Lancaster University Management School
Working Paper
2004/047

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Outcome Uncertainty And The Couch Potato Audience

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October, 2004

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Acknowledgement

Thanks are due to John Goddard, Peter von Allmen and two anonymous referees for helpful comments on an earlier draft. We also gratefully acknowledge responses from participants at the International Association of Sports Economists, Neuchâtel and Western Economic Association, Vancouver.

Abstract

Previous studies of attendance demand for professional team sports have failed to yield clear-cut findings on the importance of outcome uncertainty to consumers. But potentially fewer problems should arise in examining the link between outcome uncertainty and demand in the television market for team sports, which in the case of English Premier League football is in fact a more important component in total club revenue. This study models both the choice of which games to show and the size of audience attracted by each game, exploiting data on audience sizes for games between 1993 and 2002. We propose a new measure of match outcome uncertainty and, from our results, both the broadcaster and the audience appear interested in competitive balance.

Keywords: soccer, television, competitive balance, outcome uncertainty.

JEL categories: L82, L83

OUTCOME UNCERTAINTY AND THE COUCH POTATO AUDIENCE

1. Introduction

This paper is a demand study for top-level English professional football (soccer). In focusing particularly on the relationship between demand and outcome uncertainty, it reflects a strong theme of the literature on the economics of team sports in North America. As in America, the sport itself has debated whether maintaining fan interest depends on restricting the degree of competitive imbalance to less than that which would follow from the unimpeded flow of market forces. In contrast to American sports, no special labour market restrictions, such as salary caps or player drafts, have been agreed. But there is collective selling of television rights in the FA Premier League and this has attracted the attention of competition authorities at both the national and European levels. Within the UK legal system, the League defended collective selling by explicit reference to the alleged need to provide minimum broadcasting income to financially weaker clubs so that they could afford the talent to remain competitive on the field. The argument was accepted by the Restrictive Practices Court which allowed a public interest defence that collusion in the selling of rights was necessary to maintain a degree of competitive balance consistent with the maintenance of long-run interest in the sport (Restrictive Practices Court (1999)).

The arguments in the Court, between the League and the competition authority that brought the case, highlighted different interpretations of econometric evidence concerning the relationship between attendance demand and outcome uncertainty. Reasons for a lack of consensus on this issue are discussed below, but one might argue that the evidence before the Court, as in the academic literature, was deficient in focusing only on the demand for live attendance. In contemporary major league sports, the television audience comprises a more

important element in demand even than attendance at the stadium. For example, in season 2001-02, the share of turnover (net of transfer fees) accounted for by broadcasting was 38% in the case of the Premier League; other match day income (principally ticket sales) was only 31% according to information supplied to us by the Premier League. An assessment of the importance for demand of maintaining competitive balance therefore requires that at least as much attention be paid to the preferences of the broadcasters who pay for rights, and of the audiences they serve, as to those of the hard-core fans who attend games.[1] Accordingly, in this paper we model both the determinants of the broadcaster's choice of which games to select for televising and the determinants of the size of television audience for each match shown. In the models, our focus variables are designed to reveal how important outcome uncertainty is to broadcasters and television viewers.

2. Advantages in modelling television demand

In looking only at the effect of outcome uncertainty on attendance demand and not at all at television demand, the existing literature, to the extent that it purports to examine the link between outcome uncertainty and the financial health of a sport, implicitly assumes that the preferences of the two audiences are similar. Even if one accepted such a strong assumption, it would nevertheless be preferable to apply demand models to audience figures rather than to attendance data.[2] Studying the television audience avoids four problems so significant in the modelling of attendance demand as to seriously undermine the conclusions of previous studies on the link, at match level, between the demand for football (or other sports) and outcome uncertainty.

[1] Income from broadcasting rights dominates ticket income to an even greater extent in some American sports. In football, a majority of *all* NFL income derives from broadcasting (Cave and Crandall (2001), Table 5) so that the case for research to identify the determinants of broadcaster willingness to pay is compelling.

[2] Two papers model determinants of individual match television audience size for the case of American basketball but neither includes a variable to reflect outcome uncertainty: Hausman and Leonard (1997) and

First, a majority of tickets at all Premier League grounds is allocated to season ticket holders. Published attendance data for individual matches do not distinguish between season ticket holders and purchasers of individual tickets. However, Feehan, Forrest and Simmons (2002) provide evidence, from a very large fan survey by the University of Leicester, that most season ticket holders attend all, or nearly all, games. Virtually the whole of the variance in the dependent variable of match-level attendance demand studies comes therefore from those who pay for tickets on a game-by-game basis. Unless one can assume that the purchase of season tickets, the more important component in demand, is completely unresponsive to the mean characteristics of the matches on offer, long-run elasticity of demand with respect to any match characteristic included in the regression will be underestimated. There has in fact, been no study of the relationship between the sales of season tickets and the degree of outcome uncertainty experienced in past seasons or expected to characterise future sets of matches covered by a season ticket. In the absence of appropriate treatment of the season ticket phenomenon, doubt is cast on the validity of the findings of those previous studies where season ticket sales form a majority of ticket purchases.

Second, attendance demand studies for the Premier League face the problem that, in over half the matches, demand cannot be observed because there is a sell-out of tickets. This is a modern phenomenon that has emerged since the rebranding of top-division football when the Premier League was formed in 1992. It reflects mainly an increase in attendances but also falls in capacity associated with safety improvements in stadia. By 1999, average capacity utilisation at Premier League matches exceeded ninety percent and some clubs, such as Manchester United and Newcastle, sold out every single match in the season (Dobson and Goddard (2001), pp. 322, 324). The tobit estimation technique is often appropriate in

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Kanazawa and Funk (2001) focus on the effect on audience (Nielsen) ratings of, respectively, a match featuring a ‘superstar’ and a match featuring a higher proportion of white players.

circumstances where the dependent variable is constrained; but, as Dobson and Goddard (ibid) point out, its employment depends on there being some non-constrained observations in the data set and for some clubs there are none[3]. More fundamentally, we would argue that even if there were a fair proportion of matches where the capacity constraint was non-binding, tobit estimation would be invalid in the particular case of football. For attractive matches, all tickets are sold and it is possible to guarantee attendance only by purchasing a season ticket (or occasionally by collecting a specified number of ticket stubs from past games): the ability to buy tickets for attractive fixtures depends on buying tickets for lesser games. Hence, while one observes less than the true demand for capacity constrained matches, one also observes more than the true demand for non-capacity constrained matches; and the assumptions necessary for tobit estimation are violated. Existing match-level demand studies either ignore capacity constraints or employ tobit estimation and therefore inferences drawn from coefficient estimates lack reliability.

Third, the bulk of attendees at Premier League matches are home supporters. Variation in attendance across matches reflects primarily the attendance of home fans.[4] In this circumstance, it becomes difficult to distinguish between the preference for home success and the preference for outcome uncertainty (i.e. a prospectively close and therefore exciting game). Peel and Thomas (1988) found attendance in English football games to be maximised when the probability of a home win was about 60% (Rascher (1999) had a very similar finding for baseball). Given that draws are common in soccer, a 60% probability indicates a match unusually unbalanced in favour of the home team; but it may, of course, not be possible by any reallocation of talent to ensure that all home teams have such a strong chance of winning!

[3] A similar situation prevails in, for example, American football and basketball.

Our contention is that the study of the television audiences for league games by-passes all of these problems. In television dissatisfied viewers can switch off or switch channels in a manner that is measurable. There is no division of the audience into season ticket holders and non-season ticket holders (a subscription is necessary but there is no equivalent of casual ticket sales). There is no binding capacity constraint (measured audience could in principle be constrained by the number of subscriptions but this has never happened in practice). Also, there is no 'home' team in that there is no difference in costs incurred whether one is viewing one's favoured team at home or away or whether one is a neutral for the particular fixture. There is then a better chance of detecting and reliably measuring any public taste for outcome uncertainty by a study of the 'couch potato' market than by a study of attendance demand.[5]

3. Concepts of outcome uncertainty

On the face of it, there is no obvious competitive imbalance problem in the FA Premier League compared with many other successful sports leagues. Buzzacchi, Szymanski and Valletti (2003) show that a standard measure of competitive balance, dispersion of win percent, is sharply lower than in the major leagues in the American team sports of football, baseball, basketball and (ice) hockey. This is despite the absence of labour market restrictions designed to impose greater balance and despite the fact that the majority of income from broadcasting is distributed not in equal shares but on the basis of league position (according to a formula that generates a steep and convex relationship between success and income) and the number of appearances by each club (which again favours the stronger teams). It is true

[4] This is even more true in American sports where distances between team locations are often prohibitive of attendance by travelling fans.

that there is an issue of championship dominance since there has been only one championship won by a club other than Manchester United or Arsenal since the League was founded in 1992. However aggregate attendance in every season since the Premier League began has exceeded that achieved by its predecessor league over the period from 1980 when there was much less championship dominance. Perhaps this is because nearly all the twenty clubs, for nearly all the season, remain in contention, if not for the prize of the championship, at least for qualification for one of two European competitions (sixth place and above in most seasons) or, in less happy cases, for demotion out of the Premier League (eighteenth place and below). There are therefore few 'meaningless' matches.

But do evenly balanced matches in fact attract greater audiences? Borland and Macdonald (2003) tabulate the results of 18 match-level studies of the relationship between attendance and outcome uncertainty and reveal very mixed results with only three cases where the hypothesis is supported. Szymanski (2003) likewise describes the evidence as "far from unambiguous". Out of 22 cases cited by Szymanski, 10 offer clear support for the outcome uncertainty hypothesis while seven offer only weak support and five reject the hypothesis.

Table 1 reports some studies of game-day attendance in various European football leagues which use some measure of outcome uncertainty as an explanatory variable. One group of studies uses betting odds to extract probabilities of match outcomes. Peel and Thomas (1988) pioneered the employment of betting odds to measure the probabilities of different outcomes to a match. Rascher (1999) and Welki and Zlatoper (1999) similarly proxied uncertainty of outcome by reference to betting market information (odds or point spreads) in attendance studies for baseball and American football.

[5] Empirical estimates from match-day attendance models carry greater validity when season ticket sales form a minority of ticket purchases and when stadia capacities are under-utilised. These conditions do often apply e.g,

The validity of this approach depends on an assumption that betting odds provide unbiased estimates of team win probabilities. While it is hard to doubt the ability of odds setters to assign probabilities accurately, this does not mean that posted odds will be free of bias. Levitt (2004) and Kuypers (2000) present theoretical models which demonstrate that it is profit maximising for bookmakers to distort odds away from those implied by 'true' probabilities to take account of bettor preferences. Some empirical evidence suggests that bookmakers adjust the terms of bets in response to the relative numbers of fans each team in a game is likely to have, given that fan-bettors are a significant part of the market (Forrest and Simmons, 2004; Avery and Chevalier, 1999).

Betting market biases matter in the present context. For example, a natural measure of outcome uncertainty might be the absolute difference between the probability-odds offered on a home win and the probability-odds offered on an away win. On this measure, the prospectively most uncertain games should be those where the value of the proposed variable is close to zero. But, posted odds may understate the probability of a home win and overstate the probability of an away win (home-away bias). Outcome uncertainty should then be proxied by deviation of the difference in odds not from zero but from a negative number implied by the degree of home-away bias in the betting market. A further complication is that the existence and magnitudes of biases tend to vary over time (Sauer (1998)).

A study of attendance demand in the Football League by Forrest and Simmons (2002) derived match outcome probabilities by first modelling the betting market to identify any inefficiency and then adjusting the posted odds on the basis of the results. They showed that their model yielded very different results, even qualitatively, when their outcome uncertainty

in lower division football and in some North American sports.

measure was generated from bookmaker odds adjusted for statistically significant bias compared with when they just used raw odds. This sensitivity of results to the modelling of the betting market undermines the case for using betting odds in outcome uncertainty studies. Any misspecification in the modelling of the betting market will, of course, introduce errors into the sports demand equation. To avoid the problems associated with using betting odds, we will propose here a new and simpler way of measuring ex ante uncertainty that will prove to be statistically significant in explaining the behaviour of broadcasters and the television audience.

The second group of studies reported in Table 1 uses measures of outcome uncertainty based on closeness of teams in league standings. Improved competitive balance should make for a more closely competitive league so that more matches will remain significant (i.e. relevant to championship, European qualification or relegation issues) as the season progresses to its climax. This should then lead to increased attendance demand and possibly greater TV audiences.

In their attendance demand equation, Hart, Hutton and Sharot (1975) included as their uncertainty of outcome variable the absolute difference in home and away league positions. But this is more properly interpreted as a representation of how much the game matters for final league position; it is not a measure of uncertainty of match outcome because it fails to account for home advantage (the closest games should be where the home team is ranked several places below the away team in the standings).[6]

[6] Baimbridge *et al.* (1996) and Garcia and Rodriguez (2002) utilised a quadratic form of difference in league positions in an attendance equation. In principle, this would permit implicit account to be taken of home advantage. Results would, however, be difficult to interpret since coefficients would reflect both the shape of the

Jennett (1984), for Scottish football, measured match significance by the reciprocal of the number of wins a team would need to reach the points total that would eventually prove adequate to secure the championship. His measure has been treated with scepticism since the number of points that would be enough to win the league would not have been known at the time of the match. Cairns (1987), again for Scottish football, included as regressor a dummy variable intended to signify whether a match was relevant to championship, promotion or relegation issues (relevance was sometimes defined only for the home team)[7]. Necessarily, with this approach, the definition of a game 'mattering' is ad hoc in that, for each fixture, it involves asking questions such as 'could team x still win the championship if it won y% of available points from its remaining games and other teams that might be champions won z% of available points from their remaining games?'. y is always chosen to be a high number and z a low number but there is no obvious criterion for choosing the precise values.

Despite criticisms, these studies show a statistically significant impact on match attendance from whether or not a fixture 'matters'.[8] We shall examine whether broadcasters and television viewers respond according to the degree of ex ante uncertainty of match outcome while controlling for the significance of a fixture for the settlement of league issues and for team quality.

4. The Premier League television contract

Before we present details of our models, it is necessary to understand the principal features of arrangements between the Premier League and Sky Television. From season 2004-05, partly

relationship between outcome uncertainty and league positions and that between attendance and outcome uncertainty.

[7] See also Paton and Cooke (2004) for English county cricket.

[8] Dobson and Goddard (2001, p. 178) proposed a measure of match significance based on the same sort of algorithm and it proved to raise the explanatory power of a model for forecasting match results. Presumably their measure successfully identified occasions when one team had a particular incentive to perform well.

because of pressure from European competition authorities, there was a radical increase in the proportion of matches televised live. But for the period to which our data pertain, from the 1993-94 season to the end of season 2001-02, contractual arrangements were stable. Sky Television (a satellite broadcaster also available to cable viewers who pay the appropriate subscription) was awarded exclusive rights for the live broadcast of Premier League games within the United Kingdom. Each season it could select sixty matches (sixty-six in the last year), from a total of 380, for live transmission. With some exceptions, for example around holidays, it had to choose two matches from each weekend's round of fixtures. Normally weekend matches are played on Saturday afternoons but those selected by Sky were moved to Sunday afternoon and Monday evening so that (it was hoped) there would be no impact on live attendance at other games. All Sky's choices up to Boxing Day (a holiday on the first weekday after Christmas Day) had to be made before the season began. After Boxing Day, it could choose its games as the season progressed and as the shape of the league standings developed. Each of the twenty members of the league had to feature at least once in the season; this is a light constraint and apparently non-binding since there was no case of an individual team appearing fewer than three times in a season. There was, however, also informal pressure to limit how often more popular teams were shown because season ticket holders at those clubs complained about the inconvenience of matches being shifted from Saturday afternoon. Another understanding in the contract was that Sky should favour showing 'derby' matches, i.e. those between local and regional rivals. The rationale for favouring fixtures between teams geographically close to each other was that, if a game is switched to Sunday (when public transport is poor) or to Monday evening (after work hours), it is particularly inconvenient for away fans with a long distance to travel.

5. Data

The data period was one of growth for satellite television. The number of subscribers, direct or cable, increased every year of the data period, from 2.28m. in December, 1993 to 11.22m. in December, 2001.[9] For our sample of 546 televised games, mean audience was 1.17m. The lowest recorded audience was 117,000 for Arsenal v. Coventry on March 26, 2000, and the highest was 2.86m for Arsenal v. Manchester United on November 9, 1997. Table 2 summarises some descriptive statistics of TV audiences.

Our data on audience size were the estimates made by Broadcasters' Audience Research Board Ltd. (BARB). We collected the BARB data from Monopolies and Mergers Commission (1999) for the period to November 1998 and from issues of the trade magazine *TV Sports Market* for the period subsequent to November 1998.

BARB is a not-for-profit company owned by a consortium of all the major UK broadcasters and the Institute of Practitioners in Advertising. Its estimates of audience size derive from electronic metering of all receiving and video playback equipment in a panel of homes chosen, on the basis of initial interviews in 52,000 households each year, to be representative of the UK population. The estimates take account of which equipment is playing the programme and the number of people in the room is recorded by a device known as a 'passive peoplemeter'[10]. The number watching is counted in this way every minute during each programme and the published estimate of audience size is based on an average of these minute-by-minute readings.

[9] This information was provided by Sky but it did not reveal how many of the subscribers paid the supplement required for access to the sports channels.

[10] Most peoplemeters used in the U.S require that viewers punch in the channels that they are watching. In the system used by BARB in Britain viewers merely need to indicate whether they are watching TV or not. A set-top box automatically detects the channel being viewed. This does at least remove two sources of bias: under the U.S. system households might forget to punch in the channel or might enter the wrong channel.

The survey methods employed by BARB were consistent through our data period until mid way through the final season. Although BARB endeavoured to obtain a representative sample, using multi-staged, stratified and unclustered sample design, their sample did contain some biases. Participation in BARB's survey is voluntary and it is likely that many invited households do not participate and that there is much turnover within the sample. The sample is likely to contain a disproportionate number with low opportunity costs of participating such as the elderly[11].

BARB recognised these problems of selection bias and revised its sample design to correct for earlier undersampling of audiences from lower social classes and make for improved geographic representation. For example, the London region was under-sampled in the previous ratings system.[12] Our regression model for audience size will take due account of the impact of these changes on estimated audience size but in fact only thirty (5.7%) of the televised matches in our sample took place under the new regime. This means that our results have to be interpreted with caution insofar as they may be affected by selection bias in the older reporting methods. Future work on TV sports audiences will benefit from BARB's improved sample design which contains both greater accuracy and increased sample size.

Information necessary for the calculation of the variables used as regressors in our models was obtained from various editions of the *Rothmans Football Yearbook* and (in the case of club wage bills) from various editions of the Deloitte and Touche *Annual Review of Football Finance* (Touche Ross prior to 1996). There were four instances over the nine seasons when an individual club failed to declare its wage bill and, since we used wage data to proxy team quality, matches involving Bradford in 1999-2000, Middlesborough in 2000-01 and Leicester

[11] We are grateful to an anonymous referee for alerting us to these problems. The analogous Nielsen ratings measures for U.S. TV audiences suffer from similar sources of bias.

and Derby in 2001-02 were excluded from our sample. The data set analysed comprised 3,346 matches, 522 of which were nominated for live transmission on Sky.

6. Broadcaster's choice of games

The immediate client for the Premier League is the television company which acts as purchaser of matches on behalf of its viewers and advertisers. In this section we seek to identify which match characteristics are favoured in choosing the games to show. Presumably, given collective selling of rights, broadcaster willingness to pay would be increased if favoured characteristics were present in more matches. If collective sale were abandoned in the future under pressure from the European competition authorities, perhaps all matches would be bought by some broadcaster or other but our results should indicate which factors in a match would attract the highest bids.

Over the period, Sky was able to broadcast live 522 of the 3,346 Premier League fixtures in our sample. We explore the determinants of their choices by estimating a probit model. The specification had to take into account that different considerations will have influenced choice of games in the pre-and post-Boxing Day parts of each season (the phrase pre-Boxing Day includes Boxing Day itself): for example, beyond Boxing Day we would expect clubs' current league records to be an important influence; but for games up to Boxing Day, decisions have to be made well before the start of the season and choice of regressors should reflect only information available at that time. Accordingly, our right hand side variables fall into three categories, season-long variables, pre-Boxing Day variables and post-Boxing Day variables (the latter two were constructed by interacting the relevant statistic with a pre-or post-Boxing Day dummy, as appropriate). Variable definitions are presented in Table 3.

[12] See the BARB website, www.barb.co.uk for full details of changes to their recording system.

Results from probit estimation, together with marginal effects (calculated at the conditional means of continuous independent variables and at the means of dummy variables), are displayed in Table 4. Since fixtures are organised in groups of matches, we adjust standard errors of coefficients by clustering on rounds of matches, where a round can cover either Saturday through to Monday or Tuesday through to Friday. Clustering treats errors as independent across rounds of matches while allowing for dependence within groups. Amongst season-long variables, *weekend* identifies matches (by far a majority) that took place on Saturday, Sunday or Monday: these matches were more likely to be chosen for broadcast since, in most (but not all) weeks, Sky's choice was constrained to be from the weekend programme rather than from any of the occasional midweek fixtures. *Derby* matches were much more likely than average to be selected for coverage. This could be because matches between local rivals are often closely fought, tight and tense encounters with even the potential for on-the-field violence; but again, given that we report below that any tendency for derby matches to attract higher audiences is weak, the result may merely reflect compliance with the League request (noted above) to give these matches priority in deciding which games to screen.

The current strength of teams appears to drive the broadcaster's decision on whether or not to screen a game. For matches after Boxing Day, when Sky can pick its fixtures at short notice, current season league performances can be employed in modelling as an indicator of strength. But for matches up to Boxing Day, model specification should include only information available pre-season since this is when Sky makes its choice. At this time, Sky could choose to rely on the preceding season's final league table to inform its decisions; but clubs typically retool at the end of each season and many teams will include a high proportion of new players when the fresh campaign starts in August. The quality of players assembled at each

club ahead of the new season will be readily observable by Sky when it draws up its shopping list of games for the August-December period. We adopt as our proxy for the quality of the players likely to be on show in each fixture a measure based on the sizes of the wage bill at the two clubs. Wage bills are revealed only much later, when club accounts are published (and subsequently summarised in the Deloitte and Touche *Annual Review*), but wages agreed with contracted players for the coming season are likely, in the context of a competitive and international labour market, to capture adequately the variation in quality observed across clubs by Sky's experts. Accordingly, our quality variable at the match level is *combined wages* which is the sum of the relative wages of the two teams where relative wage is the ratio of a club's wage bill for the particular season to the average wage bill in the Premier League that season.[13] Thus the mean value for *combined wages* is 2.0 by construction and the range across our 3,346 matches is from 0.65 to 3.93. The significant coefficient *combined wages* pre-Boxing Day indicates that the television company has a strong preference for relaying a match with higher quality players[14].

Our preferred measures of outcome uncertainty and match significance, introduced below, cannot be used pre-Boxing Day in the match selection equation because they rely on current season performance indicators. However, the strong negative coefficient (and the large magnitude of the associated marginal effect) on a second variable, *difference in relative wages*, is suggestive of a taste for matches between relatively closely matched teams and a distaste for games between mismatched teams.

[13] Scaling club wage bills by the League average for the season allows for inflation in player wages over time.
[14] North American gate attendance studies sometimes make use of a variable to show how many players appeared in an All-Star team or All-Pro team selected by players and/or fans. The nearest equivalent to this in football would be number of players currently selected for international games (Kuypers (1996), Garcia and Rodriguez (2002)). This suffers from the disadvantage that players in the English Premier League are selected for a wide variety of national teams which vary greatly in quality. Any mechanism for weighting quality of national teams, using FIFA rankings perhaps, would be *ad hoc*. The wage bill offers a more direct and more objective measure of team quality. Garcia and Rodriguez (2002) found for Spanish football that gate attendance

Once Boxing Day was over, Sky was able each season to give relatively short notice of which games it intended to cover. After Boxing Day, *combined wages* remains highly significant but the marginal effect is smaller in magnitude since Sky can now be guided also by current season form. In this post- Boxing Day section of the season, the selection criteria adopted by Sky appear consistent with the presumption that match significance and match outcome uncertainty are each important. Typically, crucial issues are settled at the first (champion team), seventh (Champions League or, less prestigiously, UEFA Cup qualification) and 18th (relegation) positions in the League. For nearly all clubs, certainly up to the penultimate month of the season, an improvement or deterioration in form could move them between the right and wrong sides of one of the relevant lines. To investigate match significance, we experimented with a set of dummy variables to show combinations of the following four groups of team positions in the League: first two (championship contenders, termed *Champion*), third to seventh (European qualification, denoted by *European*), eighth to 14th (*mid-table*) and 15th to 20th (relegation candidates or *relegation*). Initially, the omitted category was matches involving two mid-table sides leaving nine dummy variables for match significance, gradually reduced to five by a general-to-specific specification search.[15] For game selection, our results show that Sky, understandably, is more likely to select games involving at least one team in the top two places or in contention for European competitions compared to a game between mid-table or relegation candidates. The marginal effects on match significance dummies show declining marginal effects as one moves from games between one top team and a team also in top two, a candidate for European qualification, a

increased with number of international players on the visiting team, but not the home team. Borland and Macdonald's survey (2003) reports mixed evidence on the impact of star players on gate attendance.

[15] It is worth asking whether the broadcaster selects games on the basis of 'brand name' or reputation over and above other characteristics. We experimented with dummy variables for selection of Arsenal, Liverpool and Manchester United as teams with widespread national following and reputation but the coefficients were not significant.

mid-table team and a relegation-threatened team. Matches between European contenders outside the top two are also more likely to be selected than matches between mid-table teams or relegation candidates. Conversely, matches involving only mid-table or relegation-threatened teams are less likely to be selected.

The results from a model of the broadcaster's choice of games appear to demonstrate the appeal of a competitively balanced league in that it could generate more games that matter for the championship. But even in an unequal league, like the Premier League, our results imply that the widening of team achievement to encompass European qualification permits many games to generate some extra interest because they matter for this issue in the final standings.

For uncertainty of outcome at the level of the individual game, we propose a new and simple measure that allows for the importance of home advantage. The matches where the gap in points per game between teams is small will not be the matches where uncertainty of outcome is greatest. In English soccer, home teams win nearly twice as often as away teams, so the probability of the home team winning is much greater than the probability of the away team winning where the abilities of the two teams are the same. By contrast, uncertainty of outcome is greatest when a team towards the bottom of the standings plays host to a team well up in the standings.

Outcome uncertainty is the absolute value of the following: home advantage (measured in point per game) *plus* the home team's points per game in the current season *minus* the away team's points per game in the current season. The value of 'home advantage' is taken as the difference in the previous season between points per game won by *all* home teams and points per game won by *all* away teams (the mean value of home advantage across the nine seasons

is 0.57 points). This measure of outcome uncertainty is zero where home advantage in the league is exactly sufficient to cancel out the impact on expected outcome from a superior playing record by the visitors in a particular match. Higher outcome certainty is reflected in a smaller value of our measure.

Our way of measuring uncertainty suggests a negative sign in the probit model and we do indeed estimate a strongly significant coefficient on this variable. Television therefore appears, as one would expect, to favour screening matches where the contest is anticipated to be close. Overall, Sky has exhibited behaviour consistent with the hypothesis that competitive balance is an important factor in demand. It favoured matches of significance for some issues within the league and matches expected to be closely contested.

7. Size of Audience

Table 5 displays our results from an ordinary least squares model to account for variations in the recorded size of television audience for the games shown over the nine seasons for which we have information.[16]. The functional form is log-linear. Controls this time include dummy variables for different seasons and different months in the year (the first season and August/September are the reference categories). As with the broadcaster selection equation, we interacted our explanatory variables with two dummy variables, to represent period before and after Boxing Day. For the audience equation, these periods were chosen by experimentation with month interaction terms.

We experimented with the inclusion of individual day of week dummies but they were insignificant: Sunday and Monday audiences were not different from each other and for other

days in the week there were very few observations for any single day[17]. The variable *weekend* distinguishes Saturday-Monday games from those televised between Tuesday and Friday. Its significant negative sign may simply indicate that audience is larger when a television event is displaced from its familiar time slot. The fact that Monday viewing is as popular as Sunday suggests that broadcast on a working day is not in itself a problem for the audience. On the sign of the coefficient on *derby*, we had no strong prior. Such matches are often contested with particular passion. On the other hand, they involve teams from a single area of the country and the rest of the national TV audience may regard them as private affairs. We find some evidence (significance at 10%) of a positive impact of derby matches on TV audience. The significant coefficient on *promoted v promoted* suggests enhanced audience interest, reflecting novelty, in games between two newly promoted sides.

We tested for the possibility that the three largest clubs (Arsenal, Liverpool and Manchester United) might attract bigger TV audiences over and above other control variables. There is evidence in favour of specific positive effects on audience for games in which Manchester United or Liverpool appear. This suggests that removing the informal constraints on game selection might encourage the broadcaster to show more games involving these teams. Further, it suggests that, with individual selling of broadcast rights, these clubs would generate greater broadcast revenues than others.

The results for the season dummies indicate a rising trend in audience but only up to 1997. Thereafter, while the overall number of households with access to non-terrestrial television continued to grow, audiences appear to have been deterred by the high price for the sports

[16] The first round of matches each season was excluded from the sample for this equation for lack of current-season data.

channel add-on (£69.20 per season in 1997-98; in 1992-93, the fee had been only £11.81 per month (average realised subscription price)). It is also likely that the halt to the upward trend reflects a switch from household viewing to watching televised football in pubs and clubs. Unfortunately, we lack audience measurement for this type of viewing.

The results on the month dummies show a clear pattern with viewing highest in the midwinter months. The behaviour of the couch potato audience is therefore understandably different from that of live attendance which peaks in the Spring. England enjoys a milder climate than most of Europe but there have been recent proposals for a midwinter break or even a switch to summer play. This could be costly in terms of the value of television rights. Viewership in January is estimated to be 26% higher than in early and late season and the value of television rights is likely ultimately to reflect audience size.

Our results suggest that a primary indicator of audience interest in televised football is *combined* team quality. Viewers were drawn to matches where more expensive talent was on show. The audience was raised by more than one-quarter in matches where the clubs' players were 'worth' (in wages) twice the divisional mean. The use of a wage bill measure to proxy combined team quality in a match is novel in sports demand studies, and we would urge its consideration in models of gate attendance.[18] In contrast, empirical gate attendance studies, for football and other sports, have tended to emphasise the roles of team performance (especially the home team) and team form (see Borland and McDonald (2003)). Not

[17] Over our sample period there were just two regular slots for televised Premier League games: Sunday at 4 p.m and Monday at 8 p.m. Future work could usefully demonstrate whether audience figures respond to the greater diversity of televised match times since 2002.

[18] The only attendance demand study to use wage bills to proxy team quality is Garcia and Rodriguez (2002). They utilised home team and away team 'budgets' (predicted wage bills) in their study of Spanish game-day attendance but found that home team budget was negatively related to attendance while away team budget had a positive impact. They did not consider a variable for the combined match team budgets.

surprisingly these do not appear to be important in our context where the national audience is likely to comprise mainly 'neutrals'.[19]

It is possible that the wage bill measure used to proxy team quality incorrectly omits those teams who perform remarkably well while operating on a small budget. We proceeded to capture 'overperforming' teams by regressing team performance (measured by points per game) on relative wage bill in a fixed effects regression with season-club observations (Simmons and Forrest (2004)). The estimates of this model for our sample period were, with absolute t-statistics in parentheses:

Points per game = 0.981Relative wage - 0.227Relative wage squared + Fixed effects
(2.57) (1.63) n = 180, R^2 = 0.53

If actual points per game were greater than one standard deviation away from the predicted points per game, inclusive of fixed effect, then the particular team-season observation was entered as a dummy variable in the audience equation. Eight such team-season effects were significant at 10%. For example, Blackburn Rovers won the Premier League in 1994-95 with a modest wage bill. Televised matches involving this team in this season are shown to have been particularly attractive *ceteris paribus*. Ipswich finished 5th in 2000-01 and qualified for the UEFA Cup with a relatively small wage bill. Their televised games drew higher audiences.

We noted above that Sky was more likely to select matches involving teams who were contenders for either championship or European qualification than games without such teams. From the significant positive coefficients on matches involving championship contenders, audiences appear to be particularly attracted to matches featuring at least one team in the top

[19] Experimentation with points per game, recent form and goals scored failed to deliver significant coefficients when added to our model, irrespective of whether teams were classified as home and away or 'big' and 'small'.

two places. Matches involving potential European qualifiers only generate additional audience size, *ceteris paribus*, if a championship contender is the opponent. Apart from matches between the top two teams, which draw bigger audiences regardless of scheduling, our match significance dummies are only relevant post- Boxing Day when league rankings have settled down to the point where it is clear which teams will be candidates either for European qualification or relegation[20].

The impact of our *outcome uncertainty* variable depends on which part of the season the match is transmitted. In the first half of the season, the coefficient is insignificant but in the second we find a strong negative coefficient, significant at 1%, in line with the hypothesis that there is more appeal to a game where the result is anticipated as likely to be close. Our support for influence of outcome uncertainty is more in line with the findings of Garcia and Rodriguez (2002) and Peel and Thomas (1988) for football, and Welki and Zlatoper (1999) for American football, than the football demand studies of Baimbridge *et al* (1996) and Czarnitski and Stadtmann (2002).[21]

The lack of explanatory power from the outcome uncertainty variable in the first half of the season possibly reflects its weakness that, until several rounds of games have been observed, teams' points performances may be only weakly correlated with their perceived strength since there is understood to be a lot of noise in the results of any individual round of matches. Further, particular clubs may be known to have played against a selection of clubs skewed in average quality, upwards or downwards. Other ways of measuring match outcome uncertainty face similar problems – Dobson and Goddard (2001) report that both bookmaker

[20] None of the other match group dummies delivered significant coefficients at 10%.
[21] Czarnitski and Stadtmann (2002) found a significant role for 'reputation' of teams in their study of game-day attendance in German football. We experimented with a similar measure but could not find any significance in our audience demand model.

odds and their own forecasting model become more accurate guides to results as the season progresses.

As noted in our literature review, existing empirical studies of gate attendance across various sports are ambivalent about the significance of outcome uncertainty. We have offered evidence here in support of the notion that outcome uncertainty is an influence on demand for a large and increasingly important constituency, the TV audience, after controlling for team quality, for matches involving the top two placed sides and for matches involving 'overperforming' teams.

However, although outcome uncertainty is a significant determinant of audience size, the magnitude of its impact appears to be modest relative to the prominence of the issue in discussion of sports policy. Our measure has a mean of 0.31 with a standard deviation of 0.46 (and a range from close to zero to 2.29). With all variables, including outcome uncertainty, set at their respective mean values (defined over the set of all, not just televised, games), predicted audience size for a match played after Boxing Day is 888,457. 'Improving' outcome uncertainty by one standard deviation, i.e. to not very far from complete equality in the prospects of the two teams in the particular match, would raise predicted audience size by 74,152, an increase of only 6.3%. That a game much more balanced than the typical match would be likely to raise broadcaster willingness-to-pay by only 6% (assuming that television companies are just buying viewers on behalf of advertisers) suggests that even radical measures to change the degree of competitive balance in the Premier League would have a limited impact on the incomes of the member clubs.

8. Conclusions

The television audience for Premier League Football, as for other major sports events, dwarfs that in the stadium. This is reflected in the fact that broadcast rights revenue now exceeds that from ticket and other match day income and underpins the high remuneration for players in the modern era. It is not so far reflected by published studies of the determinants of television demand. Here we have attempted to model the preferences of a broadcaster selecting games to be screened and to model final audience figures. There is some evidence – probably more clear-cut than that in the existing attendance demand literature – that both broadcaster and audience favour matches between teams competing for a similar league position and matches expected to be close.

In modelling expected closeness of contest, we have proposed a new measure that gives due weight to the phenomenon of home advantage. Qualitatively, the evidence from employment of this measure is, as just implied, consistent with the argument of the Premier League that League policy should attempt to promote competitive balance. However the magnitude of the impact of variations in outcome uncertainty on the size of the television audience is modest. Further it cannot be assumed that collective selling is the most appropriate way of promoting increased equality of financial and playing resources within the division. On the other hand, if the league generates monopoly profits from such collusion, it will be better resourced for raising playing standards by recruiting the best players worldwide. Our modelling of audience size reveals a strong interest on the part of viewers in the quality of talent likely to be on the field in a particular fixture. Our overall conclusion is that outcome uncertainty does matter for the English Premier League ‘couch potato’ audience- but only up to a point.

References

Avery, C. and Chevalier, J. (1999) 'Identifying investor sentiment from price paths: the case of football betting', *Journal of Business*, 72:493-521.

Baimbridge, M., Cameron, S. and Dawson, P. (1996), 'Satellite television and the demand for football: a whole new ball game?' *Scottish Journal of Political Economy*, 43:317-333.

Borland, J. and Macdonald, R. (2003) 'Demand for sport', *Oxford Review of Economic Policy*, 19: 478-502.

Buzzacchi, L., Szymanski, S. and Valletti, T. (2003) 'Equality of opportunity and uncertainty of outcome: open leagues, closed leagues and competitive balance', *Journal of Industry, Competition and Trade*, 3:167-186.

Cairns, J. (1987) 'Evaluating changes in league structure: the reorganisation of the Scottish Football League', *Applied Economics*, 19:259-275.

Cave, M. and Crandall, R. (2001) 'Sports rights and the broadcast industry', *Economic Journal*, 68:F4-F26.

Czarnitzki, D. and Stadtmann, G. (2002) 'Uncertainty of outcome versus reputation: empirical evidence for the first German football division', *Empirical Economics*, 27:101-112.

Deloitte and Touche (various years) *Annual Review of Football Finance*, Manchester, Deloitte and Touche.

Dobson, S. and Goddard, J. (2001) *The Economics of Football*, Cambridge, Cambridge University Press.

Feehan, P., Forrest, D. and Simmons, R. (2002) 'Premier League soccer: normal or inferior good?' *European Sport Management Quarterly*, 3:31-45.

Forrest, D. and Simmons, R. (2002) 'Outcome uncertainty and attendance demand in sport: the case of English soccer', *The Statistician*, 51(2):229-241.

Forrest, D. and Simmons, R. (2004) 'Sentiment in the soccer betting market', working paper, University of Salford.

García, J. and Rodríguez, P. (2002) 'The determinants of football match attendance revisited: empirical evidence from the Spanish Football League', *Journal of Sports Economics*, 3:18-36.

Hart, R., Hutton, J. and Sharot, T. (1975) 'A statistical analysis of association football attendances', *Applied Statistics*, 24:17-27.

Hausman, J. and Leonard, G. (1997) 'Superstars in the National Basketball Association: economic value and policy', *Journal of Labor Economics*, 15:586-624.

Jennett, N. (1984) 'Attendances, uncertainty of outcome and policy in Scottish League football', *Scottish Journal of Political Economy*, 31:176-198.

Kanazawa, M. and Funk, J. (2001) 'Racial discrimination in pro basketball', *Economic Inquiry*, 39:599-608.

Kuypers, T. (1996) *The beautiful game? An econometric study of why people watch English football*, Discussion Paper in Economics 96-01, University College, London.

Kuypers, T. (2000) 'Information efficiency: an empirical study of a fixed odds betting market', *Applied Economics*, 32:1353-1363.

Levitt, S. (2004) 'Why are gambling markets organised so differently from financial markets', *Economic Journal*, 114, 223-246.

Paton, D. and Cooke, A. (2004) 'The demand for county cricket: an economic analysis', *Journal of Sports Economics*.

Peel, D. and Thomas, D. (1988) 'Outcome uncertainty and the demand for football', *Scottish Journal of Political Economy*, 35:242-249.

Peel, D. and Thomas, D. (1992). 'The demand for football: some evidence on outcome uncertainty', *Empirical Economics*, 17: 323-331.

Rascher, D. (1999) 'A test of the optimal positive production network externality in Major League Baseball' in Fizel, J., Gustafson, E. and Hadley, L. (eds), *Sports Economics: Current Research*, New York, Praeger.

Restrictive Practices Court (1999) Premier League Judgement, 28th July, 1999, E & W No.1.

Rollin, J. (various years) *Rothmans Football Yearbook*, London, Headline.

Sauer, R. (1998), 'The economics of wagering markets', *Journal of Economic Literature*, 36: 2021-2064.

Simmons, R. and Forrest, D. (2004), 'Buying success: Team performance and wage bills in U.S and European sports leagues' in Fort, R. and Fizel, J. (eds.) *International Sports Economics Comparisons*, New York: Praeger.

Szymanski, S. (2003) 'The economic design of sporting contests: a review', *Journal of Economic Literature*, 41:1137-1187.

Welki, A. and Zlatoper, T. (1999), 'US professional football game-day attendance', *Atlantic Economic Journal*, 27: 285-298.

Table 1 Studies of outcome uncertainty in football match-day attendance demand

Study	Sport	Measure of outcome uncertainty	Findings
Outcome uncertainty derived from betting odds			
Peel and Thomas (1988)	English football Divisions 1 to 4 1981-82	Probability of a home win	Significant
Peel and Thomas (1992)	English football Divisions 1 to 4 1986-87	Linear and quadratic measures of home-win probability	Coefficients of linear and quadratic probabilities negatively significant and positively significant respectively
Czarnitzki and Stadtmann (2002)	German football First division 1996-97 and 1997-98	Linear and quadratic measures of home-win Probability	Insignificant
Forrest and Simmons (2002)	English football Divisions 1 to 3 1997-98	Ratio of probability of home win to probability of away win	Significant
Kuypers (1996)	English football Premier League 1993-94	Difference in maximum and minimum probabilities of home-win, draw and away-win	Insignificant
Outcome uncertainty based on league standings			
Baimbridge et al (1996)	English football FA Premier League 1993-94	Linear and quadratic of absolute difference in home and away teams' league positions	Insignificant
Garcia and Rodriguez (2002)	Spanish football 1992-93 to 1995-96	Linear and quadratic of difference in home and away teams' league positions	Both positive and significant
Hart et al (1975)	English football Four football clubs 1969-70 and 1970-71	Log difference in league positions	Weak support

Table 2 Descriptive statistics for TV audience (millions)

Season	Mean	Standard deviation	Minimum	Maximum
All	1.167	0.438	0.117	2.860
1993/94	0.820	0.225	0.395	1.482
1994/95	0.973	0.316	0.532	2.005
1995/96	1.278	0.444	0.661	2.753
1996/97	1.464	0.418	0.688	2.600
1997/98	1.400	0.484	0.118	2.860
1998/99	1.240	0.418	0.307	2.578
1999/2000	1.076	0.406	0.117	2.058
2000/01	1.088	0.350	0.202	1.940
2001/02	1.167	0.438	0.401	2.291

Table 3 Variable definitions

TV Audience

Audience estimates for Sky-televised matches as listed in Monopolies and Mergers Commission (1999) and various issues of *TV Sports Market*.

combined wages

The combined relative wage of the two clubs in a fixture. *Relative wage* is the wage bill for a club in the particular season divided by the mean wage bill in the Premier League that season.

difference in relative wages

The difference in the *relative wage* figures for the two clubs in a fixture.

promoted v. promoted

Dummy variable set equal to one where a match features two clubs newly promoted to the Premier League from the start of the current season.

outcome uncertainty

Home advantage *plus* points-per-game to date of the home team *minus* points-per-game to date of the away team, where home advantage = mean points-per-game achieved by all home teams in the previous season *minus* points-per-game achieved by all away teams in the previous season.

derby

A dummy variable set equal to one for fixtures between local or regional rivals (full list available from the authors).

weekend

A match played as part of a weekend round of fixtures, i.e. played on Saturday, Sunday or Monday.

oct, nov, dec, jan, feb, mar, apr/may

Dummy variables to represent the month of a fixture.

season 94/95, season 95/96, season 96/97, season 97/98, season 98/99, season 99/00, season 00/01, season 01/02

Dummy variables to represent the season a fixture took place.

champion, champion v European, champion v mid-table, champion v relegation, European v European

Dummy variables to represent matches between: two teams in top 2 places, team in top 2 versus team in positions 3 to 7, team in top 2 versus team in positions 8 to 14, team in top 2 versus team in positions 15 to 20, team in positions 3 to 7 against similarly placed team. Preliminary model contains additional dummies based on combinations of these groups.

BARB

A dummy variable to represent the period from January 1, 2002 when British Audience Research Board Ltd. had in place revised methodology for recruiting its sample of viewers.

Table 4 Probit estimation for selection of matches for broadcasting

	coefficient	*marginal effect*	*(absolute) t-statistic*
Season-Long Variables			
Derby	0.472	0.130**	3.47
Weekend	0.205	0.043**	3.20
Pre-Boxing Day Variables			
Combined wages	0.546	0.121**	9.37
Difference in relative wages	-0.527	-0.117**	4.44
Post-Boxing Day Variables			
Combined wages	0.424	0.094**	7.33
Outcome uncertainty	-0.190	-0.042*	2.22
Champion v champion	1.255	0.428*	2.37
Champion v European	0.897	0.284**	4.90
Champion v mid-table	0.607	0.175**	4.10
Champion v relegation	0.422	0.114**	2.74
European v European	0.354	0.093*	2.10
N	3346		
Pseudo-R^2	0.084		

Notes: t- statistics are computed with standard errors adjusted for clustering on rounds of matches.
In Tables 4 and 5, ** indicates significance at the 1% level and * indicates significance at the 5% level.

Table 5 Ordinary least square results for audience demand

Dependent variable: natural log of TV audience		
	Coefficent	***(absolute) t-statistic***
Constant	12.87**	176.8
Combined wages	0.241**	9.00
Outcome uncertainty (pre-Boxing Day)	-0.002	0.06
Outcome uncertainty (post-Boxing Day)	-0.138**	2.78
Promoted v promoted (pre-Boxing Day)	0.149**	3.09
Derby	0.074	1.83
Weekend	0.084*	2.32
Champion versus:		
Champion (pre-Boxing Day)	0.237**	5.55
Champion (post-Boxing Day)	0.296**	3.22
European (post-Boxing Day)	0.183**	3.23
Mid-table (post-Boxing Day)	0.210**	3.37
Relegation (post-Boxing Day)	0.172**	2.82
Manchester United	0.087*	2.30
Liverpool	0.061	1.81
Arsenal 1997-98	0.327**	3.17
Aston Villa 1995-96	0.154**	2.98
Blackburn 1994-95	0.342**	3.98
Ipswich 2000-01	0.240	1.81
Leeds 1999-2000	0.214*	2.19
Leicester 1999-2000	0.325**	3.11
Nottingham Forest 1994-95	0.109	1.83
Tottenham 1995-96	0.113	1.91
Oct	0.035	0.96
Nov	0.100*	2.53
Dec	0.147**	4.59
Jan	0.263**	4.90
Feb	0.187**	3.11
Mar	0.130	1.88
Apr/May	-0.042	0.68
Season 94/5	0.117**	3.33
Season 95/6	0.355**	8.64
Season 96/7	0.570**	14.35
Season 97/8	0.435**	7.70
Season 98/9	0.401**	9.43
Season 99/00	0.196**	2.66
Season 00/01	0.274**	5.25
Season 01/02	0.411**	7.44
BARB	-0.219**	2.74
R^2	0.56	
N	522	