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A TALE OF TWO AUDIENCES: SPECTATORS, TELEVISION VIEWERS AND OUTCOME UNCERTAINTY IN SPANISH FOOTBALL

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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. Championship winning dynasties are largely absent and turnover of divisional, conference and World Championship winners is considerable (Leeds and 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 (Dobson and Goddard, 2001, Buraimo, Simmons and Szymanski, 2006). 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.

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 top division, La Liga. Previous literature on gate attendance has delivered mixed results on the direction of impact of match outcome uncertainty on attendances (Szymanski, 2003). According to Borland and Macdonald's (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 an impact of match outcome uncertainty on gate attendance (for a similar result, see Szymanski, 2003). Studies of television audiences are much rarer, due to lack of data availability.[1] Forrest *et al* (2005) found a significant positive relationship between outcome uncertainty and size of television audiences in English Premier League football between 1993 and 2003. 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.

We shall estimate a joint gate attendance-television audience model for La Liga. 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

[1] 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 so significant impact of differences in betting odds on attendance demand in English one-day cricket.

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.

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 model 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 model to calibrate impacts of policies aimed at reducing inequality of team strengths in La Liga. 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 and Gagnepain (2006)). In 1992-93, 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 2003-05 to 2005-06 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 1995-96 season, clubs in the LFP collectively sold their broadcast rights. Pressure from the league's wealthier clubs meant that for the 1996-97 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 cause. 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 2005-06, 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. 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 2003-04 and 2005-06 inclusive, the transmission of matches on free-to-air terrestrial television has been 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, in 2006-07, lost the free-to-air rights package to another consortium of regional broadcasters, LaSexta. LaSexta's reach is relative low at 86% when compared with Forta's full market penetration and consequently, average audience ratings for matches in 2006-07 has been lower compared with those of the previous three seasons. The mean audience rating for 2006-07 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 La Liga were collected from various issues of *TV Sports Markets*. The data span seasons 2003/04 to 2006/07. 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 and Szymanski, 2004 and Forrest and 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. The attractiveness of away teams will also be indicated by their current form and we introduce this as *away points per game*, the accumulated points divided by maximum possible up to the given match.

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 three dummy variables, *Barcelona away*, *Real Madrid away* and *Valencia away* to capture the top three Spanish teams in terms of revenue.

Live television coverage of games can lead to lower match attendances. In a previous study of match attendance in Spain covering the seasons 1992/93 to 1995/96, Garcia

and Rodriguez (2002) found substantial negative impacts on gate attendance of 33 per cent and 45 per cent, from free-to-air and satellite television respectively. In contrast, a study of gate attendance in the English Premier League by Forrest, Simmons and Szymanski (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.

Home team performance is given first by *home points per game*, the points total up to the match divided by maximum possible. This is a measure of recent form. To capture other 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

per cent. We adjust the probability of each match outcome by dividing by the sum of probabilities.

We adopt two measures of outcome uncertainty. The first of these 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 *et al.* (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. These studies find a U-shaped relationship between attendance and probability of a home win. For both sets of authors the home win probability that minimises attendance is 0.6. Since the average probability of a home win in English football has historically been around 0.45 to 0.5, it is clear that the majority of observations in the samples used in the literature will be in the range where gate attendance is negatively related to probability of home win. If we take outcome uncertainty to be negatively related to probability of home win, then the outcome uncertainty hypothesis is supported in these studies as increased home win probability implies lower outcome uncertainty and lower attendance, as the hypothesis predicts.

However, a difficulty with using home win probability as a proxy for outcome uncertainty is that this measure is really picking up home team strength rather than

closeness of a contest (Forrest and Simmons, 2002). The absolute difference of home and away win probability is a better indicator of closeness of a match, given home team strength and is to be preferred over home win probability. If stadium spectators and television audiences value outcome uncertainty, the coefficient on *absolute probability difference* will be negative.

Our second measure of outcome uncertainty is a *Theil measure*, previously used by Peel and Thomas (1992) and Czarnitzki and Stadtmann (2002). Using absolute difference in home and away win probabilities assumes that the probability of a draw is constant. The mean draw probability is 0.27 with a standard deviation of 0.03. Given the small measure of the deviation, the assumption of a constant measure and no deviation is not entirely inappropriate. The *Theil measure*, however, takes into account that all three probabilities may vary and is computed as follows:

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

where p_i is the home, away and draw probabilities, respectively. If fans attending matches and television audiences value outcome uncertainty, then the coefficient on the *Theil measure* will be positive.

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.

With season and match dummy variables inserted, we have the following specification for log attendance:

Log attendance = F(*previous home attendance*, *previous away attendance*, *home points per game*, *away points per game*, *probability home win*, *absolute difference in probability (or Theil measure of outcome uncertainty)*, *derby*, *Barcelona away*, *Real Madrid away*, *Valencia away*, *Public TV weekday*, *Public TV weekend*, *Subscription TV weekday*, *Subscription TV weekend*) (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 1,469 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 mix of viewers between home fans, away fans and neutrals is likely to be very different to the 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 only has 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 covariate 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):

Log attendance = G(*previous home attendance, previous away attendance, probability home win, absolute difference in probability (or Theil measure of outcome uncertainty), derby, Barcelona home or away, Real Madrid home or away, Valencia home or away, weekend*) (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.

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

Log television audience = H(*home attendance*, absolute difference in probability (or Theil measure of outcome uncertainty), Barcelona home or away, Real Madrid home or away, Valencia home or away, Barcelona×absolute difference in probability (or Barcelona×Theil measure of outcome uncertainty), Real Madrid×absolute difference in probability (or Real Madrid×Theil measure of outcome uncertainty), weekend*) (3)

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

Barcelona home or away, *Real Madrid home or away* and *Valencia 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.

4. EMPIRICAL RESULTS

Table 3 shows the results of two models using 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 form variables. As is standard in the literature (see e.g. Forrest and 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 and based on model 1a, with large extra impacts of 14 and 15 per cent, respectively, when Real Madrid or Barcelona are the visitors. The corresponding results from model 1b are similar. Increased form

measures of away teams also generate higher home gate attendances, over and above size of core support. Interestingly, home attendances do not respond significantly to home team form, again suggesting considerable inertia of home support within seasons. Habit (previous season's attendance), tradition (matches with keen rivalry) and away team attractiveness stand out as key determinants of gate attendance.[2]

As is conventional, derby matches with strong rivalry generate extra fan interest with both models reporting 13 per cent higher gate attendance, *ceteris paribus*. Non-televised midweek games attract fewer fans, again a conventional result. Of the broadcast dummy variables, only public television coverage on weekdays significantly lowers gate attendance at the five per cent level. A small reduction in gate attendance (three per cent) is also found for public television broadcasts on weekends, but the coefficient is of marginal significance (*p value* = 0.065 for model 1a and *p value* = 0.055 for model 1b). There is no evidence of a statistically significant adverse impact of private subscription broadcasts on gate attendance. These results are consistent with Forrest, Simmons and Szymanski (2004) and Forrest and Simmons (2006) for English football. Larger and significant adverse impacts of television coverage on gate attendance tend to be found for free-to-air broadcasters with larger audience reach. Statistically insignificant effects tend to be found for satellite or cable providers with smaller audience penetration.

Our focus is on outcome uncertainty, as measured by absolute difference in bookmaker probabilities and the *Theil measure*. The *Absolute probability difference* has a significant, *positive* coefficient suggesting that increased gaps between team win

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

probabilities are associated with higher home attendances. This is further substantiated by the significant but negative coefficient on the *Theil measure*. These results are contrary to the outcome uncertainty hypothesis as they suggest that fans prefer more uneven contests. Out of 1469 games in our sample there are only 263 in which the probability of away win exceeds probability of home win. For the overwhelming majority of games in La Liga, it appears that home fans prefer a more predictable match in their favour.

Thus, we have evidence that fans inside the stadium, predominantly home fans, prefer less close contests in favour of their teams to closer contests. Do television audiences exhibit different preferences in relation to closeness of contest?

In our television audience model, 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 29 per cent and 54 per cent respectively).[3] The coefficient on *absolute difference in probability* is negative (and significant at the one per cent level), in contrast to the results for 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 and positive. Moreover, the coefficient on the Barcelona interaction is almost exactly equal and opposite to the coefficient on *absolute difference in probability* in model 2a and the *Theil measure* in model 2b.

[3] 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.

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 fans prefer to attend games that have a higher probability of a win for the home team compared to the away team while television viewers respond positively to improvements in outcome uncertainty. This seems quite plausible. Home fans want to see their team win and do not particularly want to see a close game. 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.[4]

5. MODEL CALIBRATION

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 probability of winning. Our first measure of outcome uncertainty is then zero whereas in the sample the average value is 0.25. Reducing the measure to zero generates a loss of average gate attendance by 804. In contrast, mean match television audiences rise by 276,727, if all other factors remain constant with the exception of stadium attendance, which itself is negatively influenced by this improvement in outcome uncertainty and therefore has an impact on television audience ratings. Using our second measure of outcome uncertainty, the Theil measure, increasing outcome uncertainty requires an improvement in the mean value of 1.020 to 1.099. The effects of this improvement in outcome uncertainty are a

[4] Alavy *et al*. (2006) analyse television audience ratings 0for 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.

reduction in mean gate attendance of 520 and an improvement in the mean television audience rating, again taking into account the change in gate attendance, of 231,285.

The reported changes in gate attendance and television audience rating are statiscially significant but their economic significance should also be highlighted. Using the more modest estimates from the Theil measure and the average income per gate attendee and television viewer based on revenues from 2003-04 to 2005-06, improvements in outcome uncertainty across all 380 will cause stadium revenue to decrease by €5.3m, however, revenue from the broadcast market will improve by €22.2m. Or based on the 2005-06 season, this is a reduction of 1.6% in gate revenue and an increase of 5.5% in broadcast revenue. Consequently, policy initiatives to improve outcome uncertainty may be justified.

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 and, as the home win probability increases, the number of spectators in the stadium also increases. Rather than value close contests, the majority of spectators in the stadium have a preference for outcomes which favour the home team. Our empirical analysis shows 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? The analysis shows that, unlike their stadium counterparts, television audiences have an overwhelmingly preference for close matches than ones in which the outcomes are more predictable. Given the results of the empirical analysis, any attempts to maximise television audiences will have the effect of reducing stadium attendances, *ceteris paribus*. Attempts to maximise the combined audiences from both the television and stadium markets mean that league administrators should initiate policies at equalising playing strengths. The net effect is that the size of television audiences increases substantially and that of stadium spectators is significantly reduced. The increase in television audiences outweighs the decline in stadium spectators. Our analysis is also robust to an alternative specification in which outcome uncertainty is inferred from the home win probability. This specification reinforces the earlier finding of different preferences of spectators in the stadium and audiences watching on television.

Policy initiatives aimed at redistributing playing resources within the league so as to equalise playing strength are likely to produces positive benefits in the broadcast market by increasing audience ratings and broadcast revenue, although this is likely to be partially offset by a reduction in gate attendance. A means of addressing this in

Spanish football might be to revert back to centralised league-level broadcast arrangements and also ensure that the distribution of broadcast revenues to small-market teams is substantial enough to improve their competitive standings.

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

Season	Match day	Broadcast	Commercial
2003-04	276	391	286
2004-05	288	412	329
2005-06	324	405	428

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

Panel A: Gate attendance (N = 1469)

Variable	Mean	Standard deviation	Minimum	Maximum
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
Theil measure	1.02	0.09	0.56	1.10

Panel B: Television audience (N = 151)

Variable	Mean	Standard deviation	Minimum	Maximum
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
Theil measure	1.02	0.10	0.66	1.10

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

Dependent variable is ln(attendance)

	Model 1a		**Model 1b**	
Explanatory Variables	**Coefficient**	**T Statistic**	**Coefficient**	**T Statistic**
Previous home attendance	0.852	37.26	0.850	37.55
Previous away attendance	0.038	3.20	0.037	3.09
Home points per game	0.025	1.46	0.024	1.43
Away points per game	0.046	3.45	0.045	3.42
Derby	0.129	6.80	0.130	6.79
Barcelona away	0.150	4.93	0.152	4.92
Real Madrid away	0.143	4.84	0.147	5.02
Valencia away	0.016	0.68	0.017	0.72
Public TV weekday	-0.189	-4.09	-0.184	-3.98
Public TV weekend	-0.032	-1.84	-0.034	-1.92
Subscription TV weekday	-0.079	-1.47	-0.078	-1.45
Subscription TV weekend	-0.020	-1.18	-0.018	-1.06
Weekday not televised	-0.073	-4.00	-0.073	-3.98
Probability home win	-0.008	-0.07	-0.013	-0.12
Absolute probability difference	0.134	2.81		
Theil measure			-0.275	-2.93
Constant	1.044	4.49	1.390	5.18
Autocorrelation parameter	0.437		0.428	
R-squared	0.928		0.927	
N	1469			
Panel	Home team			
Month dummies	Yes			
Season dummies	Yes			

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

First stage, dependent variable is ln(attendance)

	Model 2a		Model 2b	
Explanatory Variables	**Coefficient**	**T Statistic**	**Coefficient**	**T Statistic**
Previous home attendance	0.838	15.28	0.849	15.35
Previous away attendance	-0.013	-0.24	-0.008	-0.15
Derby	0.115	2.52	0.109	2.39
Barcelona home or away	0.388	4.33	-1.866	-3.72
Real Madrid home or away	0.301	3.38	-1.450	-3.11
Valencia home or away	0.072	1.54	0.061	1.32
Weekend	0.157	2.47	0.144	2.29
Probability home win	-0.157	-0.68	-0.161	-0.68
Absolute probability difference	0.586	3.38		
Theil measure			-1.513	-3.58
Barcelona × absolute probability difference	-0.852	-3.60		
Real Madrid × absolute probability difference	-0.572	-2.48		
Barcelona × Theil measure			1.983	4.08
Real Madrid × Theil measure			1.560	3.45
Constant	1.533	1.79	3.080	3.42
Adjusted R-squared	0.850		0.875	
N	151			
Month dummies	Yes			
Season dummies	Yes			

Second stage, dependent variable is ln(television audience rating)

	Model 2a		Model 2b	
Explanatory Variables	**Coefficient**	**T Statistic**	**Coefficient**	**T Statistic**
Home attendance*	0.091	2.20	0.089	2.18
Absolute probability difference	-0.349	-2.66		
Theil measure			0.784	2.52
Barcelona home or away	0.294	4.10	1.293	3.19
Real Madrid home or away	0.541	8.20	0.689	1.78
Valencia home or away	0.061	1.66	0.061	1.66
Barcelona × absolute probability difference	0.401	2.05		
Real Madrid × absolute probability difference	-0.022	-0.12		
Barcelona × Theil measure			-0.879	-2.19
Real Madrid × Theil measure			-0.145	-0.38
Weekend	-0.107	-2.04	-0.095	-1.83
Constant	14.128	34.47	13.250	21.28
Adjusted R-squared	0.830		0.831	
N	151			
Month dummies	Yes			
Season dummies	Yes			

* Home attendance is the instrumented variable.