which the outcomes are more predictable. Even though any attempts to raise television audiences by increasing outcome uncertainty will have the effect of reducing stadium attendances, *ceteris paribus*, our simulation exercise shows that increased broadcast revenue can dominate decreased gate revenue.

The task of generalising our results for other European football leagues is clearly an important one for further research. Based on what we find for Spain, the net effect of increased outcome uncertainty is that the size of television audiences increases substantially and that of stadium spectators is modestly reduced. Translated into rough revenue calculations, the increase in television audience revenues outweighs the decline in revenue from stadium spectators.

For now, our principal finding is that spectators in the stadium and audiences watching on television have different preferences in relation to outcome uncertainty of games. The conjecture that fans inside stadia prefer *ex ante* close contests to uneven contests is not supported by our results. If the concept of outcome uncertainty is to have meaning for policy analysis of European football, it is expressed via the responses of television viewers. If league planners really desire closer contests in European football, the trade-off shown here between interests of stadium fans and television viewers needs to be explicitly incorporated into their thinking.

Acknowledgements

We thank David Forrest, David Peel, two anonymous referees and participants at the Applied Econometrics Association Media and Communications conference, Paris and Western Economic Association International conference, Honolulu for helpful comments that led to improvements in the manuscript.

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