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Competitive Balance and Match Attendance in European Rugby Union Leagues.[1]

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26th June 2012

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Competitive Balance and Match Attendance in European Rugby Union Leagues.

***Abstract*:** The paper analyses the impact of the relatively belated move to professionalism in Rugby Union. We use data on match attendance for 3,667 fixtures in European club Rugby over 15 seasons to estimate the effect of competitive balance on attendance. We find that (short- and medium-term) competitive balance has 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.

Key Words: Professional team sports, competitive balance, league structures, revenue sharing, salary caps, consumer demand.

JEL Classifications: D12, D21, L22, L23, L83.

1: 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. Rugby Union provides an interesting case study because it only turned professional in 1995 in contrast to soccer and the major US team sports which have been the main focus of the literature.[2] The move to professionalism in rugby provides an interesting natural experiment as it resulted in very significant structural changes, at both club and league level, with significant differences in different countries. The present paper builds on previous work by Hogan et. al. (2011) and analyses the determinants of attractiveness of fixtures to fans based on data for 3,667 matches from the three main European rugby leagues over the period 1997/98 to 2010/11.

The balance of the paper is structured as follows. Section 2 reviews the economics literature on professional sports leagues. The historical development of rugby is described briefly in Section 3. Section 4 provides some information on the sport's finances. Evidence on competitive balance within the three main European rugby leagues is presented in Section 5. Section 6 then considers various aspects of match attendance. Econometric results for the determinants of attendance are presented in Section 7. Some conclusions are outlined in Section 8.

2: 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). Teams are competitors in a sporting sense, in that the very essence of sport involves the teams in a particular match trying to beat one another, and each team in the league trying to finish higher than its rivals. Only by acting collectively, however, can a league and its member clubs produce a full season of matches resulting in a championship competition. The US Supreme Court has described league sports as "perhaps the leading example" of a business activity

[2] 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.

that "can only be carried out jointly."[3] In other industries firms seek to take business from their rivals and would gain if their rivals were forced out of business. This is not true of sports leagues, since a team that put its rivals out of business by taking customers from them would have no teams left to play against.

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 an essential feature of sport and this requires a degree of equality between the teams in a league. Increased competitive balance may not be welfare maximising, however, if teams potential support bases differ significantly in size. (Szymanski, 2001). Revenue sharing, salary caps and restrictions on players' ability to move between clubs are commonly employed in sports leagues as ways of promoting greater competitive balance. (See, for example, Rottenberg, 1956, Neale, 1964 Borland and MacDonald, 2003 and Sloane, 2006).

Revenue sharing provides teams with equal opportunities to hire the best players. Empirical studies on the impact of revenue sharing on competitive balance have yielded mixed results. (See, for example, Quirk and El Hodiri, 1974; Downward and Dawson, 1995; Fort and Quirke, 1995; Cave and Crandall, 2001: Szymanski, 2003; Szymanski and Kesenne, 2004 and Garcia and Rodriguez, 2009).

Salary caps are designed to address the tendency for teams to over invest in playing talent. (Dietl et. al., 2009). Fort and Quirk (1995) concluded that enforceable salary caps were the only effective device for maintaining financial viability and competitive balance. Lenten (2009a) found that salary cap and draft arrangements introduced in Australian Rules Football in 1995 had increased competitive balance, although Lenten (2009b) found that rules designed to improve competitive balance had to be revised periodically as clubs tended to find ways of evading them. Vrooman (2007) argues that revenue sharing and salary caps will improve competitive balance in leagues if team owners are win rather than profit maximisers.

[3] *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 organizing services."

Restrictions on players' ability to move clubs were found to be illegal under EU law in the *Bosman* case.[4] Rottenberg (1956) pointed out that in baseball restrictions on players' freedom to move between teams did not prevent the migration of the best players to bigger teams and thus had no effect on competitive balance but artificially depressed player salaries and enabled team owners to earn monopoly rents.

Szymanski (2003) observes that the competitive balance argument is based on two assumptions that may be unique to US sports:

1. The supply of talent available to clubs is fixed;[5] and.
2. The absence of promotion and relegation in US leagues makes competitive balance more important for maintaining supporter interest over time.

McMillan (1997), nevertheless, argued that competitive balance was essential to maintain a healthy level of competition in New Zealand rugby, while Arnaut (2006, 3.66) argued that leagues that employed revenue sharing and other measures designed to promote competitive balance would "in the long run, be most successful from both a sporting and economic point of view."

Sloane (2006) argues that although the competitive-balance/uncertainty argument has tended to dominate the analysis of team sports, little attention has been paid to defining and accurately measuring it. The literature refers to three different concepts of uncertainty.

- Short-run uncertainty of match outcome, i.e. uncertainty regarding the outcome of an individual match which should increase supporter interest in individual matches;
- 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.

[4] Case C-415/93 *Union Royale des Societes de football association, Royal Club Liegois et UEFA v. Jean Marc Bosman* [1995] ECR I 4921.
[5] European rugby teams can effectively recruit players worldwide.

3: Rugby – A Brief Overview.

Some understanding of how rugby is structured may be useful. Rugby, like soccer emerged in England in the mid 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.[6] Compared with soccer, rugby, at least at the highest level, is played in a relatively limited number of countries worldwide.[7]

Szymanski (2009) argues that the question of professionalism emerged in team sports once they began to attract large paying audiences. 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.[8] 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."[9]

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.[10] The author of a 1986 history of Irish rugby baldly stated:

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

The 1995 decision by the IRB to permit professionalism thus marked a radical departure. Professionalism resulted in major changes in the structure of the sport at

[6] http://www.rfu.com/AboutTheRFU/History.aspx

[7] 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.

[8] Such payments became known as "broken time" payments.

[9] http://www.rfu.com/AboutTheRFU/History.aspx

[10] Williams (2012), for example, recounts an episode from Australia.

both club and league level in all of the main rugby playing countries, although there were significant differences in the responses in different countries.

Unlike soccer, English rugby has no long tradition of a national league championship competition for clubs. The Courage League only began 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. Fixed Saturday fixtures were introduced the following season and in 1993/94 the teams first played each other on a home and away basis.[11] Professionalism resulted in a major upheaval in English rugby. (Richards, 1996). Several clubs were acquired by wealthy individuals while some clubs floated on the stock exchange. Bitter disputes erupted between the RFU and the leading clubs over the terms for the release of players to play for the England team and over the division of television revenues. (McMillan, 1997) This resulted in the leading clubs establishing a new domestic league competition, known as the Premiership, which replaced the Courage League.

The Premiership operates a revenue sharing and a salary cap arrangement. All revenues (except gate receipts), including those received by teams from participation in European competitions are split equally between the member teams. Such arrangements are considered necessary to ensure the long-term viability of the league's member clubs rather than to ensure competitive balance.[12]

The transition to professionalism was somewhat less disruptive in France than in other countries, at least initially. The French national championship known as the Top 14 traces its origins back to 1892. Prior to 2005/6 the league was composed of two sections of eight teams with the top teams from each section reaching the play-offs. In 2005/6 the Top 14 was restructured into a single division of 14 teams. Following the move to professionalism a number of clubs were acquired by wealthy individuals as in England. Apart from television revenue, French clubs do not operate a revenue sharing arrangement. In recent seasons a number of French clubs have experienced

[11] Source: http://www.premiershiprugby.com/information/history.php

[12] The League was reduced to its current 12 teams in 1999/2000 when one club, Richmond, went bankrupt and London Irish and London Scottish merged. Other clubs have also encountered financial difficulties. Assuming that teams play each other twice during the season, a reduction in league membership from 12 teams to 10, for example, would reduce the total number of matches from 132 to 90, with potential implications for the viability of the league.

financial difficulties resulting in the introduction of a salary cap from the beginning of the 2010/11 season, albeit at a much higher level than in England.[13]

In Ireland rugby clubs were historically organised into four provincial leagues. A national club league, known as the AIL with approximately 50 teams divided into a hierarchical four division structure, was only established in 1989/90.

Following the introduction of professionalism, the Irish Rugby Football Union (IRFU) adopted a policy of centrally contracting all of its leading Irish based players. The IRFU was permitted to enter provincial representative teams in the newly established European Rugby Cup (ERC). Broadcast revenue and prize money from the Irish teams' participation along with the bulk of the gate receipts from home matches in European competitions is paid to the IRFU. The IRFU pays the bulk of the running costs of the four Irish professional teams, out of revenue generated from international matches. Payments to the four professional teams accounted for 60% of total IRFU expenditure in 2009/10. (IRFU, 2009/10) Rugby in Ireland is thus vertically integrated with the relationship between the IRFU and the four professional teams effectively a parent subsidiary one.

Scotland adopted a vertically integrated model similar to Ireland. Initially there were four Scottish professional teams but this proved unsustainable and was subsequently reduced to just two professional teams.[14]

In Wales the transition to professionalism resulted in what the Welsh Rugby Union's (WRU) Chief Executive described as "a painful few years for Welsh rugby as it has been forced to adapt and change in an attempt to climb out of the financial mire." (WRU, 2003/4, p.16). Proposals to adopt a vertically integrated structure similar to Ireland were rejected by the clubs. Financial pressures, however, led to a restructuring in 2003/04 leading to the establishment of five regionally based professional teams, although one of these was wound up after just one season. There are no revenue sharing arrangements between the regional teams although they receive some

[13] One club, Montauban, went into liquidation in 2010.
[14] For a time two franchises funded by the SRU operated alongside a privately owned franchise but this was subsequently sold back to the SRU and the number of Scottish teams was reduced to two.

financial assistance from the WRU.[15] Welsh rugby exhibits a high degree of vertical integration but not to the same extent as in Ireland or Scotland. Ongoing financial pressures forced the Welsh regions to introduce a salary cap of £3.5m which is to come into effect for the 2012/13 season.

Following the move to professionalism, it soon became apparent that the supporter base in Ireland, Scotland and Wales was insufficient to sustain full-time professional leagues at a national level. 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.[16]

The size and format of the Celtic League has varied over time. Initially the league consisted of 15 teams (9 from Wales, 4 from Ireland and 2 from Scotland) divided into two sections with the top four from each section qualifying for the play-off stages. In 2003/04 the format changed to a straightforward league competition involving 12 teams with the nine Welsh clubs being replaced by the five newly established regional teams. The league was reduced to 11 teams the following season with the collapse of one of the Welsh regional teams and to 10 in 2007/08 with the winding-up of one of the Scottish teams. A play-off to decide the league winners involving the top four teams was introduced in 2009/10. The number of teams increased to 12 for the 2010/11 season with the admission of two Italian teams.

4: Economics of Professional Rugby.

Financial data is available in respect of the French Top 14 and the English Premiership.[17] Table 1 compares the financial performance of the two leagues in 2009/10.

Total income of Top 14 clubs in 2009/10 amounted to €243m with combined operating losses of €25m. Total revenue of English Premiership clubs in 2009/10 was approximately €120-130m with combined operating losses of €22.3m. Only two

[15] Payments to the regional teams accounted for 25% of total WRU expenditure in 2009/10.
[16] The league has been renamed on a number of occasions reflecting sponsorship changes. We use the original Celtic League title throughout this paper.
[17] Similar data is not available for the Celtic League.

clubs, Leicester and Northampton, recorded an operating profit. Aggregate player salaries at Top 14 clubs in 2009/10 accounted for 35% of total revenue at €85m. The average player wage bill per Top 14 club increased from €2.4m in 2000/01 to €6.1m in 2009/10.[18] (DNACG, 2011).

Table 1: Aggregate Financial Data for Top 14 and Premiership Clubs 2009/10
€m

	French Top 14	English Premiership
Total Revenue	243	120-130
Operating Loss	25.4	22.3

Note: The average €/sterling exchange rate for the period 1 July 2009 to 30 June 2010 was used to convert figures for Premiership clubs to €.
Source: DNACG (2011) and Deloitte (2011).

Details of total revenue of Top 14 clubs for the period 2006/07-2009/10 are given in Table 2.

Table 2: Aggregate Income of French Top 14 Clubs
(€m)

	2006/07	2007/08	2008/09	2009/10	% Change 2006/07-2009/10	% of Total Revenue 2009/10
Sponsorship	67.1	75.3	95.3	93.6	+39.5	42
Match Receipts	29.0	33.5	38.4	46.3	+59.7	21
Merchandise Sales	10.1	11.1	11.7	14.9	+47.5	7
Other Products	9.0	14.9	10.9	13.0	+44.4	6
Transfers	7.4	7.3	9.0	10.4	+40.5	4
League Disbursements	20.9	25.7	25.4	29.2	+39.7	13
Subventions	12.8	12.3	13.4	15.9	+24.2	7
Total Revenue	**162.1**	**185.5**	**218.9**	**242.7**	**+49.7**	**100**

Source: DNACG (2011).

Sponsorship accounted for 42% of total income in 2009/10. Match receipts accounted for 21% - the first time that they exceeded 20% of total revenue since the Top 14 was established. (DNACG, 2011). League disbursements (mainly broadcast revenues) made up 13% of the total. Merchandise sales represented 7%, other product sales 6% and subventions (mainly from local government) accounted for 7% of total income.

[18] English Premiership clubs were subject to a salary cap of €4.6m in 2009/10.

Table 3 ranks the Top 14 teams by revenue and also shows their final league position for the past three seasons. The table illustrates the wide disparity in income between Top 14 clubs. In 2010/11, for example, Toulouse had total revenue of €33m which was more than three times greater than Agen and La Rochelle the clubs with the lowest revenue. By way of comparison, Leicester, the highest earning English club in 2009/10 had total revenue of €21m which was in line with the fourth richest French club.[19]

Table 3: Top 14 Clubs Income and Final League Position 2008/09 – 2010/11.

	2008/09		2009/10		2010/11p	
	Budget €m	League Position	Budget €m	League Position	Budget €m	League Position
Toulouse	29.3	2	33.5	4	33.1	1
Clermont Auvergne	20.4	3	23.8	3	23.3	4
Racing Metro	-	D2	21.0	6	22.3	2
Toulon	17.8	9	20.0	2	20.7	8
Stade Francais	21.2	4	22.0	8	20.1	11
Montpellier	18.9	10	18.1	10	17.7	6
Bayonne	13.4	6	14.6	13	17.0	7
Biarritz	15.6	5	17.7	7	16.9	5
Perpignan	15.9	1	15.7	1	15.9	9
Castres	15.3	12	14.5	5	15.0	3
Brive	18.6	7	19.5	9	15.0	12
Bourgoin	12.0	11	11.2	11	11.8	14
La Rochelle	-	D2	-	D2	10.5	13
Agen	-	D2	-	D2	10.4	10
Montauban	12.4	8	13.4	12	-	D2
Albi	-	D2	9.8	14	-	D2
Dax	8.6	13	-	D2	-	D2
Mont-de-Marsan	6.5	14	-	D2	-	D2
Rank Order Correlation Coefficient	.705		.604		.701	

Notes: 2010/11 financial data are provisional unaudited figures. D2 indicates club was in second division and was not included in the correlation estimates.
Source: DNACG (2011), p.38.

As we only have data for three seasons, it was not possible to undertake a detailed comparison of the link between budget and performance for the French Top 14 clubs. We compared financial and league rankings for Top 14 teams using Spearman's Rank

[19] Only three other English clubs had revenue in excess of €10m in 2009/10: Northampton €13.7m; Harlequins, €12.1m and Gloucester €10.7m, while the highest earning Welsh team, Cardiff Blues, had total revenue of €10m. (Deloitte, 2011). These figures are less than all but the three poorest Top 14 teams. Financial data is not available for Irish and Scottish teams.

Order Correlation Coefficient. The coefficient ranged between 0.6 and 0.7 indicating that financial resources and league position were highly correlated. As sponsorship is the largest element of club revenue this would tend to suggest that in general better resourced clubs perform better.[20] The table shows that money cannot guarantee success. Perpignan finished in top position in two of the three seasons despite operating off a budget that was only half that of the best resourced team, Toulouse.

5: Evidence on Competitive Balance.

There have been numerous studies of competitive balance in sports leagues. Most 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, 2011). 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.

Different responses to the introduction of professionalism in European rugby provide an interesting natural experiment of the competitive balance hypothesis. The Premiership operates a salary cap and revenue sharing arrangement while the Top 14 traditionally did not, only introducing a salary cap (at a much higher level) in 2010/11. The Celtic League consists of teams from different countries with different national arrangements in relation to revenue sharing and no salary caps. All three leagues are open talent, i.e. teams recruit players from other leagues and countries and it seems reasonable to regard clubs in all three leagues as win maximisers.[21] Both the Premiership and Top 14 have promotion and relegation while the Celtic League does

[20] Evidence of a strong correlation between revenue and performance by itself tells us nothing about the direction of causality. If match and merchandise receipts accounted for the bulk of team revenue then arguably high levels of income may be due to on-field success rather than the other way round. Although a long established club, Stade Francais operated in the lower levels of French rugby for much of its history but has emerged as a major force in the professional era, winning seven championships since 1997/98, following the clubs acquisition by a wealthy businessman.

[21] The majority of English and France clubs are loss making and several clubs in both countries have got into financial difficulties. The Irish, Scottish and Welsh Celtic League teams are all reliant to varying degrees on their parent associations for revenue. This suggests that clubs in all three leagues are win rather than profit maximisers. The Scottish Rugby Union's Strategic Plan provides that both Scottish professional teams should increase their win ratio in the Celtic League to 55%, finish in the top 5 and achieve one quarter final appearance in the ERC by 2012. SRU (2007).

not.[22] *A priori*, the Premiership should display a greater degree of competitive balance than the Top 14. Indeed the CEO of Premiership Rugby has asserted that it seeks to position itself "as the most competitive league in World rugby". (Maxwell, 2012). It is not possible to say *a priori* whether the Celtic League should have a higher or lower degree of competitive balance than the other two leagues.

First we consider short-term uncertainty or uncertainty of outcome of individual matches. A commonly used measure of short-run competitive balance in the literature is the adjusted standard deviation of teams' win ratios. The adjusted standard deviation is calculated as the ratio of the actual standard deviation to an idealised win ratio generated by a perfectly balanced league which is given by the formula $0.5/\sqrt{n}$ (where n is the number of matches played).[23] Table 4 shows the results for short-run competitive balance in the three rugby leagues; the Courage League, which preceded the Premiership, and soccer's FA Premier League (FAPL).

Table 4: Competitive Balance using Adjusted Standard Deviation of Win Ratios

Variable	FAPL	Premiership	Courage League	Celtic League	Top 14
year	0.030	-0.017	0.073**	-0.005	-0.089
cons	-58.604	36.493	-143.843**	10.819	178.796
N	14.000	14.000	10.000	8.000	6.000
r^2	0.272	0.061	0.695	0.004	0.377

legend: * p<0.05; ** p<0.01; *** p<0.001

The time coefficient is negative for the English, French and Celtic leagues but is insignificant in all three. Interestingly, the time coefficient is positive and significant

[22]In the Premiership only one team is relegated each season compared with two in the Top 14. Szymanski and Valetti (2003) suggest that promotion and relegation reduces the incentive to share revenue and this may explain the low level of revenue sharing in the Top 14. As pointed out earlier, revenue sharing and salary caps were introduced in the Premiership in order to ensure the viability of the participating teams rather than as a means of promoting competitive balance. Noll (2007) concluded that leagues with promotion and relegation would be stronger than closed leagues.

[23] This measure is attributed to Noll (1988) and Scully (1989) and allows comparisons 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. There have been significant outliers in some seasons in both the Celtic League and Premiership.

for the Courage League which indicates that the amateur league was becoming progressively more unbalanced in the years before the move to professionalism.

All three leagues award a bonus point when a team loses a match by seven points or less. Seven points is the equivalent of a converted try and so 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 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 various leagues.[24] Table 5 gives the results of a time series regression on the proportion of close matches per season for each league.

Table 5: Trend in Close Matches by League

	(1)	(2)	(3)
VARIABLES	Premiership	Celtic League	Top14
Trend	1.557***	0.931*	0.474
	(0.322)	(0.432)	(1.507)
Constant	29.38***	30.17***	36.04
	(3.031)	(5.068)	(19.01)
Observations	14	8	6
R-squared	0.660	0.436	0.024

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results show that the percentage of close matches in all three leagues has risen over time indicating an increase in competitive balance. In the case of the Top 14, however, the results proved statistically insignificant.[25] The Premiership had a higher proportion of close matches than the Top 14 indicating a higher degree of competitive balance which is in line with expectations.[26]

Next we consider the issue of dynamic competitive balance, i.e. whether the various leagues are dominated by a small number of teams or whether the championship rotates between several different clubs.[27] Table 6 gives details of the number and

[24] 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).
[25] This is not very surprising given the limited number of observations in the case of the Top 14.
[26] In some seasons more than 50% of Premiership matches were close matches.
[27] The issue of medium-term balance is considered later.

frequency of championship wins in the English and French leagues since 1997/8 (2001/2 in the case of the Celtic League). Data on the Courage League for the period 1987/88 – 1996/97 is included for comparative purposes.

Table 6: League Champions

	Premiership	French Top 14	Celtic League	Courage League
Seasons	14	14	10	10
No. Of winners	6	5	5	3
Wins by Team	Leicester 6 Wasps 4 Gloucester 1 Newcastle 1 Sale 1 Saracens 1	Stade Francais 7 Biarritz 3 Toulouse 2 Clermont Auvergne 1 Perpignan 1	Ospreys (Wal) 3 Munster (Irl) 3 Leinster (Irl) 2 Llanelli (Wal) 1 Ulster (Irl) 1	Bath 6 Leicester 2 Wasps 2
HHI	0.29	0.33	024	0.44

Source: http://www.premiershiprugby.com/ , http://www.lnr.fr/ and http://www.rabodirectpro12.com/.

Up to 2010/11 six teams had won the Premiership; while there were only five winners of the Top 14 over the same period. There have been five winners of the Celtic League over a shorter space of team, three Irish and two Welsh. No Scottish team has won the title to date. No team has won the Celtic League in successive seasons.

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 its proportionate number of championship wins, i.e. in the case of Leicester in the Premiership this is equal to 6/14. 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.

The HHI data in Table 6 suggest that the Celtic League displayed the greatest degree of dynamic competitive balance. The Premiership had a higher degree of dynamic competitive balance than the French Top 14 which is consistent with revenue sharing and salary caps resulting in greater competitive balance. It is also worth noting that

the Premiership displays a much greater degree of competitive balance than its predecessor from the amateur era, the Courage League.[28]

We also tested the degree of dynamic competitive balance using a test proposed by Vrooman (2007). The test measures team performance on the basis of points obtained over the course of a season as a percentage of the maximum possible points obtainable. The test assumes that the points obtained by a team would follow an autoregressive process over playing seasons. If the auto regression has close to a unit root then the league would be largely deterministic i.e. the league structures acted to keep the imbalance between teams constant with any change being the result of a random shock. The results for the various rugby leagues and the FAPL are shown in Table 7.

Table 7: Vrooman Regression Results
(Dependent Variable: Points this year)

Variable	FAPL	Premiership	Courage League	Celtic League	Top 14
Points Last Year	0.879***	0.482***	0.738***	0.392***	0.592***
_cons	0.046*	0.264***	0.126*	0.296***	0.216**
N	218.000	140.000	89.000	86.000	55.000
r^2	0.635	0.193	0.394	0.158	0.314

legend: * p<0.05; ** p<0.01; *** p<0.001

The autoregressive coefficient is significant in every regression. The coefficient was extremely high in the case of the FAPL indicating that the league outcome is largely deterministic which is consistent with Vrooman (2007). In contrast the coefficients were much lower and appear to be systematically lower in each of the three European rugby leagues. The Premiership and Celtic League coefficients, in particular, suggest a high degree of dynamic competitive balance. The coefficient was lowest in the case of the Celtic League which is consistent with the results in Table 6. Similarly the Premiership coefficient is lower than that for the Top 14 which is consistent with revenue sharing and salary caps improving dynamic competitive balance.

[28] The HHI for soccer's FAPL for the period from 1997/8 to 2010/1 was 0.42 indicating a much greater degree of dynamic imbalance than the three rugby leagues.

The results provide a comparison of the degree of dynamic competitive balance in rugby before and after the switch to professionalism in the case of England. The coefficient was much lower for the Premiership than for the Courage League and the drop in the coefficient is statistically significant. The evidence is therefore consistent with the hypothesis that the introduction of professionalism led to an improvement in dynamic competitive balance.

6: Match Attendance.

This section provides an overview of the relationship between match attendance and some key data in European Rugby. This review will help clarify the issues and motivate the more formal econometric analysis of the next section.

Table 8 provides some summary data showing how attendances in the three European rugby leagues have evolved over time. Data on aggregate attendances are included to illustrate the total numbers involved. In 2010/11 the aggregate attendance figures for the three leagues was in excess of 5m. Aggregate attendance figures in all three leagues have risen significantly over time.

Table 8: 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
2010/11	1,568,095	2,553,318	964,611	11,880	14,029	7,308

Source: As for Table 6.

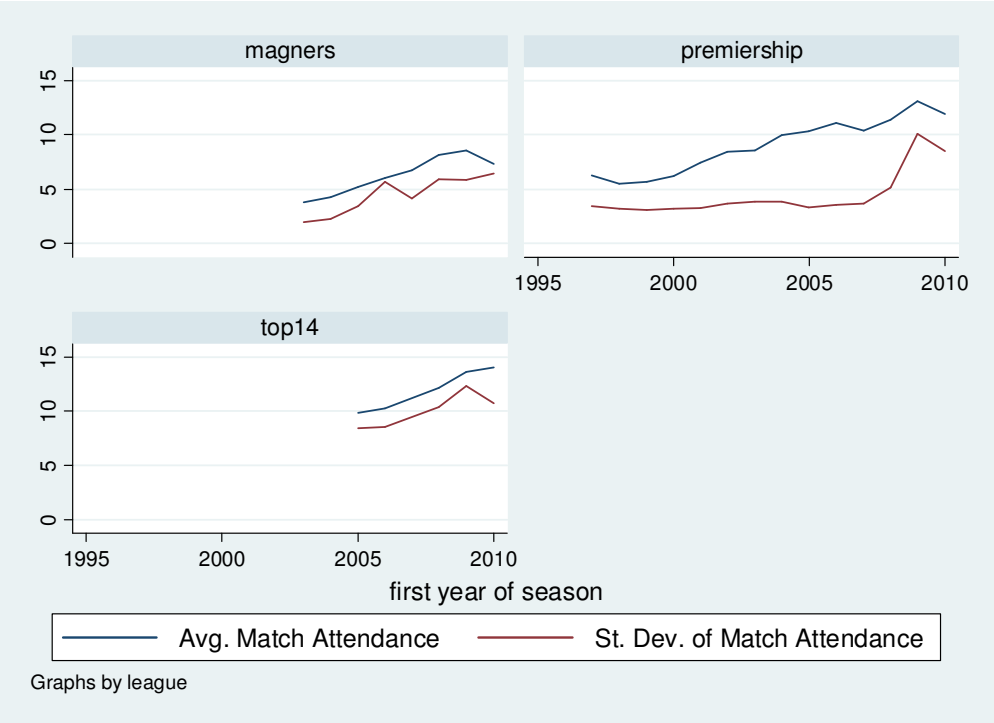
Average attendance figures are more useful measure for comparisons as the number of teams and hence matches varies between leagues and over time. The Top 14 had the highest average match attendance in 2010/11 at over 14,000. Average match attendance in the Premiership in 2010/11 was almost 12,000 while the corresponding

figure for the Celtic League was 7,300.[29] Average attendances in all three leagues have risen over time.

Chart 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. The increased variability of attendance would be consistent with the notion that the leagues had become less balanced over time rendering some fixtures considerably more attractive than others, although our analysis indicates an improvement in competitive balance. The English premiership stands out as an exception to this rule. Until recently the standard deviation of match attendance was almost constant implying that the shape of the distribution has remained more or less constant – just right shifted over time. There was a sudden change in the last few years. It is interesting to speculate what might be the cause of such increased dispersion in match attendance. An obvious candidate would be changes in the structure of the league which radically changed the degree of competitive balance. We examine this issue in detail in the next section.

[29] Within the Celtic League there are significant differences in average match attendance between countries with Irish teams having the highest average attendance in 2010/11 at 10,800. The corresponding figures for Wales, Italy and Scotland respectively were 7,760, 3,733 and 2,978. The low attendances in Italy and Scotland cast doubt on the long-term viability of teams from those countries and for the league itself.

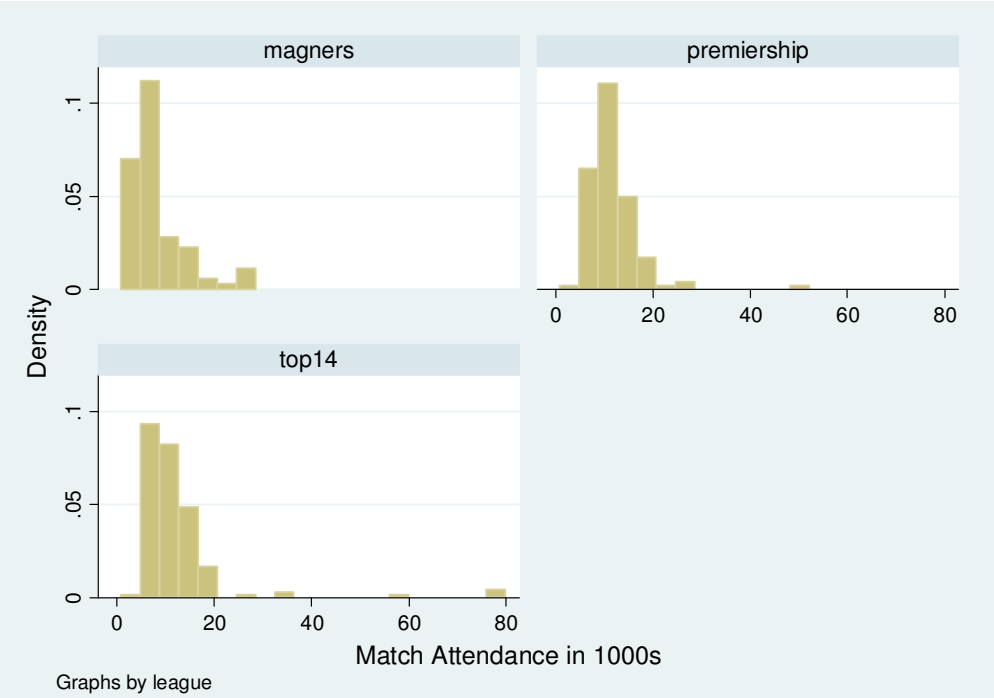
Chart 1: Average Rugby Match Attendance by League.



In fact the distribution of match attendance is highly skewed. Chart 2 shows the histogram for match attendee by league in 2008. All the competitions tend to have a few matches with attendance way in excess of the average. For example, in the French Top 14, one club, Stade Francais will have one match per season with a crowd of almost 80,000 – roughly 10 times the average for the league. The skewness that is evident in all competitions may reflect factors such as ticket price policy. In the case of Stade Francais, for example, the club regularly chooses one match to dramatically lower ticket prices as a sort of special introductory offer to prospective fans. Some English Premiership clubs also run similar one-off promotions.[30]

[30] Stade may sell tickets to such matches for as little as €5. In recent seasons the Premiership will normally have a double bill of two matches in the same stadium to launch the new season. In our data we split the attendance for such a fixture 50/50 between the two "home" teams.

Chart 2: The Dispersion in Attendance in 2008



7. An Econometric Model of Match Attendance

The previous sections looked at match attendance and competitive balance in European Rugby leagues. An obvious question is whether, or to what extent, these two phenomena are linked. We examine this question using a formal econometric model using data on results and attendances for 3,667 matches in the three European leagues.[31]

The uncertainty of outcome hypothesis implies that fans prefer close matches to highly unbalanced matches. On that basis, in deciding whether or not to attend a match, fans have to form some *ex ante* view as to how evenly matched are the two participating teams. This assumes some knowledge among fans on the respective merits of different teams which we suggest is based on teams' league record. 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 matches. Our basic hypothesis is that

[31] The data set includes all matches in the Premiership since its establishment in 1997/98. In the case of the Celtic League and Top 14 it includes all matches since 2003/04 and 2005/06 respectively the date that the competitions adopted a standard league format. In all cases the data covers the period up to the end of the 2010/11 season.

the more evenly balanced the two teams are, the more attractive the match is to fans and hence the higher the attendance. Having estimated a win ratio for each team for every match in each of the leagues we then used the two teams' win ratios for every match as explanatory variables in order to test the impact of short-run competitive balance on attendances.[32]

In addition to short-run *ex ante* competitive balance, the other key factor in determining attendance in our model 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. To capture this we estimated a coefficient for each team for each match based on a combination of the number of points the team was behind the top/qualifying position and the number of matches remaining.[33]

The results of the estimation of the basic model are shown in column 1 of Table 9 below. The dependant variable, match attendance, is measured in thousands. 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.

[32] Initially we sought to construct a direct measure of short-run competitive balance defined as the absolute difference between the win ratios of the teams in every match. This measure, however, had no significant impact.

[33] 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 prior to a given match and p^* is the number of points obtained by the leading team (or the team in the final play-off qualifying place) prior to the match, m is the number of matches remaining and k is a constant. Teams were awarded a value of zero in cases where it was mathematically impossible for them to finish on top or make the play-offs. The Top 14 operated a play-off system for the entire period for which we have attendance data. The Premiership introduced play-offs in 2003/4 while the Celtic League introduced play-offs in 2009/10. The number of teams qualifying for the play-offs in the English and French leagues has varied over time. Play-offs increase the degree of medium-term uncertainty as they increase the number of teams remaining in contention to win the championship.

Table 9: Model of Match Attendance

	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	OLS	OLS	FE
VARIABLES					
Win Ratio Home	6.362***	6.297***	6.688***	5.871***	2.093***
	(0.514)	(0.516)	(0.456)	(0.460)	(0.436)
Win Ratio Away	3.478***	3.444***	3.314***	2.761***	1.097**
	(0.477)	(0.478)	(0.460)	(0.447)	(0.428)
Home team in contention	0.172*	0.169*	0.104*	0.0816*	0.0110
	(0.0880)	(0.0885)	(0.0551)	(0.0464)	(0.0307)
Derby		1.373***	1.423***	1.253***	
		(0.266)	(0.251)	(0.243)	
Bonus			0.627*	0.775**	0.303
			(0.375)	(0.371)	(0.296)
Trend			0.562***	0.572***	0.587***
			(0.0414)	(0.0402)	(0.0343)
Top14	2.954***	3.028***	0.776*	0.535	
	(0.353)	(0.352)	(0.455)	(0.445)	
Celtic League	-2.788***	-2.660***	-4.525***	-4.146***	
	(0.199)	(0.198)	(0.218)	(0.229)	
Home Champion				1.818***	
				(0.293)	
Away Champion				1.581**	
				(0.616)	
Home ERC				1.762***	
				(0.543)	
Away ERC				0.949	
				(0.855)	
Friday				-2.248***	
				(0.217)	
Mid-Week				-1.922***	
				(0.269)	
Sunday				-1.991***	
				(0.233)	
Holiday				1.746*	
				(0.919)	
Constant	3.384***	3.021***	-1.479***	-0.286	1.804***
	(0.433)	(0.427)	(0.416)	(0.400)	(0.406)
Observations	3,667	3,667	3,667	3,667	3,667
R-squared	0.148	0.156	0.234	0.267	0.162
Number of match					810

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 3,180. 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.

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.

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. This variable takes on value of zero if it is mathematically impossible for the home team to win the league/qualify for the playoffs. The variable has a value of 5 for the team in the final play-off position.[34] Thus if a team were to be transformed from no hope of qualification to being in the final play-off position (or top of the league if there are no play-offs) , attendance would rise by 860. To put this in context, this is approximately half the 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 a 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

[34] In the absence of play-offs the variable has a value of 5 for the top team in the league.

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. King et. al. (2011), however, report similar results in the case of the Australian National Rugby League, although they used a different methodological approach.[35]

We might also be interested in whether there is, what might be described as, a "Derby" effect i.e. matches between local rivals. We have identified 997 instances of matches between local rivals. Column 2 of the table allows us to test for the presence of this Derby effect. Perhaps unsurprisingly the derby variable coefficient is large statistically significant and positive. According to these results, a match between local rivals will have attendances higher on average by 1,373. To put this figure in context, this is slightly less than the effect of the away team increasing its win ratio by 50%.

A further factor that we consider in analysing attendances is the impact of bonus points which were introduced at different times in the various leagues. 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.[36]

[35] The latter study relates to rugby league rather than rugby union.
[36] The English Premiership introduced bonus points in 2000/1 while the Top 14 introduced 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.

Column 3 of Table 9 adds a dummy variable to the regression that is set to 1 during years where bonus points were in force. 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 0.09) in the presence of the time trend. The coefficient is positive, as expected, but is small in magnitude. Bonus points appear to matter much less than 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. Thus we cannot reject the hypothesis that bonus points had no effect on attendance at the 5% significance level.

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. As can be seen, the previous success of both teams has a large and significant positive effect on attendance the following season. The effect of the home teams seems larger than that of the away team, but in fact the difference is not statistically significant. 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, winning the ERC seems to matter only as much as winning the home league (p-value = 0.93). We might have expected that ERC, being the more prestigious completion, would matter more.

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.[37]

[37] This suggests that some people may only attend a match during the Christmas/New Year period.

We consider the possibility that estimates in columns 1 to 4 are rendered inconsistent by unobservable effects that are correlated with the 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 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 9. As we are controlling for a match specific effect it is not possibly 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 different 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 finding that measures designed to make matches more attractive to supporters have had little impact on attendances is surprising and raises some questions about contest design. In order to analyse this further we ran a time regression for average tries per match per season for each of the leagues. The results are summarised in Table 10.

Table 10: Trends in Average Tries per Match

	(1)	(2)	(3)
	English	Celtic	French
	Premiership	League	Top 14
Trend	-0.140***	-0.162***	-0.0379
	(0.0282)	(0.0315)	(0.139)
Constant	5.461***	5.792***	3.897*
	(0.241)	(0.339)	(1.638)
Observations	14	8	5
R-squared	0.673	0.815	0.024

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The table shows that the number of tries per match has fallen in all three leagues (columns 1-3,). The results are derived from very small sample sizes and so must be treated with caution and were statistically insignificant for the Top 14. Nevertheless it is reasonably clear that the introduction of bonus points has failed to achieve its stated goal of increasing the number of tries.

We noted earlier that the number of close matches (defined as the percentage of matches where there was seven points or less between the teams) has risen over time (see Table 5) suggesting that the introduction of bonus points has coincided with an increase in the number of close finishes. Furthermore, there is a statistically significant inverse relationship between average tries per match and the proportion of close matches (Table 11). This is hardly surprising; a team is more likely to score lots of tries in an unbalanced match. Overall the results suggest that all the leagues have become more balanced over time with more close matches and fewer tries scored.

Our earlier analysis indicated that attendance depended primarily on the relative strength of the home team while short-run competitive balance had a lesser effect so, at one level, it is perhaps not surprising that bonus points appear to have little effect on match attendances. At the same time the evidence indicates that the introduction of bonus points has been only partially successful; it has resulted in a greater number of close matches but the number of tries per match has fallen which may also explain why bonus points appear to have had little impact on attendances.

Table 11: Close Matches v Tries by League

	(1)	(2)	(3)
VARIABLES	Premiership	Celtic League	Top14
	Close	Close	Close
Tries	-8.379***	-5.779**	-7.064
	(2.205)	(2.009)	(5.258)
Constant	79.95***	64.50***	66.34**
	(9.940)	(8.257)	(18.27)
Observations	14	8	6
R-squared	0.546	0.580	0.311

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

8: 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. Professionalism brought a major restructuring of the sport in the main European rugby playing countries and contrary to longer established professional sports leagues the three main European rugby leagues operate different business models.

Short-run competitive balance has increased in all three leagues over time. The Premiership displays a greater degree of short- and long-run competitive balance than the Top 14 which is unsurprising given that it has a greater degree of revenue sharing and a salary cap. Interestingly the evidence indicates that competitive balance in English rugby has increased since the move to 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 directly and appears not to have halted a secular decline in the average number of tries per match. Dynamic competitive balance may be important in maintaining supporter interest over time, particularly in closed leagues but that is beyond the scope of the present paper.

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