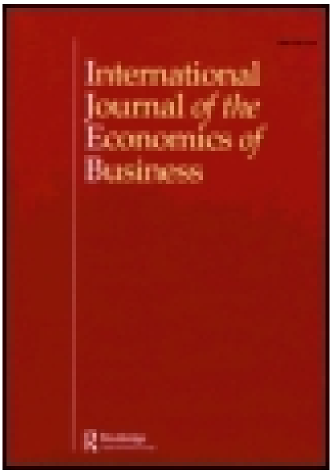

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Uncertainty of Outcome or Star Quality? Television Audience Demand for English Premier League Football

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Uncertainty of Outcome or Star Quality? Television Audience Demand for English Premier League Football

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ABSTRACT *This paper presents new evidence on the relevance of uncertainty of outcome for demand for sports viewing. Using television viewing figures for eight seasons from the English Premier League, we show that uncertainty of outcome does not have the hypothesised effect on television audience demand. Separating uncertainty of outcome effects by season, the results show that, at best, uncertainty of outcome had imprecise effects on audiences in earlier seasons, but zero effects in later seasons. Television audiences have evolved to exhibit preferences for talent. We suggest that the notion of a pure sporting contest in which uncertainty of outcome matters is no longer relevant and more important is the extent to which sports teams and leagues can increase the quality of the talent on show.*

Key Words: Broadcasting; Demand; Uncertainty of Outcome; Soccer; Football; Superstars.

JEL classifications: L82, L83.

1. Introduction

Economic analyses of professional team sports have generally been different to those of other markets. Unlike conventional markets in which competition is encouraged, economic cooperation is often regarded as a necessary condition in order to maximise consumer welfare. Neale's (1964) seminal contribution appraised the peculiar economics of professional sport. Neale noted, among other things, that monopoly practices were undesirable and there was a need to maintain uncertainty of sporting outcomes. For professional sport to thrive, the presence of viable competitors is desirable so that the unpredictability of sporting outcomes is maximised. Essentially, the values of sporting contests are maximised if rivals are evenly matched, as this creates *uncertainty of outcome*.

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Attempts to maximise uncertainty of outcome in professional sports have seen the introduction of policies aimed at equalising the playing strengths of teams organised in leagues. In North American sports, the use of player drafts, salary caps, luxury taxes, and revenue sharing are aimed at maintaining competitive balance. In Europe, and more specifically European soccer, similar schemes are not as prevalent, partly due to the overriding principle of free movement of labour. Players are traded freely, although with some constraints relating to work permits for non-EU players. Consequently, talent generally migrates to big-budget teams where salaries are likely to be at their highest. The only practice that might have an impact on equalising playing strength is the distribution of broadcast revenue, but policies on this vary across leagues. For example, since the start of the English Premier League in 1992, broadcast revenues have been systematically shared between its member clubs, whereas clubs negotiate broadcast rights on an individual basis in Spain. Irrespective of whether policies to maintain some form of equality between teams actually achieve the desired outcome, league authorities have often defended these policies on the grounds of preserving uncertainty of outcome. However, an important consideration for policymakers is whether preserving uncertainty of outcome is actually welfare maximising.

The relevance of uncertainty of outcome needs to be reassessed in the era of modern professional sports. As a theoretical conjecture that was first put forward in the 1950s (Rottenberg 1956), it has strong merits; the validity of any sporting contest surely depends on the comparative strengths of rivals involved and whether outcomes are predetermined. However, there is a need for such a conjecture to be empirically validated, particularly if it is going to be the basis of policymaking and management practice. This is even more relevant, as there have been numerous changes occurring in professional sports. Specifically, in the past, the audiences for professional team sports have predominantly been stadium goers, and they have been the dominant source of revenue for leagues and teams. More recently, however, globalisation and advances in technology have attracted new consumers, and broadcasting is now a more dominant source of revenue. Many of the world's leading sports' leagues now generate the majority of their revenue from the sale of rights to broadcasters who in turn broadcast matches across different platforms and territories (Cave and Crandall 2001; Solberg 2007). According to Deloitte data, in the 2010–11 season, revenue from broadcasting accounted for 52% of total revenue in the English Premier League, 45% in Spain's Primera Liga, and 60% in Italy's Serie A. Given the growing importance of broadcasting and television audiences compared with the traditional markets of stadium goers, the consideration of uncertainty of outcome should not be limited to consumers who attend sporting contests live at stadia. Television audiences and their preferences for outcome uncertainty should be given greater prominence in empirical analysis. Unfortunately, the data needed for this task tend to be elusive.

This paper examines the economic importance of uncertainty of outcome among television audiences in the English Premier League. The results show that the overall impact of uncertainty of outcome on television audiences is not significantly different from 0. Separating the impact of uncertainty of outcome across different seasons is revealing. The impact of uncertainty of outcome on television audiences in earlier seasons is significant but only at the 10% level.

As the seasons progress from earlier to more recent ones, the impacts of outcome uncertainty fall to 0. Rather than valuing contests in which outcomes are uncertain, television audiences now have a preference for matches in which the quality of talent (proxied here by the clubs' wage bills) is high. The change in preference from uncertainty of outcome to quality of playing talent captures a fundamental shift. "Pure" sporting contests are no longer of value and have been superseded by entertainment to be delivered by sports superstars.

The rest of the article is organised as follows. Section 2 reviews the literature on the relationship between outcome uncertainty and attendance demand in sports. Section 3 presents the setting, while Section 4 sets out our data set and empirical models. The results are discussed in Section 5, and the final section offers concluding remarks.

2. Literature on Uncertainty of Outcome

The extent to which uncertainty of outcome positively impacts consumer demand and maximises consumer welfare is far from unambiguous (Szymanski 2003). However, the need to preserve it has been defended by league authorities, and the English Premier League is no exception (Restrictive Practices Court 1999). Many studies have investigated the relationship between uncertainty of outcome and demand across a variety of leagues and sports. For the most part, these have concentrated on demand for stadium attendance.

Uncertainty of outcome can be viewed at three levels: match level, seasonal dimension, and long run (Borland and Macdonald 2003; Dobson and Goddard 2011; Szymanski 2003). The focus of this paper is uncertainty of outcome at the match level.

In baseball, Knowles, Sherony, and Haupert (1992) examine the effects of uncertainty of outcome on game-day attendance. Using the probability of a home win as their measure of uncertainty of outcome and controlling for a series of factors, they find in favour of the hypothesis that as the home team's (or the away team's) probability of winning became more (less) certain, attendances declined. Attendances were maximised when the home team's win probability was 0.6, indicating that stadium goers have a preference for a home win but not dominance. Lee and Fort (2008) and Mills and Fort (2014) similarly examine uncertainty of outcome and attendance in baseball across a long period, from 1901. However, they do not find in favour of uncertainty of outcome effects at the game level. They do find some evidence in favour of play-off uncertainty. Coates, Frick, and Jewell (forthcoming) also study baseball attendance demand, but their results support 'loss aversion' and directly contradict the uncertainty of outcome hypothesis. They note that out of 24 attendance demand studies surveyed, only four gave support for the outcome uncertainty hypothesis. Analyses of uncertainty of outcome in other sports include international cricket (Sacheti, Gregory-Smith, and Paton 2014), rugby (Owen and Weatherston 2004a; 2004b), NBA basketball (Rascher and Solmes 2007), college football (Paul, Humphreys, and Weinbach 2012), American football (Paul, Wachsman, and Weinbach 2011), and soccer (Buraimo, Forrest, and Simmons 2007; Buraimo and Simmons 2008; Czarnitzki and Stadtmann 2002; Pawlowski 2013).

There have been a limited number of studies that have modelled television audience demand and even fewer modelling the effects of uncertainty of outcome on television demand. Forrest, Simmons, and Buraimo (2005) were among the first to examine the effects of uncertainty of outcome among television audiences and found that uncertainty of outcome did have the theorised impact on audience demand. Buraimo and Simmons (2009) analysed demand for both gate attendance and television audiences in Spanish league soccer and found that stadium goers disliked uncertainty of outcome. However, television audiences had a preference for it. Tainsky and McEvoy (2012) also examined the effects of uncertainty of outcome on the size of television audiences in the NFL and found that greater uncertainty resulted in greater audience demand in line with the hypothesis. Alavy, Gaskell, and Szymanski (2010) used minute-by-minute measures of television audience demand in English league football and found in favour of uncertainty of outcome. However, the progression of the match and the score line were dominant factors in determining the level of television audiences.

Another strand of literature examines the effects of star quality or brands on audience demand. Studies finding some effects of star quality include Berri, Schmidt, and Brook (2004) on National Basketball Association, and Brandes, Franck, and Nüesch (2008), Czarnitzki and Stadtmann (2002), and Pawlowski and Anders (2012) all on German Bundesliga. These studies all relate to gate attendance and revenues, and do not consider the effects of star quality on broadcast audiences, which is our concern in this paper. Previous analyses of outcome uncertainty have relied on stadium attendance demand models, partly because television audience data are typically difficult and expensive to obtain. Using a rare television ratings data set from the 2000–01 to 2007–08 seasons, we examine the impact of uncertainty of outcome on the size of television audiences.

3. The Setting

The setting for this study is the English Premier League. The English Premier League was established in 1992 and currently comprises 20 teams. The establishment of the Premier League coincided with advances in technology which brought about satellite broadcasting and the entry of pay-television operators. Their emergence saw a dramatic increase in broadcast revenue accruing to the top tier of English football. Table 1 shows the rights values to the English Premier League since it started. The increases in broadcast revenues have made it the most valued soccer league in Europe.

The connection between broadcasting (increase in rights values, revenue sharing among clubs, and number of televised games) and the clubs' motivation to spend large sums in the labour market is an important one (Cox 2012). The desire to maximise wins means that clubs are motivated to increase their spending in the labour market (see Table 2). The effect of an increase in wage-bill spending by clubs in the league is substantial. The migration of star-player talent to the English Premier League makes it a very attractive spectacle to viewers. Broadcasters are willing to invest in this league so as to maximise television audiences, advertising revenues, and subscriptions which in turn helps maximise their profits.

Table 1. Rights fees for English Premier League from 1992–93 to 2013–14 (Baimbridge, Cameron, and Dawson 1996; Buraimo 2012)

Year	Duration of Contract (years)	Broadcasters	Matches per Season	Mean Annual Rights Fee (£m)	Rights Fee per Match (£m)
1992	5	BSkyB	60	52	0.87
1997	4	BSkyB	60	199	3.32
2001	3	BSkyB	66	371	5.62
2004	3	BSkyB	88	341	3.88
2007	3	BSkyB and Setanta*	92 and 46	567	4.11
2010	3	BSkyB and ESPN	115 and 23	594	4.30
2013	3	BSkyB and BT	116 and 38	1,012	6.58

*Setanta's administration saw its final season's rights bought by ESPN.

Up until 2003–04, BSkyB, the principal broadcaster, had a monopoly over Premier League broadcasts, and the number of games was limited to 66 per season. Consequently, consumer demand was restricted to a limited number of games. However, the European Commission was unhappy with both the market structure and the limited outputs (Harbord and Szymanski 2004). In an effort to keep the Commission and other competition authorities at bay, the league increased the rights package to four packages with a total of 138 games.[1] The intention of this restructuring was to allow smaller broadcasters to enter the market. Although more and smaller rights packages were available, BSkyB still acquired the rights to all four packages. BSkyB's monopoly continued, but consumers now had a greater number of matches to view (88 matches per season). Whilst the net effect was a reduction in the mean television audience rating, the total audience across all matches increased by 176,000 viewers. This suggests that the previous monopoly arrangements adversely affected consumer welfare. For the 2007–08 season, the European Commission ruled that no single broadcaster should acquire all live rights. It was only then that smaller broadcasters entered the market. Setanta was the first and while its involvement in the market was short-lived (Buraimo 2012), the subsequent entries of ESPN and, most recently, British Telecom (BT) represented competition in a market that had been monopolised by BSkyB for 15 years. The broadcast rights for the period 2013–14 to 2015–16 generated £3.04 billion for the English Premier League (Hughson 2013). It is this increase in economic significance in the broadcast market for sport which warrants an empirical analysis of the effects of uncertainty of outcome and superstars on television audience demand.

4. Data and Model

Audience data from the 2000–01 to 2007–08 seasons inclusive were obtained from the print versions of the publication *TV Sports Markets*. The data are limited to these seasons, and whilst extending the data would be desirable, this is not feasible, since the print version of the publication ceased after 2008.

While the source of data is *TV Sports Markets*, the origin is the British Audience Research Board (BARB), a not-for-profit limited company funded by the major broadcasters in the UK and the Institute of Practitioners in

Advertising. BARB is the official source for television audience viewing figures in the UK. Audience sizes derive from more than 30,000 electronic viewing devices in a sample of more than 5,100 households (http://www.barb.co.uk). These devices measure the number of people watching a programme when first transmitted and also when viewed on playback. The data on viewers are captured on a minute-by-minute basis and then averaged across the duration of the programme to generate audience ratings.[2] Unlike the Nielsen Ratings used in the United States which measure the share of the population in designated market areas, the UK audience ratings are the estimated number of individuals watching the programme. Using multistaged, stratified, and unclustered surveys, the viewing figures are then extrapolated for the whole of the UK population (http://www.barb.co.uk).

Table 3 provides summary statistics for the television audience ratings across the sample period. From the summary data, there was a steady increase in the mean television audience rating from 2000–01 to 2003–04. Since this peak, per-match audience ratings have declined. The decline coincides with the structural change in broadcasting regime.

Over the 2000–01 to 2007–08 seasons, a total of 660 out of 3,040 games were televised. The effective sample of the audience data set comprises 631 televised games. A small number of observations (29 televised games) were dropped due to missing data. The mean television audience rating was 978,647.[3] Note that the viewing ratings relate to domestic households only and do not include pubs and social clubs where games might be shown.

The television audience rating for a match involving teams i and j in season t is modelled as follows:

$$\ln\left(AUDIENCE_{ijt}\right) = \alpha X_{ijt} + \beta Z + \epsilon_{ijt} \tag{1}$$

where X_{ijt} is a vector of independent variables and Z is a vector of team, month, and season fixed effects, and ϵ_{ijt} is the disturbance term. A peculiar feature of the market for televised English Premier League games is that not all games are televised, as the broadcasters have some degree of freedom over match selection. If games were modelled using ordinary least squares (OLS), the estimates may be biased if there are differences in the characteristics of

Table 2. English Premier League wage bill and relative wages by season

	Wage (in millions of £)				Relative Wage (mean = 1)		
Season	Mean	St. Dev.	Minimum	Maximum	St. Dev.	Minimum	Maximum
2001–02	35.02	14.87	18.22	62.22	0.426	0.512	1.944
2002–03	36.78	15.11	11.37	70.46	0.424	0.303	2.090
2003–04	39.38	22.84	19.28	115.57	0.584	0.475	2.829
2004–05	38.47	22.28	16.92	108.89	0.573	0.419	2.695
2005–06	43.27	26.79	17.35	114.00	0.598	0.383	2.516
2006–07	47.36	28.81	17.10	132.82	0.591	0.366	2.754
2007–08	59.28	36.70	26.11	171.62	0.652	0.376	2.974
2008–09	65.59	36.35	29.75	165.61	0.537	0.448	2.518
2009–10	69.96	42.57	22.37	172.55	0.608	0.319	2.479

Table 3. Television audience ratings for English Premier League (in millions)

	N	Mean	St. Dev.	Minimum	Maximum
By season					
2000–01	60	1.09	0.35	0.20	1.94
2001–02	66	1.17	0.44	0.40	2.29
2002–03	66	1.36	0.52	0.27	3.44
2003–04	66	1.36	0.48	0.57	2.69
2004–05	88	1.22	0.56	0.41	3.14
2005–06	88	1.21	0.54	0.39	3.02
2006–07	88	1.18	0.55	0.22	2.95
2007–08	137	0.98	0.57	0.20	2.78
By broadcaster					
Setanta	46	0.45	0.16	0.20	0.77
BSkyB	613	1.23	0.51	0.20	3.44

televised and non-televised games. Consequently, there might be a need to model not just television audience demand but also the broadcasters' choice of games to televise.

The Heckman selection model (Heckman 1979) can be used to model equation (1) as part of an estimation procedure which first uses maximum likelihood estimation to model the likelihood of a game being selected for broadcasting and, conditional on being broadcast, the size of the television audiences. The following equation models selection:

$$\text{Prob}\left(TELEVISED_{ijt}\right) = \Phi(\gamma Y_{ijt} + \lambda Z + \varepsilon_{ijt}) \tag{2}$$

where $TELEVISED_{ijt}$ is a dummy variable which takes the value of 1 if the game between team i and team j was televised in season t and 0 otherwise, Y_{ijt} is a vector of independent variables which include X_{ijt}, and $\Phi(.)$ is the standard normal distribution function. The error term ε_{ijt} has a mean value of 0 and is normally distributed with a variance of 1. If there are characteristics that distinguish televised from non-televised games and these features influence the broadcasters' selection, then the correlation coefficient ρ, between ϵ_{ijt} and ε_{ijt} will be statistically different from 0, and therefore the estimates in the television audience equation derived using OLS will be biased and the Heckman selection model offers more reliable estimates. The Heckman selection model is an appropriate estimation procedure for establishing *if there are factors* that affect whether games are televised but not the size of the audience if televised. The existence of such factors is *required* for identification. In this respect, equation (2) is the first part of the Heckman selection model, and equation (1) is the second part. If $\rho = 0$, then the estimates from Heckman will be similar to those of OLS. Below, we report both Heckman and OLS estimates of television audience demand.

In studies of gate attendance demand, it is normal to treat the teams involved in the contest as home and away. However, the concepts of home and away teams in the televised market are irrelevant, as there is no difference in the cost of watching the games for home, away, and neutral fans. Any group of fans could dominate the others in the televised market, unlike

Table 4a. Description of summary statistics

Variable	Description
COMBINED RELATIVE WAGE	A team's relative wage is its wage bill for a give season divided by the mean wage bill for that season. COMBINED RELATIVE WAGE is the sum of the two teams' relative wages.
ABSOLUTE DIFFERENCE IN RELATIVE WAGE	This the absolute difference in the two teams' relative wage bill.
COMBINED LAG POINTS PER GAME	This is the combined points per game from the previous season of the teams involved in the match.
ABSOLUTE DIFFERENCE IN LAG POINTS PER GAME	This is the absolute difference in points per game from the previous season of the teams involved in the match.
COMBINED POINTS PER GAME	This is the sum of both teams' points per game prior to the match. Points per game is the ratio of the total number of points to the number of games played prior to the match.
ABSOLUTE DIFFERENCE IN POINTS PER GAME	This is the absolute difference in the teams' points per game prior to the match. Points per game is the ratio of the total number of points to the number of games played prior to the match.
CHAMPION CONTENTION	This is a dummy variable that takes the value of 1 if either of the teams in the match can win the championship if it were to win all its remaining games while others only take an average of one point from their remaining games and 0 otherwise.
EUROPE CONTENTION	This is a dummy variable that takes the value of 1 if either of the teams in the match can qualify for either the Champions League or the Europa Cup but not win the championship if it were to win all its remaining games while others only take an average of one point from their remaining games and 0 otherwise.
RELEGATION CONTENTION	This is a dummy variable that takes the value of 1 if either of the teams in the match can be relegated if it were to win all its remaining games while others only take an average of one point from their remaining games and 0 otherwise.
SETANTA	This dummy variable is 1 if the match was televised by the broadcaster Setanta and 0 otherwise. If 0, the match was televised by BSkyB.
OTHER MATCHES	This is a dummy variable that takes the value of 1 if there are other matches being broadcast at the same time and 0 otherwise.
DERBY	This is a dummy variable that takes the value of 1 if the match involves teams who are historical or local rivals and 0 otherwise.
WEEKDAY	This is a dummy variable that take the value of 1 if the game is televised on Monday to Friday inclusive and 0 otherwise.
FIRST HALF	This is a dummy variable that takes the value of 1 if the match is played between August and December inclusive and 0 otherwise.
SECOND HALF	This is a dummy variable that takes the value of 1 if the match is played between January and May inclusive and 0 otherwise.
OUTCOME UNCERTANTY	This is the absolute difference in home-win probability and away-win probability. Probabilities are derived from the bookmaker's odds and adjusted for over-round.
THEIL	$\sum_{i=1}^{3} P_i \times \ln\left(\frac{1}{p_i}\right)$ where P_i is the probability of outcome i which is any one of the three possible results.

Table 4b. Summary statistics for televised games

	Televised games (N = 631)			
Variables	Mean	St. Dev.	Minimum	Maximum
TELEVISION AUDIENCE RATING	978,647	570,092	204,000	2,780,000
COMBINED RELATIVE WAGE	2.368	0.879	0.831	5.067
ABSOLUTE DIFFERENCE IN RELATIVE WAGE	0.646	0.559	0.000	2.598
COMBINED POINTS PER GAME	3.104	0.815	0	6
ABSOLUTE DIFFERENCE IN POINTS PER GAME	0.658	0.525	0	3
CHAMPION CONTENTION	0.187	0.390	0	1
EUROPE CONTENTION	0.160	0.367	0	1
RELEGATION CONTENTION	0.179	0.384	0	1
SETANTA	0.071	0.258	0	1
OTHER MATCHES	0.025	0.194	0	2
DERBY	0.074	0.263	0	1
WEEKDAY	0.319	0.466	0	1
OUTCOME UNCERTAINTY	0.249	0.180	0	0.712
THEIL	1.020	0.095	0.662	1.097

stadium attendance in which the home team's fans are always dominant. Instead of home and away, two alternative metrics are used: *COMBINED* and *ABSOLUTE DIFFERENCE* (see Forrest, Simmons, and Buraimo 2005).

The first of the independent variables in X_{ijt} is *COMBINED RELATIVE WAGE*. Relative wage is a team's wage bill for the current season divided by the mean wage bill for that season. For the eight seasons from 2001–02 to 2009–10, the mean wage bill of the English Premier League clubs increased from £35 million to £70 million (Table 2). A typical strategy for many clubs is to improve their playing talent by spending more on better players and inflationary wage-bill increases. Furthermore, the variance in player talent is also increasing. For example, the standard deviation of wage bill has generally increased over the eight seasons shown in Table 2. The use of a relative wage-bill measure normalises the wage bill by the average in a given season. Hence, the mean value of the relative wage bill must be 1. The standard deviation varies from 0.42 to 0.65, rising over time with the most recent value being 0.61. Hence, the distribution of talent is widening as large clubs outspend others.

Wage-bill data are gathered from various years of Deloitte's Annual Review of Football Finance. The wage-bill data are for all the clubs' employees and not just the team. However, it is extremely likely that the wages of the players dominate those of other employees in the clubs, and it is therefore a good proxy for the quality of both the squad and the team. Furthermore, the market mechanism for buying and selling players, which is effectively an auction, means that the best players are also the highest paid. A test of this is the correlation between end-of-season performance and wage bill by season. The correlation between performance and wage bill by season is very strong (Hall, Szymanski, and Zimbalist 2002).[4] Hence, the wage bill is a good reflection of skill and quality of talent. As *COMBINED RELATIVE WAGE* is the sum of the two teams' relative wage and as it increases, it is expected that audience rating will also increase as fans have a preference for watching the best talent. *ABSOLUTE DIFFERENCE IN RELATIVE WAGE* is included to capture the spread of talent across the two teams in the match. With respect to talent, if fans have a preference for a contest in which the quality of talent is evenly distributed across the teams (Buraimo 2008; Forrest, Simmons, and Buraimo 2005), then this variable is in itself a measure of outcome uncertainty. As such, we need to recognise the possibility of multicollinearity with *OUTCOME UNCERTAINTY*. Hence, *ABSOLUTE DIFFERENCE IN RELATIVE WAGE* is included in the Heckman selection model, since it represents a prior indicator of outcome uncertainty before the season starts when the broadcasters begin to select games.

We use the sum of the two teams' current points per game up to the match to derive combined points per game. In English football, three points are awarded for a victory, one point for a draw, and no points for a loss. The measure captures the form of the teams prior to the contest. The combined value captures the overall form of the two teams, and higher values are likely to have a positive impact on audience ratings. The next set of independent variables captures the extent to which at least one of the teams in the contest is in contention for the championship (winning the league), European competition the following season, or relegation. Contention is computed using an algorithm proposed by Goddard and Asimakopoulos (2004). A team is in contention if it wins all its remaining games (three points per game) and others only tie theirs (one point per game), and in doing so, the team is able to win the title or qualify for Europe. A team is also in contention for relegation if other teams win their remaining matches and it only ties and in doing so will be relegated. These in contention variables (*CHAMPION CONTENTION*, *EUROPE CONTENTION*, and *RELEGATION CONTENTION*) capture the long-run aspect of competitiveness and are expected to have a positive impact on television audience, *ceteris paribus*. Previous studies have constructed numerous variables to capture contention (see, e.g., Jennett 1984; Pawlowski and Anders 2012). However, they have all used the number of points necessary to win the championship in their measures. The number of points required to win the championship is available *ex post*, and such information is not available to consumers. It is for this reason that Goddard and Asimakopoulos's approach is preferred.

Games televised by Setanta in the 2007–08 season feature in the data, and a dummy variable, *SETANTA*, takes the value of 1 if the game was broadcast by the new entrant. Otherwise, *SETANTA* take the value of 0, as the game was broadcast by BSkyB. Given Setanta's limited penetration within the televised football market, the coefficient of *SETANTA* is expected to be negative with a large magnitude.

Games are televised at different times of the day and week to avoid clashes and cannibalising audience ratings for other games. However, all games on the last day of the season are played at the same time. A dummy variable, *OTHER MATCHES*, is included and takes the value of 0 if no other matches are occurring at the same time and 1 if at least one other match is taking place concurrently. Another dummy variable, *DERBY*, is included to capture matches that involve local and historical rivals. *DERBY* may or may not be significant in the context of television audiences. In models of gate attendance, *DERBY* has proved to be a significant determinant of demand, such is the intense historical and local rivalry between neighbouring football teams (Buraimo 2008; Buraimo, Paramio, and Campos 2010; Forrest and Simmons 2006). However, television audiences are drawn from a wider population, and such rivalry may be regarded as a local matter. Forrest, Simmons, and Buraimo (2005) found that derby matches had no significant effect on television audiences. Alternatively, national audiences may similarly share this passion for rivalry.

The final control variable in $X_{ijt}$is the dummy variable *WEEKDAY*. This takes the value of 0 if the match is televised on Saturday or Sunday and 1 otherwise. This is intended to capture the reduced leisure time available during the week relative to the abundance of leisure time available at the weekend. As well as these variables, a set of fixed effects is included in Z, comprising team, month, and season effects.

Our focus variable is outcome uncertainty, defined here as the absolute difference in the two teams' probability of winning the match. The probabilities are derived from the betting odds posted by William Hill, a leading UK bookmaker. The choice of bookmarker is irrelevant, as the correlations between posted odds by different bookmakers are extremely high (around 0.95) and the results are robust to the use of different bookmakers' odds. The use of odds to compute probabilities is apt, as they are very strong predictors of match outcomes, indicating a strong degree of efficiency. A further advantage of using betting odds is that they capture all relevant public as well as private information that is not readily observed but which may affect performance, such as player injuries, suspension, and dressing-room morale.

The sum of unadjusted (home win, away win, and draw) probabilities routinely exceeds unity due to the bookmaker's margin. This margin, or 'over-round', was around 12% over our sample period. The adjusted probabilities are derived by dividing each of the probabilities by the sum of unadjusted probabilities. By doing so, the adjusted values sum to 1. The values of *OUTCOME UNCERTAINTY*, the absolute difference in home and away team probabilities, for televised games range from 0 to 0.712. A value of 0 represents matches with the highest degree of uncertainty, while high values represent those matches with a low degree of uncertainty. The values of uncertainty of outcome show that there is a high variation, given that the theoretical range is between 0 and 1. Hence, there is enough variation to capture any effect of uncertainty of outcome on audience rating. A shortcoming of this measure is that the draw probability is assumed constant. This is a reasonable assumption, since there is only a slight variation in the draw probabilities across matches. However, as a robustness check and to deal explicitly with the draw probability, an alternative measure of outcome uncertainty, the Theil measure, is also used (Buraimo and Simmons 2008; Czarnitzki and Stadtmann 2002; Peel and Thomas 1992). The Theil measure makes use of the probabilities of all three match outcomes and is derived as:

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

where P_i is the probability of outcome i, which is any one of the three possible results. It is highly likely that the results, qualitatively, would be similar, as the correlation coefficient between *OUTCOME UNCERTAINTY* and the Theil measure is –0.944.

Considering the variables in Y_{ijt}, selecting games for broadcast is not straightforward. The challenge that broadcasters face in this market is that games selected for broadcast cannot be televised at the regular time of 3:00 pm on Saturday, by League rule. Instead, games must be moved to other times of the day (usually noon or 5:30 pm) or other days of the week. The rationale for such a move is to reduce the substitution effect that will occur across the whole of English football, since the majority of football games (in the English Premier League and the three professional divisions of the Football League) take place at 3:00 pm on Saturdays. Many spectators will simply substitute going to these games with watching live transmission of Premier League games. Moving games from 3:00 pm is disruptive, particularly to season-ticket holders who purchase their tickets in advance of the season starting. To minimise this disruption, a schedule of games for the first half of the season (normally from August to December) is announced prior to the start of the season. This means that the broadcasters have to choose which games to televise without any information on how well the teams will be doing. It is therefore likely that the broadcaster will instead make use of other exogenous information outside the current season.

Similar to audiences, broadcasters are likely to be attracted to games involving teams with a high wage bill, a proxy measure for talent. *COMBINED RELATIVE WAGE* is likely to have a positive impact on the decision to televise a match. The *ABSOLUTE DIFFERENCE IN RELATIVE WAGE* is also included to capture the emphasis that the broadcaster might place on teams who are evenly matched. With respect to talent, broadcasters may have a preference for a contest in which the quality of talent is evenly distributed across the teams (Buraimo 2008; Forrest, Simmons, and Buraimo 2005). The inclusion of *ABSOLUTE DIFFERENCE IN RELATIVE WAGE* in the selection part of the model represents a prior indicator of outcome uncertainty before the season starts when the broadcasters begin to select games. To capture the effects of the broadcasters' decision-making process in the first and second half of the season, *COMBINED RELATIVE WAGE* and *ABSOLUTE DIFFERENCE IN RELATIVE WAGE* are interacted with *FIRST HALF* and *SECOND HALF*. *FIRST HALF* takes the value of value 1 for the months between August and December and 0 otherwise, and *SECOND HALF* takes the value of 1 during the months January to May and 0 otherwise. By interacting the *RELATIVE WAGE* variables with *FIRST HALF* and *SECOND HALF*, the relative weights attributed to *RELATIVE WAGE* during the first and second parts of the season by the broadcasters can be evaluated.

Selection for broadcasting is also likely to be based on how popular the teams are. In order to capture the popularity of a given match, the (log of) the combined mean attendance of the two teams from the previous season, ln (*COMBINED LAG ATTENDANCE*), is interacted with *FIRST HALF* to capture the fact the broadcasters have to select matches for the broadcast schedule for the first part of the season in advance of the season starting. It is only in the second half that they are able to use contemporary information to inform their selection. In the absence of any information on form, the points at the end of the previous season are used as an indicator of future form, at least for the first half of the season. Therefore, the combined and the absolute difference in lag points per game, interacted with the dummy variable *FIRST HALF*, are included. During the second half of the season, however, the broadcasters, like the television audiences, are able to base their selection decision on contemporary information. It is with this in mind that *COMBINED POINTS PER GAME* × *SECOND HALF* is included. This is the sum of the points per game of the two teams prior to the current match during the second half of the season; *SECOND HALF* is a dummy variable that takes the value of 1 in the second half of the season (January to May inclusive) and 0 otherwise.

As with the television audience demand equation, champion contention, Europe contention, and relegation contention are included, but only for the second half of the season, since such information is not available to the broadcasters during the first half of the season. Each of the contention variables are therefore interacted with *SECOND HALF*. The intention of the variables is to capture any preferences the broadcasters have for games involving teams in contention of any end-of-season honours over and above any uncertainty of outcome. The potential impact of *DERBY* is also modelled, as this may influence the broadcasters' selection. The final covariate is *OUTCOME UNCERTAINTY*. For reasons noted earlier, this is interacted with *SECOND HALF*. Furthermore, as well as using the absolute difference in home and away win probabilities, the Theil measure is also used for robustness. Definitions of the variables along with their summary statistics for the televised sample are presented in Tables 4a and 4b.

5. Empirical Results

The results of the Heckman selection model with robust standard errors clustered by rounds[5] are presented in Table 5. In the selection part of the model, the coefficients of *COMBINED RELATIVE WAGE* × *FIRST HALF* and *COMBINED RELATIVE WAGE* × *SECOND HALF* are positive, as was to be expected. However, it is revealing that the coefficient of *COMBINED RELATIVE WAGE* × *FIRST HALF* is greater than that of *COMBINED RELATIVE WAGE* × *SECOND HALF*. In the absence of contemporary information to select games on a round-by-round basis, the wage bills strongly influence the broadcasters' choice. However, once there is greater freedom of the selection, the impact of wage bill falls, although it is still highly significant. This pattern is repeated for *ABSOLUTE DIFFERENCE IN RELATIVE WAGE*, as the magnitude of the variable is greater in the second half of the season. Taking the relative wage-bill variables together, the broadcasters' selection is influenced by the total talent and also by how evenly the talent is distributed across the two teams.

The coefficient of *DERBY* is significantly different from 0, and broadcasters favour games with historical and local rivalry attached. The popularity of the game as measured by ln(*COMBINED LAG ATTENDANCE*) × *FIRST HALF* is also significant, indicating that games involving teams with a strong following are more likely to be selected for broadcasting in the absence of current information on form. Similarly, games involving teams with high performances from the previous season influence selection in the first part of the season. It would also seem that if the previous season's performances of the two teams are comparable, this also increases the likelihood of selection given the sign and magnitude of the coefficient of *ABSOLUTE DIFFERENCE IN LAG POINTS PER GAME* × *FIRST HALF*. The variable *COMBINED POINTS PER*

Table 5. Heckman selection model for TV audience ratings

Audience Model: Dependent Variable is $\ln(AUDIENCE_{ijt})$	Coefficient	*t*-Statistic
COMBINED RELATIVE WAGE	0.119**	(2.12)
ABSOLUTE DIFFERENCE IN RELATIVE WAGE	−0.019	(0.51)
COMBINED POINTS PER GAME	0.023	(1.25)
CHAMPION CONTENTION	0.014	(0.37)
EUROPE CONTENTION	−0.031	(0.64)
RELEGATION CONTENTION	−0.019	(0.47)
SETANTA	−0.966***	(22.94)
OTHER MATCHES	−0.106	(0.76)
DERBY	−0.008	(0.19)
WEEKDAY	−0.083***	(3.85)
OUTCOME UNCERTAINTY	−0.039	(0.49)
CONSTANT	13.037***	(32.44)
Selection model: Dependent variable is $\text{Prob}(TELEVISED_{ijt})$	Coefficient	*t*-Statistic
COMBINED RELATIVE WAGE × *FIRST HALF*	0.572***	(7.93)
COMBINED RELATIVE WAGE × *SECOND HALF*	0.275***	(2.84)
ABSOLUTE DIFFERENCE IN RELATIVE WAGE × *FIRST HALF*	−0.526***	(5.87)
ABSOLUTE DIFFERENCE IN RELATIVE WAGE × *SECOND HALF*	−0.387***	(3.10)
DERBY	0.463***	(3.58)
LN(COMBINED LAG ATTENDANCE) × *FIRST HALF*	0.140***	(4.42)
COMBINED LAG POINTS PER GAME × *FIRST HALF*	0.005***	(3.27)
ABSOLUTE DIFFERENCE IN LAG POINTS PER GAME × *FIRST HALF*	−0.011***	(3.87)
COMBINED POINTS PER GAME × *SECOND HALF*	0.782***	(6.81)
ABSOLUTE DIFFERENCE IN POINTS PER GAME × *SECOND HALF*	0.175	(0.99)
CHAMPION CONTENTION × *SECOND HALF*	0.141	(1.28)
EUROPE CONTENTION × *SECOND HALF*	0.272***	(3.09)
RELEGATION CONTENTION × *SECOND HALF*	−0.006	(0.06)
OUTCOME UNCERTAINTY × *SECOND HALF*	0.059	(0.19)
CONSTANT	−3.647***	(13.65)
Lambda	0.007	0.083
Rho	0.026	
Observations	2872	

Absolute *t*-statistics in parentheses. Clustered by round of match using robust standard errors.
*$p < 0.10$
**$p < 0.05$.
***$p < 0.01$. Month, season, and team effects are significant.

GAME × *SECOND HALF* has a significant coefficient, and broadcasters value games involving high-performing teams. However, such games need not involve teams with comparable performance given the insignificant coefficient of *ABSOLUTE DIFFENCE IN POINTS PER GAME* × *SECOND HALF*. Of the contention variables, only *EUROPE CONTENTION* × *SECOND HALF* has a significant coefficient, indicating that as far as end-of-season honours are concerned, the race for qualifying for European competition strongly influences broadcaster selection of games.

As for the focus variable *OUTCOME UNCERTAINTY*, its estimated impact on selection is not significantly different from 0. This is a different result to that shown by Forrest, Simmons, and Buraimo (2005). The evidence suggests that broadcasters' selection is no longer driven by uncertainty of outcome and other factors are more important in the selection choice.

For the second part of the Heckman model, audience, the only variables which have statistically significant coefficients are *COMBINED RELATIVE WAGE*, *WEEKDAY*, and *SETANTA*. The relevance of *SETANTA* in this context is to suggest that the platform on which the game is transmitted matters. This is not surprising given that different platforms have different levels of penetration in the football broadcast market. As for *WEEKDAY*, the significant coefficient signals that, due to relative lack of leisure time during the week, games televised from Monday to Friday inclusive have lower audiences compared with those televised at the weekend, a marginal negative effect of 8.3%. Therefore, controlling for broadcast market conditions and team idiosyncrasies, *COMBINED RELATIVE WAGE* is all that matters to television audiences. Unlike the broadcasters who care how the talent is distributed across the two teams, television audiences are indifferent to this, and all that matters is that the volume of talent on display is high, whichever team has that talent. The fixed effects for months, seasons, and teams are included, and each set is significant. Hence, the impacts of talent noted are over and above the effects of specific teams which in themselves influence the size of television audiences that tune in.

The use of the Heckman sample selection correction reveals that the correlation between the error terms from the selection and demand equations is not significantly different from 0. This indicates that there are no discerning features between those matches that are broadcast and those that are not. The effect of this result is that the estimates from the demand equation are not significantly different from those that would otherwise be derived from OLS, that is, there is no selection bias.

As well as using a Heckman selection model, OLS is used to model TV audiences. The results of the OLS estimates are shown in Table 6. We test for the normality of the residuals in each of the models noted in Table 6. The tests show that the hypothesis that the residuals are normally distributed with a 0 mean cannot be rejected. In model 1 of Table 6, and also the Heckman model, the variables with significant coefficients are *COMBINED RELATIVE WAGE, WEEKDAY*, and *SETANTA*. Irrespective of model specification, the *OUTCOME UNCERTAINTY* variable has a coefficient that is not significantly different from 0. The significance of the *COMBINED RELATIVE WAGE* coefficient indicates that audience size is influenced by the total quality of players across the two teams; the higher the *COMBINED RELATIVE WAGE*, the greater the audience rating. The magnitude of the effect is such that if the quality of players as represented by relative wage bill were to improve by one standard deviation, the audience size is estimated to increase by 11.1%, an increase of approximately 108,389 viewers per match on BSkyB's platform. Given that deviations in recent season have increased, if the standard deviation of *COMBINED RELATIVE WAGE* for televised games in the most recent season (0.924) were to be used, the increase in television audience is 113,938 viewers per match. These increases are non-trivial given that this is a subscription platform. It is therefore in the broadcasters' interest to televise those games in which the available talent on show is high.

ABSOLUTE DIFFERENCE IN RELATIVE WAGE and *ABSOLUTE DIFFERENCE IN POINTS PER GAME* had insignificant coefficients and were

Table 6. OLS models of TV audience ratings[7]

	(1)		(2)		(3)	
	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic
COMBINED RELATIVE WAGE	0.126**	(2.84)	0.111**	(2.38)		
COMBINED POINTS PER GAME	0.021	(1.11)	0.022	(1.19)	0.015	(0.79)
OTHER MATCHES	−0.104	(0.70)	−0.100	(0.78)	−0.105	(0.81)
DERBY	−0.010	(0.039)	−0.016	(0.42)	−0.022	(0.58)
WEEKDAY	−0.086***	(3.79)	−0.085***	(3.78)	−0.092***	(4.11)
CHAMPION CONTENTION	0.012	(0.33)	0.014	(0.39)	0.008	(0.23)
EUROPE CONTENTION	−0.035	(0.68)	−0.029	(0.58)	−0.036	(0.71)
RELEGATION CONTENTION	−0.022	(0.54)	−0.019	(0.47)	−0.022	(0.55)
SETANTA	−0.967***	(21.80)	−0.982***	(20.70)	−0.971***	(20.41)
OUTCOME UNCERTAINTY[a]	−0.054	(0.76)				
OUTCOME UNCERTAINTY × *2000–2001*			−0.604*	(1.82)	−0.584*	(1.84)
OUTCOME UNCERTAINTY × *2001–2002*			−0.691*	(1.83)	−0.632*	(1.65)
OUTCOME UNCERTAINTY × *2002–2003*			−0.096	(0.54)	−0.067	(0.37)
OUTCOME UNCERTAINTY × *2003–2004*			0.176	(0.82)	0.211	(1.07)
OUTCOME UNCERTAINTY × *2004–2005*			−0.106	(0.77)	−0.156	(1.07)
OUTCOME UNCERTAINTY × *2005–2006*			0.1113	(0.96)	0.099	(0.83)
OUTCOME UNCERTAINTY × *2006–2007*			−0.065	(0.22)	−0.124	(0.45)
OUTCOME UNCERTAINTY × *2007–2008*			0.077	(0.59)	0.033	(0.24)
COMBINED RELATIVE WAGE × *2000–2001*					−0.042	(0.58)
COMBINED RELATIVE WAGE × *2001–2002*					−0.028	(0.37)
COMBINED RELATIVE WAGE × *2002–2003*					−0.019	(0.25)
COMBINED RELATIVE WAGE × *2003–2004*					−0.013	(0.23)
COMBINED RELATIVE WAGE × *2004–2005*					0.105*	(1.76)
COMBINED RELATIVE WAGE × *2005–2006*					0.125**	(2.23)
COMBINED RELATIVE WAGE × *2006–2007*					0.110**	(2.02)
COMBINED RELATIVE WAGE × *2007–2008*					0.110**	(2.33)
CONSTANT	13.791***	(75.60)	14.216***	(51.56)	14.399***	(53.32)
Adjusted R^2	0.698		0.703		0.711	
Observations	631		631		631	

Absolute *t*-statistics in parentheses. Clustered by round of match using robust standard errors.
*$p < 0.10$.
**$p < 0.05$.
***$p < 0.01$. Month, season, and team effects are significant.
[a]As an alternative, the Theil measure of outcome uncertainty is also used. The results are qualitatively similar. However, as the absolute difference in home team and away team probabilities is more intuitive, we therefore chose to report this measure instead.

duly dropped from the regression. Their exclusion can be justified on the grounds of collinearity with *OUTCOME UNCERTAINTY*. The effect of *COMBINED POINTS PER GAME* is not significantly different from 0. Television audiences are influenced more so by the identity of the teams and not their respective performances to date. The dummy variables *OTHER MATCHES* and *DERBY* and the *CONTENTION* variables do not have significant impacts on the size of television audiences. The dummy variable *OTHER MATCHES* is intended to capture the greater proportion of games televised on the last day of the season, but the lack of significance would suggest that such games are not substitutes for one another. This raises the interesting prospect that it might be possible for broadcasters to televise games concurrently without harming total audience ratings. This is particularly relevant, as the number of live games from one contract period to the next has increased, but as the number of games increases, it might be necessary to televise some matches concurrently. For *DERBY* matches, it would seem that the attraction of such games is limited, *ceteris paribus*, to stadium goers and not television viewers.

Audience ratings for matches televised during the week are lower compared with those televised at the weekend; the fall in audience rating is of the magnitude of 8.6%. This is likely to be capturing the limited amount of leisure time available to audiences during the week compared with the weekend. Also, those games televised by Setanta attracted far fewer audiences compared to those televised on BSkyB's channels. During the period of analysis, Setanta's penetration within UK households was much smaller compared with BSkyB's.

The coefficient of the focus variable *OUTCOME UNCERTAINTY* is not significantly different from 0, and this result is robust to a series of modelling approaches.[6] This finding is contrary to those reported in earlier papers (Buraimo and Simmons 2009; Forrest, Simmons, and Buraimo 2005) and could be capturing an evolution in television audiences' preferences. We interact the focus variable with season dummy variables. The estimates are reported in model 2 of Table 6. The coefficients of *OUTCOME UNCERTAINTY* interacted with 2000–2001 and 2001–2002 are significantly different from 0 (at the 10% level) with the appropriate signs showing, tentatively, that television audiences value contests that are close. However, in the seasons after 2002, the coefficients of *OUTCOME UNCERTAINTY* interacted with each season from 2003–2003 to 2007–2008 are not significantly different from 0. This would seem to mark a transition away from valuing uncertainty of outcome. To explore television audience demand further, *COMBINED RELATIVE WAGE* is also interacted with seasons, and the results are shown in model 3 of Table 6. Strikingly, the interaction of *COMBINED RELATIVE WAGE* with the earliest four seasons is not significantly different from 0. However, for the seasons 2004–05 to 2007–08 inclusive, *COMBINED RELATIVE WAGE* interacted with season has significant coefficients. Again, it should be noted that these impacts are over and above the team fixed effects which already distinguish between the identity and brand of the teams. For example, the reported effect of *COMBINED RELATIVE WAGE* is in addition to the effects of individual teams which would attract large audiences anyway.

This is a major result that policymakers and league authorities should not ignore. The central finding of this paper suggests that consumer interest has shifted away from uncertainty of outcome to the quality of playing talent. Television audiences are drawn to games with a greater presence of star talent on show. Preferences for balanced contests and the anticipation of an uncertain outcome appear to have waned amongst television audiences. Instead, decision makers and league authorities should concern themselves with one dominant strategy: maximising the quality of talent coming into the league. For this to happen, clubs will need to continue to spend large sums of money on recruiting talent. Assessment of efforts to control such costs at the levels of league and governing body are beyond the scope of this paper (see, e.g., Franck [2014] and Peeters and Szymanski [2014] on UEFA's Financial Fair Play policy), but such efforts need to be reconciled with the preferences of viewers as expressed through audience demand.

Acquisition of star players to satisfy viewer preferences implies a net migration of talent into the league. However, such migration must be at the expense of other leagues. The league and its clubs therefore have an incentive to attract the best players to the league. They must be able to meet the cost of such extravagance, and one major source of finance is the revenues from the television broadcast sector. In the case of the English Premier League, it is imperative that it maximises the revenue that it generates from the broadcast market. Consequently, its rights strategy must give considerable attention to how to make use of the growing competition amongst broadcasters, particularly if it is to attract talent which in turn will maximise audience demand.

6. Concluding Remarks

This paper examines the notion that uncertainty of outcome matters to football audiences and, more specifically, television audiences for the English Premier League. The concept of uncertainty of outcome is a central conjecture in the economics literature on professional team sports, and since it was first presented, its relevance to policymaking and management practices in professional sports leagues has been strong. The empirical testing ground for uncertainty of outcome has usually been stadium attendees. Traditionally, income from stadia has been the dominant source of revenue. However, in today's sports markets in which the supply of talent to sports leagues is global, attention should shift to television audiences for sport. The use of television audiences over stadium attendees to test the uncertainty of outcome hypothesis is more appropriate.

We find that uncertainty of outcome does not have a significant impact on television audience ratings overall. Separating the measure of uncertainty of outcome by seasons shows significant coefficients over the first two seasons of our sample, albeit at the 10% level. But over seasons, this significance disappears. The dissipation of the uncertainty of outcome effect coincides with an increase in the quality of talent employed in the English Premier League. We argue that there has been a transition of preference for uncertainty of outcome towards a preference for increased talent. The classic notion of a pure sporting contest in which the outcome is unpredictable has been replaced with one in which the preference is for sporting entertainment delivered by superstars. The unpredictability of the outcome no longer matters for television viewers. The implications of these findings are that leagues should no longer defend their practices on the ground of uncertainty of outcome, and consequently the defence of sports policies should be reconsidered. Furthermore, if consumer welfare is to be maximised, maximising uncertainty of outcome is unlikely to achieve this. Instead, policies and strategies aimed at the labour market and how it operates should be the focus of league administrators. The policy recommendation that emerges from this analysis is that the league (and its constituent clubs) needs to increase the quality of talent migrating into the league; the distribution of such talent across the clubs is presently of little significance. Attempts to increase the quality of talent coming into the league mean direct competition against other leagues competing for the same talent. The league should create the right incentives for clubs to attract the best players, and similarly clubs need to create the right economic incentives to attract players from other leagues. This in turn will maximise television audience ratings.

Notes

1. Interestingly, in the German Bundesliga, there is a single broadcaster (Sky), and all games are televised. This suggests some variation in policies towards football broadcasting across the EU.
2. Whilst minute-by-minute data would be more insightful in measuring television audience demand, such data are not readily available. As noted above, only one study (Alavy, Alison Gaskell, and Szymanski 2010) has made use of minute-by-minute measures of audience ratings.
3. The mean gate attendance over this period was 34,474 per match (from Sky Sports Football Yearbook).
4. In the 2000–01 season, the correlation coefficient between performance and wages was 0.675. By the 2007–08 season, this had risen to 0.814. The mean correlation coefficient across the eight seasons is 0.795. In recent seasons, this figure has reached 0.888.
5. The standard errors are clustered by the rounds of matches, as the choice of matches to be televised is constrained by the fixture list. For a given set of matches in a given round, the broadcasters must select a proportion of matches for that given weekend. This is a significant constraint, as the broadcasters cannot select the best n matches from 380 games. In this sense, the round of the fixture list is binding, and a proportion of games from those available that weekend must be chosen. This is the condition for which the models are clustered. The standard errors of the models are therefore adjusted to reflect this.
6. We also use instrumental variable regression in which we treat *OUTCOME UNCERTAINTY* as endogenous. In doing so, the variables *Absolute difference in relative wage* and *Absolute difference in points per game are* used as instruments. The results were similar to those generated using OLS.
7. The Ramsey reset test is used to test the functional form of the models. The results of the test indicate that the models are correctly specified. Furthermore, the null hypothesis that the models have no omitted variables cannot be rejected. With respect to multicollinearity, variance inflation factor is used. The results indicate that multicollinearity does not affect the coefficients.

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