

## **Competitive Balance and Match Attendance in European Rugby Union Leagues\***

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*Abstract:* The paper analyses factors influencing match attendance in the three main European rugby union leagues using data for over 4,000 fixtures over 15 seasons. The effect of competitive balance on attendance at sports events has received considerable attention in the literature. We find that (short- and medium-term) competitive balance have a large and statistically significant effect. However, this effect is smaller in magnitude than the effect brought about by the other aspects of the fixture with the strength of the home team being the single most important influence on attendances.

### I INTRODUCTION

There is an extensive literature on the economics of professional sports leagues, much of which emphasises the importance of uncertainty of outcome in explaining the attractiveness of sport. (For a good summary of the literature see Borland and MacDonald, 2003 and Szymanski, 2003.) The current paper analyses the extent to which uncertainty of outcome and/or

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various other factors explain attendances at matches in the three main European rugby leagues. The analysis is based on data for over 4,000 matches from the three main European rugby leagues over the period 1997/98 to 2011/12.

Rugby Union provides an interesting case study because it only became professional in 1995. Soccer and the major US team sports which have been the main focus of the literature introduced professionalism in the late nineteenth century.<sup>1</sup> Traditionally international matches were the main source of revenue in rugby. The move to professionalism made attracting crowds to club matches a priority.

The balance of the paper is structured as follows. Section II reviews the economics literature on professional sports leagues. The historical development of rugby is described briefly in Section III. Section IV briefly considers the evidence on various measures of competitive balance in the three leagues. Section V then presents the results of an econometric model of match attendance to illustrate the relative importance of competitive balance compared to other factors in explaining match attendance. Some conclusions are outlined in Section VI.

## II ECONOMICS OF PROFESSIONAL SPORTS LEAGUES

The economic literature recognises that sports leagues require a greater degree of cooperation between rival firms than most other industries (Rottenberg, 1956; Neale, 1964; Borland, and MacDonald, 2003). Only by acting collectively can a league and its member clubs produce a full season of matches resulting in a championship competition which is attractive to fans. The US Supreme Court has described league sports as “perhaps the leading example” of a business activity that “can only be carried out jointly”.<sup>2</sup>

It has been suggested that the common interest of teams in sports leagues extends beyond the need to cooperate in order to produce a league championship competition. According to this view uncertainty of outcome is one of the key attractions of sports events from a supporter point of view and

<sup>1</sup> Rugby split into amateur and professional codes in 1895 (see below). The amateur code, known as Rugby Union remained the more widely played version of the sport. The professional variant is known as Rugby League. Over time rule changes have led to significant differences between the two sports. Throughout the paper rugby is used to refer to Rugby Union.

<sup>2</sup> *National Collegiate Athletic Association v. Board of Regents of University of Oklahoma*, 468 US 85, 101 (1984). Ross and Szymanski (2005), point out that the Australian courts have taken a different view seeing the key function of leagues as being to provide “competing organising services.”

this requires a degree of equality between the teams in a league. This argument has been advanced and frequently accepted as a justification for a range of practices such as joint selling, revenue sharing, salary caps and restrictions on players' ability to move between clubs which would generally be considered illegal under competition law in most industries. (See, for example, Rottenberg, 1956, Neale, 1964 Borland and MacDonald, 2003 and Szymanski, 2003.)

McMillan (1997) argued that spectator interest was highest when competitive balance was relatively even. According to Szymanski and Kesenne (2004), there is a widespread belief that leagues will be more successful the greater the degree of competitive balance because matches would be more uncertain and therefore more entertaining. Szymanski (2003) states that the uncertainty of outcome argument which has been advanced in numerous antitrust cases can be reduced to three core elements:

1. Inequality of resources leads to unequal competition.
2. Fan interest declines when outcomes become less uncertain.
3. Specific redistribution mechanisms improve competitive balance and produce more outcome uncertainty.

A report commissioned by the UK Government argued that unbalanced leagues would not maximise spectators and revenues (Arnaut, 2006).

The sports economics literature defines three different measures of competitive balance.

- *Short-run uncertainty of match outcome*, i.e., uncertainty regarding the outcome of an individual match which should increase supporter interest in individual matches. This is often measured by the standard deviation of teams' win ratios (see below).
- *Medium term or seasonal uncertainty of outcome*, i.e., uncertainty over which team will ultimately win the league, which should serve to maintain supporter interest in matches involving a wider range of teams over the course of the season;
- *Long-term uncertainty of outcome*, i.e., a lack of domination by one or more clubs over a number of seasons, sometimes referred to as dynamic competitive balance (Szymanski, 2003).

Empirical research on the effect of competitive balance on match attendances in various sports has yielded mixed results (Szymanski, 2003). Increased competitive balance may not be welfare maximising if teams potential support bases differ significantly in size (Szymanski, 2001).

## III RUGBY – A BRIEF OVERVIEW

Rugby, like soccer emerged in England in the late nineteenth century. Rules based on those of Rugby School, where tradition has it the game originated, were drawn up and the Rugby Football Union (RFU) was established at a meeting of clubs at the Pall Mall Restaurant in London in January 1871.<sup>3</sup> Compared with soccer, rugby, at least at the highest level, is played in a relatively limited number of countries worldwide.<sup>4</sup>

According to Szymanski (2009) the issue of professionalism emerged in most major team sports once they began to attract large paying audiences, specifically once the sport generated sufficient revenue to pay the players more than they could earn in their best alternative employment.<sup>5</sup> The issue of professionalism arose in rugby in the 1890s when clubs in the North of England wanted to make payments to players, not for playing, but as compensation for wages lost as a result of playing matches on Saturdays.<sup>6</sup> The resulting split clearly reflected the alternative employment opportunities available to different players. As the RFU put it:

In the South where players were more well-heeled and didn't work at weekends this was irrelevant but a powerful group insisted that payment was against the true interests of the game and consequently 22 leading clubs from Yorkshire formed their own Northern Union, which in 1922 became the Rugby League.<sup>7</sup>

Following this split the amateur code remained the more widely played version of the sport. Professionalism was viewed as an anathema in rugby union for most of its history and players who defected to the professional League code were frequently ostracised.<sup>8</sup> The author of a 1986 history of Irish rugby baldly stated:

<sup>3</sup> <http://www.rfu.com/AboutTheRFU/History.aspx>

<sup>4</sup> There are effectively six top level rugby playing countries in Europe (England, France, Ireland, Italy, Scotland and Wales) and four in the Southern Hemisphere (Argentina, Australia, South Africa and New Zealand). The International Rugby Board (IRB), however, includes a total of 95 rugby playing countries in its world rankings.

<sup>5</sup> US baseball split into amateur and professional codes in 1871 and English soccer went professional in 1885.

<sup>6</sup> Such payments became known as "broken time" payments.

<sup>7</sup> <http://www.rfu.com/AboutTheRFU/History.aspx>

<sup>8</sup> Williams (2012), for example, recounts how in the 1950s a former captain of the Australian national team was ostracised for switching to the professional code "... to the everlasting shame of the then Australian rugby community".

Professionalism has no part to play in the game in Ireland and could not be sustained. (Van Esbeck, 1986, p. 234.)

The revenue accruing to many sports increased dramatically in the 1990s due to technological changes in broadcasting. The success of Rugby League in Australia posed a serious threat to the amateur code in that country and, to a lesser extent, New Zealand. Together these changes made the move to professionalism inevitable.

Traditionally, in the European rugby playing countries, the sport's governing bodies put the emphasis on international matches centred on the annual Six Nations Championship and the bulk of revenue generated in rugby came from international matches.<sup>9</sup> England and Ireland, for example, had no national club league until just before the move to professionalism with "friendly" matches accounting for a major component of clubs' annual fixture schedules. The introduction of professionalism radically altered the situation. In order to pay players clubs needed to attract fans to matches and this required a league championship competition with a structured fixture schedule. According to Szymanski (2009), leagues work particularly well for team sports because fans tend to form a long-term attachment to a particular team. The increased importance of television as a source of revenue required clubs to act collectively in order to produce a coherent package for broadcasters.

In England a national club league known as the Courage League was first established in 1987/88 with 12 clubs which played each other once over the course of the season although there were no set dates for fixtures which were arranged on an ad-hoc basis by the individual clubs. A formal fixture schedule was introduced the following season and in 1993/94 the teams first played each other on a home and away basis.<sup>10</sup> In Ireland a national club league was not established until 1989/90.

The introduction of professionalism led to bitter disputes between English clubs and the RFU which resulted in the leading clubs establishing a new domestic league competition, known as the Premiership, which replaced the Courage League. The French national rugby championship known as the Top 14 traces its origins back to 1892. Traditionally, the league had comprised two sections of eight teams with the top teams from each section reaching the play-offs. In 2004/5 the French league was restructured into a single division of 16 teams which was subsequently reduced to 14 the following season.

<sup>9</sup> The Six Nations is played on an annual basis and involves international teams from England, France, Ireland, Italy, Scotland and Wales. It follows a league format with teams playing each other once and home field advantage rotates from year to year.

<sup>10</sup> Source: <http://www.premiershiprugby.com/information/history.php>

Professionalism posed a major challenge for the smaller rugby playing countries. While Scotland and Wales both had long established national leagues, it soon became apparent that the support base in both countries and in Ireland was insufficient to sustain full-time professional national leagues capable of competing with those in England and France. Palominio and Sakovics (2004) observe that the existence of multiple leagues in European soccer combined with players' freedom of movement means that leagues compete with one another to attract the best players as this increases their broadcast revenues. In 1999 two Scottish teams joined the Welsh Premier League to form the Welsh-Scottish League. In 2001/02 the Irish, Scottish and Welsh Rugby Unions came together to establish a new league, originally known as the Celtic League.<sup>11</sup> As the CEO of the Welsh Rugby Union (WRU) observed:

The Celtic League is vitally important for rugby in this country. We have to take it seriously and we have to encourage Ireland to take it seriously. If the Celtic League is to go head-to-head with the Zurich Premiership, the Irish Rugby Football Union – in particular – have to get on board. (Welsh Rugby Union, 2003/4. p. 7).

The Irish, Scottish and Welsh teams remain dependent on revenue generated by their national associations from international matches to varying degrees.

The professional era has witnessed a number of club failures which illustrates the importance of developing competitions that are attractive to supporters. In England the league was reduced from 14 teams to 12 in 1999/00 when one club went bankrupt and two others merged. French Top 14 club Montauban went into liquidation in 2010. Initially, the Celtic League consisted of 15 teams divided into two sections. Financial pressures led to a series of mergers which resulted in the nine Welsh Celtic League clubs being re-organised into five regional teams in 2003/04, while a third Scottish team was introduced and the format was changed to a straightforward league competition comprising 12 teams. One of the new Welsh regional teams collapsed after just one season while the third Scottish team was wound up in 2007/08 reducing the league to ten teams.<sup>12</sup> The number of teams increased to 12 for the 2010/11 season with the admission of two Italian teams.<sup>13</sup>

<sup>11</sup> The league has been renamed on a number of occasions reflecting sponsorship changes. We use the original Celtic League title throughout this paper.

<sup>12</sup> If teams play each other twice over the course of the season, a reduction in the number of clubs from 12 to 10 reduces the total number of matches by almost one-third from 132 to 90. This clearly has significant implications for the viability of both the league and its member clubs.

<sup>13</sup> One of the Italian teams collapsed in 2011/12 but was replaced with a new Italian franchise for the following season.

A new international competition known as the European Rugby Cup (ERC) involving teams from the six major European playing countries was established in 1995/96 coincident with the introduction of professionalism. The establishment of a multi-national competition designed to appeal to fans and broadcasters can be viewed as a logical consequence of the move to professionalism. A similar competition had been established in European soccer 40 years earlier, although Szymanski (2009) pointed out that its format was changed in the 1990s to make it more attractive to broadcasters.

Table 1 provides some summary data showing how attendances have evolved in the Celtic League, Premiership and Top 14 over time. Data on aggregate attendances are included to illustrate the total numbers involved. In 2011/12 the aggregate attendance figures for the three leagues was in excess of 5 million. Aggregate attendance figures in all three leagues have risen significantly over time.

Table 1: *Rugby Match Attendances by League Selected Years*

	Aggregate			Average		
	Premiership	Top 14	Celtic League	Premiership	Top 14	Celtic League
1997/98	823,626	n.a.	n.a.	6,240	n.a.	n.a.
2000/01	988,369	n.a.	n.a.	7,488	n.a.	n.a.
2003/04	1,130,409	n.a.	501,875	8,564	n.a.	3,802
2005/06	1,366,210	1,760,723	571,331	10,350	9,674	5,194
2008/09	1,506,639	2,203,526	731,391	11,414	12,107	8,127
2011/12	1,582,430	2,411,951	1,017,156	11,968	13,574	7,706 (8,569)

*Note:* figures in parentheses exclude the two Italian teams that joined the league in 2010/11 in order to allow a more direct comparison of trends in Celtic League average attendances over time.

*Source:* <http://www.premiershiprugby.com/matchcentre/fixtures/fixtures.php>

[http://www.rabodirectpro12.com/matchcentre/fixtures\\_list.phpl](http://www.rabodirectpro12.com/matchcentre/fixtures_list.phpl)

<http://www.lnr.fr/calendrier-resultats-top-14.html>

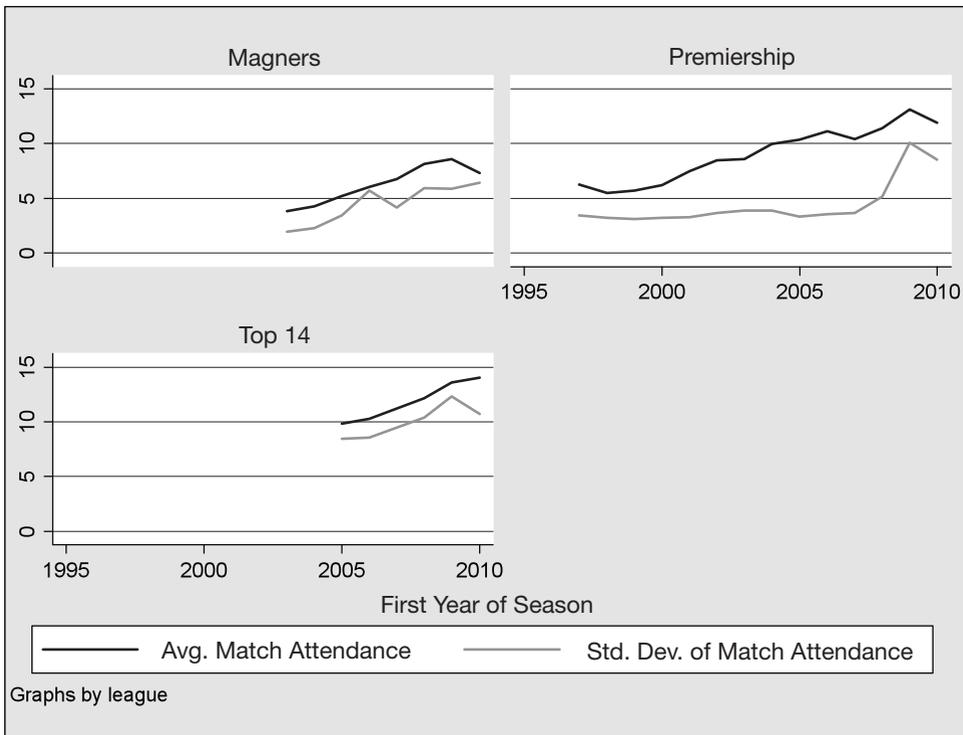
Average attendance figures are a more useful measure for comparisons as the number of teams and hence matches varies between leagues and over time. The Top 14 had the highest average match attendance in 2011/12 at over 13,500 when ticket revenue exceeded 20 per cent of clubs' total income for the first time since the restructuring of the league, (DNACG, 2011). Average match attendance in the Premiership in 2011/12 was almost 12,000 while the corresponding figure for the Celtic League was 7,700.<sup>14</sup> Average attendances

<sup>14</sup> Within the Celtic League there are significant differences in average match attendance between countries with Irish teams having the highest average attendance in 2011/12 at 11,839. The corresponding figures for Wales, Italy and Scotland respectively were 7,516, 4,136 and 3,388.

in all three leagues have risen over time indicating that they have succeeded in attracting a growing number of supporters.

Figure 1 illustrates the steady rise in average match attendance for all three rugby leagues over the last 15 years. What is interesting is that the standard deviation of match attendance has risen in line with the average in two of the leagues denoting an increased variability in match attendance. One explanation of this is that some teams occasionally charge very low prices on a once-off basis as a marketing strategy and such matches attract attendances that are much higher than the league average, e.g., French club Stade Français will play one or two matches per season at the Stade de France charging very low prices and attracting crowds in excess of 75,000 which is a multiple of the average Top 14 match attendance. In recent years some English Premiership clubs have engaged in similar strategies. This coincides with a sudden change in the standard deviation of match attendance in the English Premiership in recent years, which previously had remained more or less constant – just right shifted over time.

Figure 1: Average Rugby Match Attendance by League



#### IV EVIDENCE OF COMPETITIVE BALANCE

A recurring theme in the sports economics literature is the hypothesis that uncertainty of outcome is one of the main attractions of sports for supporters. There have been numerous studies of competitive balance in sports leagues. (See, Szymanski, 2003, for a useful summary.) Most studies focused on US sports leagues and European soccer, although Australian Rules Football (Lenten, 2009a and b) and rugby league have also been analysed (King *et al.*, 2012). There have been few studies of competitive balance in rugby union. Fourie and Siebrits (2008) used a number of different measures of short-run competitive balance and concluded that the three European rugby leagues displayed a high degree of competitive balance although their study only covered three seasons.

Evidence of competitive balance in the three rugby leagues is now briefly outlined. As previously noted, there are three measures of competitive balance which are discussed in the literature, short, medium, and long run.

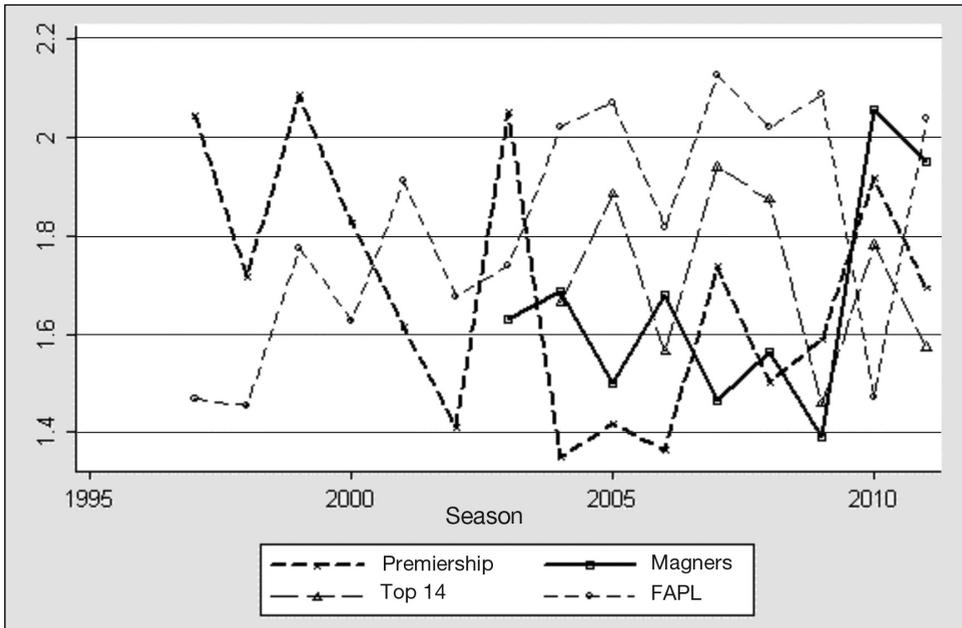
##### 4.1 *Short-run Competitive Balance*

First we consider evidence on short-term uncertainty or uncertainty of outcome of individual matches. A commonly used measure of short-run competitive balance in the literature which is attributed to Noll (1988) and Scully (1989) is the adjusted standard deviation (ASD) of teams' win ratios. The ASD allows comparisons to be made when the number of teams differs between leagues or over time. Humphreys (2002) argues that this ratio is better than other measures of competitive balance, although Lenten (2009a) points out that it is highly sensitive to occasional outliers.<sup>15</sup> The ASD is calculated by dividing the actual standard deviation of teams' win ratios over the course of a season by an idealised standard deviation (ISD) of win ratios. The ISD is the standard deviation that would be generated by a perfectly balanced league and is given by the formula  $0.5/\sqrt{n}$  (where  $n$  is the number of matches played).

Figure 2 illustrates trends in the ASD for the three European rugby leagues. Similar data for English soccer's FA Premier League (FAPL) are included for comparison purposes. The chart suggests that for most of their existence the three rugby leagues have displayed a greater degree of competitive balance than the FAPL.

<sup>15</sup> There have been significant outliers in some seasons in both the Celtic League and Premiership. Owen (2010) argues that the ASD is sensitive to the number of teams in a league and is, therefore, not suitable for comparisons between leagues and over time.

Figure 2: Trends in the ASD for the Three European Rugby Leagues



All three leagues award a bonus point when a team loses a match by seven points or less. In theory, a difference of seven points or less means that the teams were divided by a single score at the end of the match (seven points is the equivalent of a converted try) suggesting that the outcome was uncertain up to the final whistle. The number of “close” matches defined as matches where there was just a single score between the teams (including drawn matches) thus provides an alternative measure of short-run competitive balance in the three rugby leagues.<sup>16</sup>

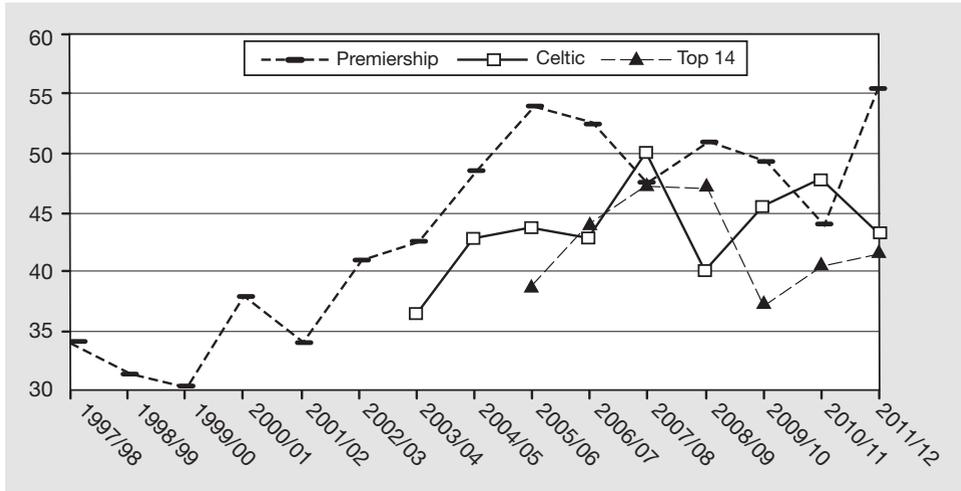
Figure 3 illustrates trends in the proportion of close matches per season for each league. Apart from the early years of the Premiership, the number of close games in all three leagues has generally varied between 40 and 50 per cent.

#### 4.2 Medium-term Balance

All three Rugby leagues have adopted a play-off system which effectively increases the number of teams that remain in contention to win the league over a longer period. Play-offs are generally recognised as a means of

<sup>16</sup> The CEO of Premiership Rugby has cited the high proportion of close matches in that competition as indicating a high level of competitive balance. (Maxwell, 2012).

Figure 3: *Percentage Close Matches Per Season*



increasing medium-term uncertainty and increasing profits of teams with good but not outstanding performance records. Play-offs introduce uncertainty into selection of champions benefiting weaker teams and reducing incentive for stronger teams to load up on talent (Fort and Quirk, 1995).<sup>17</sup>

#### 4.3 Long-term Competitive Balance

Long term or dynamic competitive balance depends on the extent to which a league is dominated by a small number of teams or whether the championship rotates between several different clubs. Table 2 gives details of the number and frequency of championship wins in the three rugby leagues. Table 2 also includes an estimate of the Herfindahl-Hirschman Index (HHI) for each league. The HHI is widely used to measure market concentration in the industrial organisation literature and can be used to measure dynamic competitive balance in sports leagues. (Leeds and von Allmen, 2005). In this case a team’s “market share” can be defined as the number of championship wins over a period of time. Teams’ “market shares” are then squared and summed to arrive at the HHI in the normal way for each league. The maximum value of the HHI in each case is 1 which would arise where a single team “monopolised” the league by winning it every season while the minimum value is 1/t where t is the number of seasons. Corresponding data for the four major European soccer leagues and for America’s National Football League

<sup>17</sup> The Top 14 has always had play-offs to determine the champions. The Premiership introduced play-offs in 2003/04 while the Celtic League introduced play-offs in 2009/10.

(NFL) generally recognised as the most evenly balanced sports league in the world are included for comparative purposes.<sup>18</sup> In addition, data for the Courage League, the forerunner of the Premiership, is included for the period 1987/88 to 1996/97.

Table 2: *Championship Winners in Various Leagues*

<i>League</i>	<i>Sport</i>	<i>Period</i>	<i>Number of Seasons</i>	<i>Number of Winners</i>	<i>HHI</i>
NFL	American Football	1997/98-2011/12	15	10	0.120
Premiership	Rugby Union	1997/98-2011/12	15	7	0.253
Celtic	Rugby Union	2001/02-2011/12	11	5	0.256
Serie A	Soccer	1997/98-2011/12	15	5	0.265
Top 14	Rugby Union	1997/98-2011/12	15	6	0.307
FAPL	Soccer	1997/98-2011/12	15	4	0.369
Bundesliga	Soccer	1997/98-2011/12	15	6	0.393
La Liga	Soccer	1997/98-2011/12	15	4	0.403
Courage	Rugby Union	1987/88-1996/97	10	3	0.440

*Source:* As Table 1 for the three rugby leagues; <http://int.soccerway.com/> for the soccer leagues and <http://www.nfl.com/superbowl/history> for the NFL.

Comparing the HHI results for the various leagues suggests that the three rugby leagues display a reasonable degree of dynamic competitive balance compared with the major European soccer leagues. The HHI for all three leagues is substantially lower than for the Courage League, the Premiership's amateur era predecessor. The results also show that the NFL displays the highest degree of dynamic competitive balance of the leagues considered.

## V AN ECONOMETRIC MODEL OF MATCH ATTENDANCE

The uncertainty of outcome hypothesis implies that fans prefer close matches to highly unbalanced matches. According to this view short-run uncertainty of outcome regarding the result of an individual match is a major determinant of attendances. On that basis, in deciding whether or not to attend a match, fans have to form some *ex ante* view on the relative strength of the two participating teams. This assumes some knowledge among fans on

<sup>18</sup> In the case of the NFL and the various soccer leagues we include data for the period from 1997/98 to 2011/12 as this corresponds to the period for which we have data for the Premiership and the Top 14.

the respective merits of different teams which we suggest is based on teams' recent league record. Our basic hypothesis is that the more evenly balanced the two teams are, the more attractive the match is to fans and hence the higher the attendance. In order to capture this we calculated a moving average win ratio for each participating team for each match based on its previous six league results.

Szymanski (2009) points out that studies of match uncertainty either rely on measures derived from historic performance (which is the approach adopted in this paper) or betting odds and observes that both approaches have shortcomings.<sup>19</sup> In the case of betting odds Szymanski (2009) observes that, in some instances, e.g., English soccer, they may be fixed in advance by bookmakers so that they do not respond to how betting evolves in the lead up to a match. Braun and Kvasnicka (2013) report that betting odds in European soccer are subject to national bias, an important point as one of the leagues being analysed here consists of teams from four different countries.

The second measure of match specific competitive balance is whether or not the home team is in contention to win the league/qualify for the play-offs, which captures the issue of medium-term competitive balance. Our assumption here is that the majority of attendees at a match are home team supporters and, in general, they will be less inclined to go if the home team is effectively out of the competition. King *et al.* (2012) note that the impact of medium-term uncertainty on attendance has received less attention in the literature than short-term uncertainty. Measures of seasonal uncertainty used in the literature are usually based on the number of games a team is required to win in order to win the championship/make the playoffs; or the number of games (wins) or points behind the leading team or the significance of the match for the championship or playoffs. For example, Kuypers (1996) and Garcia and Rodriguez (2002) both employ a measure which is the product of the number of games left before the championship is decided and the number of points the team trails behind the leader, being equal to zero when there is no possibility of the team's winning the championship). King *et al.* (2012) point out that a weakness of this approach is that it ignores the relative difficulty of teams' remaining fixtures and they employ a simulation model to measure teams' chances of making the play-offs. The probability of winning the league/making the play-offs is more complex in the present case because of bonus points.

<sup>19</sup> Studies based on historic performance have relied on teams' relative league positions, points totals or win percentages. (King *et al.*, 2012).

In order to establish whether attendances decline as teams' chances of winning the league/making the play-offs decline we calculated, for every home team for every match, a measure of its chance of finishing top of the league/making the play-offs. As with many studies of this type the measure is based on the number of points that a team is behind the leader (or final play-off place if there are play-offs) and the number of matches remaining. In this case the measure was defined as the number of points that a team was behind the top team/final play-off position divided by the number of matches remaining plus a constant so that the measure was always positive. In simple terms the further a team is behind in terms of points and the fewer the number of matches remaining the lower the likelihood of winning the league/qualifying for the play-offs and our measure attempts to put a numerical value on this. Teams were awarded a value of zero in cases where it was mathematically impossible for them to finish top of the league/make the play-offs. For any match the current top team (team in final play-off position) will have a coefficient of 5. A team that is 10 points behind with 10 matches to play will have a coefficient of 4 but a team that is 10 points behind with 3 matches to play will have a coefficient of 1.67 reflecting the fact that it is far less likely to close the gap.<sup>20</sup>

The results are shown in Table 3. The dependant variable, match attendance, is measured in thousands. We include as regressors, the two measure of competitive balance discussed above: the 6 game win ratios of the home and away teams; the variable reflecting the extent to which it is mathematically possible for the home team to win the league/make the playoffs. We also include league fixed effects. As it is likely that the variance of the error term is different for different matches, as we have defined them, we correct the standard errors for heteroscedasticity using White's procedure.

We apply our model to a data set comprising details of results and attendances from 4,111 matches in the three European rugby leagues. In the case of the Premiership the data covers the period from the leagues' establishment in 1997/98 up to the end of the 2011/12 season. The data for the

<sup>20</sup> The formula used in this calculation was  $k + ((p_i - p^*)/m_i)$  where  $p_i$  denotes the number of points obtained by a given team and  $p^*$  is the number of points obtained by the leading team (or the team in the final play-off qualifying place where the championship is decided on the basis of play-offs) prior to a given match,  $m$  is the number of matches remaining and  $k$  is a constant. Dividing the points difference by the number of matches remaining takes account of the fact that the prospects of overhauling the team in front for any given points difference decline, the fewer matches that remain. The purpose of the constant is simple. Our formula means that the top team/final play-off team would otherwise have a value of zero but we have also decided that teams which have no mathematical chance of qualifying would also have a value of zero.. The constant is set equal to the maximum number of points awarded for a win.

Celtic League and Top 14 covers the period 2003/04 and 2005/06 respectively, when the leagues switched from a two section to a single division format, up to the end of the 2011/12 season.<sup>21</sup>

At this point it is worth noting, that the model is not a structural model of the demand for Rugby match tickets. The model is a reduced form as we do not have data on ticket prices but as Garcia and Rodriguez (2002) point out this is a common problem and most studies of attendance at sports events employ reduced form models.

The first column of Table 3 shows the results of the estimation of the basic model. The first thing to note is that both win ratios are positive and significant. In addition, both effects are large in magnitude. For example, if the home team's win ratio was to rise from, say, 0.25 to 0.75, average attendance would rise by about 3,282. To put this in context, the average attendance at a match in our data was only 9,020.

The home team win ratio is clearly the most important variable in determining attendance, but the away team win ratio is also important. Its effect is positive, statistically significant and large in magnitude. It is however, only about one half of the size of the home team effect. Note that if pure competitive balance were all that mattered then we would expect the difference in the win ratios to be important. This restriction is decisively rejected by the data.<sup>22</sup>

Perhaps unsurprisingly, these results suggest that crowds seem to be larger for good teams. Nevertheless, given the different magnitudes of the effects, fans are quite happy to turn up to see a good home team take on a relatively bad away team. Thus, the view that short-run competitive balance is the main driver of attendance does not appear to be supported by our results. Given these coefficients an unbalanced match between a good home team and a bad away team, would attract a higher crowd than a balanced match between two bad teams. In short, it appears that winning home teams attract large crowds regardless which is consistent with the findings for a number of other sports. (See, for example, Szymanski, 2007; Szymanski, 2009 and Gitter and Rhoads, 2010).

As is to be expected, whether or not the home team is in contention for the championship or play-offs has a positive and statistically significant effect on attendance. King *et al.* (2012) report similar results finding that whether a

<sup>21</sup> Data on match results and attendances were obtained from the various league websites.  
<http://www.premiershiprugby.com/matchcentre/fixtures/fixtures.php>  
[http://www.rabodirectpro12.com/matchcentre/fixtures\\_list.phpl](http://www.rabodirectpro12.com/matchcentre/fixtures_list.phpl)  
<http://www.lnr.fr/calendrier-resultats-top-14.html>

<sup>22</sup> A Wald test of the null hypothesis that the coefficient on the win ratio are equal in magnitude but of opposite sign produces a p-value of less than 0.00001.

team is in contention (medium-term uncertainty) is more important than short-run (match) uncertainty in explaining attendances. Thus, if the qualification coefficient for a team increased from 2.5 to 5, attendance would rise by 508. To put this in context, this is slightly more of an increase in attendance that would be had from moving a match from mid-week to Saturday (see below). Also note that the prospects of qualification seem to matter less than recent performance as measured by the win ratio from the previous six matches. It seems that fans are motivated by short-term performance. Again this suggests that home fans are quite happy to see a good home team play a bad away team independently of whether the championship is still a possibility. As play-offs will result in more teams being in contention over a longer period than a straight league format, our results confirm that play-offs will increase aggregate league attendances.

The final two variables in column 1 capture the fixed effect of a match taking place in the French League ("Top 14") or the Celtic league. The excluded category is the English League ("Premiership"). Both these dummy variables are significant. Attendances in the French League are, on average, about 3,000 higher than the Premiership while attendances in the Celtic league are smaller than those of the Premiership by about the same amount.

So far the results presented in column 1 are as might be expected. The only surprise is that short-run competitive balance seems to matter less than the absolute quality of the home team.

It is possible that the results in column 1 are biased by some sort of derby effect. That is to say that attendance will be unusually large when there is a match between two teams from the same region who have a traditional rivalry. If these teams were also competitively balanced (with similar win ratios and/or chances of qualifying), then the regression results in column 1 may be picking up the effect of the local rivalry rather than genuine effect of competitive balance. An obvious example to illustrate the point is the "Old Firm" game from Scottish soccer where matches between Rangers and Celtic might be expected to draw larger crowds than mere competitive balance would suggest.

In order to test this effect we created a dummy variable when teams were from the same region and/or were known to have a special rivalry. We identified 119 such fixtures.<sup>23</sup> Column 2 of Table 3 shows the impact of this derby effect. Perhaps unsurprisingly the derby coefficient is large statistically significant and positive. According to these results, a match between local

<sup>23</sup> In the case of the Celtic League we define all matches between teams from the same country as derby matches. In the case of the Premiership and Top 14 we define matches between teams from the same geographic area as derby matches, e.g., matches between London teams in the Premiership and matches such as Biarritz versus Bayonne in the Top 14.

rivals will have attendances higher on average by 2,754. To put this figure in context, this is roughly equal to the effect of the away team increasing its win ratio by 80 per cent. Interestingly, the coefficient on the competitive balance variables are unaffected by the inclusion of the derby dummy variable. This suggests that the derby effect, while strong, is independent of competitive balance effects.

It is also of interest to see whether bonus points have had an impact on attendance. Awarding bonus points for scoring tries or for losing narrowly can be seen as a measure designed to make matches more attractive to fans by encouraging attractive high-scoring close contests. Our data thus allows us to test the effectiveness of this measure.<sup>24</sup>

In column 3 of Table 3, we add a dummy variable to the regression that is set to 1 for matches played under a bonus point system. As this variable might pick up the effect of any secular time trend, we have also included a time trend in the regression. We find that the bonus variable is significant (p-value of 0.02) in the presence of the time trend. The coefficient is positive, as expected, but is small in magnitude. Bonus points appear to matter less than the day of the week on which the match is played (see below). It is, however, difficult to disentangle the true effect of the introduction of bonus points from the secular increase in attendance over time.

In column 4, we examine the possibility that attendance may be larger if either of the teams won their home league in the previous year. Winning a championship may, for example, result in increased advanced season ticket sales for the following season, which in turn tends to be reflected in higher attendances. As can be seen, the previous success of both teams has a large and significant positive effect on attendance the following season. We also test whether either team winning the ERC the previous year affects attendance. As can be seen, both point estimates are positive but only the home team effect is statistically significant. Interestingly, for the home team, winning the ERC seems to matter only as much as winning the home league.<sup>25</sup> We might have expected that ERC, being the more prestigious completion, would matter more. The fact that the away team won the ERC has no impact on match attendance is consistent with the notion that attendance is mainly made up of home team supporters who want to see their team triumph, with relatively little regard to the quality of the opposition.

<sup>24</sup> The English Premiership introduced bonus points in 2000/1 while the Top 14 and Celtic League always had bonus points for the relevant periods. The Celtic League and Premiership award a bonus point for scoring four tries while the Top 14 awards a bonus point for outscoring the opposition by three tries. All three leagues provide for a bonus point where a team loses by seven points or less.

<sup>25</sup> A Wald test of the null hypothesis that both coefficients are equal generates a p-value = 0.89.

We also test in column 4 whether the day of week on which a match is played has any impact. As most matches are played on Saturday, we include dummy variables for matches played mid-week, on Fridays, on Sundays and over the Christmas/New Year period. The coefficients on these variables should thus be interpreted as the extra attendance that would occur if a match was shifted from Saturday to the other day. As can be seen, shifting a match from a Saturday to another day reduces attendance by about 2,000. The exceptions are the Christmas holiday matches, which have a systematically larger attendance than a normal Saturday match.<sup>26</sup>

There are suggestions that teams in the different leagues attach differing degrees of importance to winning their own league and winning the ERC. For example, English and French clubs have claimed that Celtic League teams may rest key players in the week prior to playing in the ERC. Similarly it is suggested anecdotally that French clubs place greater emphasis on winning the Top 14 than the ERC and that they sometimes field weakened teams in the latter competition. If teams are known to field weakened teams in league matches that take place on the weekend before ERC matches, we might expect this to affect attendances at such matches. We analyse this by including a dummy variable set to 1 if home team was due to play in the ERC the week after the relevant league match. As can be seen, the coefficient on this variable is statistically significant and positive. This is somewhat surprising. It suggests that claims of teams fielding weakened teams in matches immediately before they are due to play in the ERC may be somewhat overstated. The alternative explanation is that fielding weakened teams the week before an ERC match, has no adverse effect on attendance which seems counterintuitive especially when the major influence on attendance is the quality of the home team.<sup>27</sup> Perhaps a more plausible explanation is that clubs often use upcoming ERC games to promote domestic games taking place in the weeks prior to ERC fixture.<sup>28</sup>

As previously noted our results suggest that winning either the league or ERC has a similar impact on home attendances the following season which suggests that, from a revenue point of view, there is no obvious reason for clubs to prioritise one competition over the other.

Finally, we consider the possibility that estimates in columns 1 to 4 are rendered inconsistent by unobservable effects that are correlated with the

<sup>26</sup> This suggests that some people may only attend a match during the Christmas/New Year period.

<sup>27</sup> We checked whether this result may differ across leagues by interacting the ERC match dummy with league fixed effects. The resulting coefficients were all positive, jointly significant ( $p$  value = 0.006) but each was individually insignificant.

<sup>28</sup> We thank an anonymous referee for this observation.

Table 3: *Model of Match Attendance*

	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	OLS	OLS	FE
VARIABLES					
Win Ratio Home	6.564*** (0.537)	6.426*** (0.525)	6.819*** (0.461)	5.778*** (0.455)	2.506*** (0.439)
Win Ratio Away	3.673*** (0.462)	3.425*** (0.459)	3.295*** (0.444)	2.611*** (0.425)	1.445*** (0.429)
Home team in contention	0.203** (0.0959)	0.197** (0.0928)	0.122** (0.0569)	0.0936** (0.0458)	0.0293 (0.0314)
Derby		2.754*** (0.339)	2.953*** (0.319)	2.714*** (0.300)	
Bonus			0.865** (0.354)	1.084*** (0.351)	0.438 (0.308)
Trend			0.508*** (0.0377)	0.498*** (0.0360)	0.530*** (0.0324)
Top14	2.979*** (0.327)	3.209*** (0.321)	1.171*** (0.406)	1.069*** (0.400)	
Celtic League	-2.766*** (0.197)	-3.051*** (0.196)	-4.876*** (0.230)	-4.666*** (0.237)	
Home Champion				2.000*** (0.357)	
Away Champion				2.092*** (0.625)	
Home ERC				2.103*** (0.569)	
Away ERC				0.719 (0.791)	
ERC game next week				1.621*** (0.574)	
Friday				-1.995*** (0.211)	
Mid-Week				-1.934*** (0.252)	
Sunday				-2.016*** (0.228)	
Christmas				2.246** (1.074)	
Constant	3.255*** (0.428)	3.032*** (0.423)	-1.496*** (0.418)	-0.228 (0.400)	1.665*** (0.414)
Observations	4,111	4,111	4,111	4,111	4,111
R <sup>2</sup>	0.149	0.167	0.240	0.277	0.140
Number of fixtures					864

included repressors. This is a distinct possibility as there are likely to be team specific effects that impact attendance and are correlated with win ratios, for example. If we are willing to make the assumption that the match specific component of the error term is time invariant, then we can develop a consistent estimator by performing OLS on variables expressed as deviations from their match specific means. This “fixed effects” estimator is consistent because the differencing process eliminates the time-invariant component of the error term, leaving the remaining error term uncorrelated with the dependent variables. The fixed effects estimates are presented in the last column of Table 3. As we are controlling for a match specific effect it is not possible to identify a derby effect or separate league or match day fixed effects. As can be seen, the results support the notion that attendance is rising in team performance and competitive balance. The only difference is that magnitude of the effect of competitive balance is much lower than in columns 2 or 3. Nevertheless, the home team’s win ratio still has about twice the impact as the away team’s win ratio. The inclusion of match level fixed effects also renders the impact of the contention dummy statistically insignificant.

Our results ignore the issue of stadium capacity, largely because it does not appear to be a significant constraint on match attendances. For example, most Top 14 clubs regularly relocate big matches to larger stadia. In 2011/12, for example, 9 per cent of matches were relocated. (DNACG, 2012). In the Celtic League less than 5 per cent of matches in any season had attendances in excess of 95 per cent of stadium capacity. Capacity or near capacity attendances were more common in the Premiership in recent seasons but this was largely due to two clubs – Bath and Northampton – where most matches have drawn attendances in excess of 95 per cent of stadium capacity. The regressions were re-run excluding these two teams home matches but this resulted in no statistically significant changes in the estimated coefficients.

Our analysis also does not take into account the fact that a match may have been broadcast live. However, in all three leagues matches are typically spread over a weekend to facilitate the live broadcast of several matches, while in the Celtic League different matches may be broadcast in different countries.

## VI CONCLUSIONS

There is an extensive literature on the economics of sports leagues much of it concerned with the impact of competitive balance in determining supporter interest. Rugby has received relatively little attention in the literature due, in part, to the fact that it became a professional sport far more recently than most other major team sports and because, in some countries,

national league competitions were only established shortly before the advent of professionalism.

Our analysis of match attendance indicated that while short- and medium-term competitive balance both had a significant positive effect on attendances, they were not the key determinant. The strength of the home team mattered far more than the strength of the away team or indeed the teams' relative strength. This is consistent with a view that attendance is driven by home bias. In other words, crowds are drawn primarily to matches that involve a good home team. They would rather pay to see a good home team beat a bad away team than see two evenly matched mediocre teams. Derby matches between local rivals also attracted higher attendances. Somewhat surprisingly the introduction of bonus points had only a small effect on attendances.

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