Does size matter? An investigation of competitive balance in the English Premier League under different league sizes.

RAMCHANDANI, Girish, PLUMLEY, Daniel <http://orcid.org/0000-0001-7875-0969>, PRESTON, Harry and WILSON, Robert

emerald PUBLISHING

Team Performance Manag

Does size matter? An investigation of competitive balance in the English Premier League under different league sizes.

Journal:	*Team Performance Management*
Manuscript ID	TPM-10-2018-0064
Manuscript Type:	Research Paper
Keywords:	competitive balance, European football, English Premier League, competition

Does size matter? An investigation of competitive balance in the English Premier League under different league sizes.

Abstract

Purpose
This paper aims to explore at what league size competitive balance reaches its best level through a longitudinal study and using the English Premier League (EPL) as an example.

Design/Methodology/Approach
In order to test the influence of league size on competitive balance in the EPL, we first calculated competitive balance scores for 22 seasons between 1995/96 and 2016/17 under the existing 20 team system. We then calculated a further ten normalised competitive balance scores for each EPL season by adjusting the league size to examine the league size threshold at which competitive balance in each season of the EPL was at its best level.

Findings
Analysis indicates that the current league structure of 20 teams compromises the overall level of competitive balance in the EPL in comparison with a league comprising between 10 and 19 teams. However, we cannot pinpoint the precise league size at which the EPL is most competitively balanced as no significant differences were observed between the competitive balance indices for these league sizes.

Originality/Value
The findings of this study has practical relevance for league organisers and the Union of European Football Associations (UEFA) given that they themselves have stated that competitive balance will be a big challenge for the European football industry in the coming years.

Keywords: competitive balance, European football, English Premier League, competition

Introduction

The world of contemporary sport management has become increasingly complex during the last two decades as sport has expanded into a global market place through wider advances in society such as commercialisation and technology. Naturally, this expansion has also led to increasing academic discourse in the field with authors citing 'the special features of sport' which make it a 'unique institution' (e.g. Smith and Stewart, 2010). The primary reason contemporary sport management is complex is because the product it delivers to participants and fans is so idiosyncratic. Essentially, at opposite ends of an extreme scale, sport battles with two contrasting philosophical approaches (Smith and Stewart, 2010). One is the view of sport as a unique cultural institution with a host of special features that considers its rich history, emotional connections, tribal links and social relevance. On the other hand, sport is viewed as nothing more than just another generic business enterprise subject to the usual government regulations and market pressures (Smith and Stewart, 2010). Consequently, in the present day sport management industry, separating sport from business becomes practically impossible.

There is, however, one key distinction between sport and business when considering the area of professional team sports. In team sport competitions it is stated by Vrooman (2015) that the perfect game is a symbiotic contest between equally matched opponents, essentially through the acquisition of equal playing talent. The practical economic problem is that professional sport leagues form imperfectly competitive natural cartels where games are played between teams with asymmetric market power (Vrooman, 2015). Comparisons between the economic environment of professional team sports and that of more traditional commercial businesses have been well documented by sports economists (e.g. Dobson and Goddard, 2011; Leach and Szymanski, 2015). Professional team sports are intrinsically different from other businesses, in which a firm

is likely to prosper if it can eliminate competition and establish a position as a monopoly supplier (Dobson and Goddard, 2011). In sport, however, it does not pay for one team to establish such a position due to the joint nature of 'production' in sports.

This statement also does not deal with the additional pressures of the league itself as the immediate governing body of said teams. Indeed, the league itself has a necessity to ensure that its members (teams) are sufficiently homogeneous to generate competition, as organisations in other sectors may look for a sufficient homogeneity between their members in terms of status, pay and incentives to favour cohesion and sustainability. However, this analogy is still fraught with complexity as each league has individual members (teams) situated within it that all have individual goals but also require all other members (teams) to buy into a shared goal to aid competition. As such, the study of professional sport teams and leagues also contributes to the broader literature on coopetition (defined as simultaneous cooperation and competition (Brandenburger and Nalebuff, 1996)). Since this seminal text, coopetition has been the subject of an increasing amount of research in the field of strategic management and measuring its impact on performance (Le Roy and Czakon, 2016). Scelles, Mignot, Cabaud and Francois (2017) state that this concept of coopetition in sport is highly relevant in the sense that if opponents are competitors on the field, they need each other to produce the competition and, as such, they are economic partners . The aforementioned literature is important for the framing of our study which considers a key economical function of professional team sports - competitive balance.

Literature examining competitive balance in professional team sports is extensive (as evidenced in the review of literature). However, our research focuses on a previously unexplored aspect of competitive balance by using longitudinal data from the English Premier League (EPL) to examine: first, whether the overall level of competitive balance in a sport league varies based

on the number of teams that make up the league; and second, at what size does the league's competitive balance reach its best level.

There is both a practical and academic rationale for this study. From a practical perspective, there is a recognition from the President of European football's governing body, the Union of European Football Associations (UEFA) that "the biggest challenge [to develop football in Europe] over the next few years will be competitive balance" (Inside World Football, 2017). It may be that the president of UEFA does not actually define competitive balance in the same way as academics but it is still clear that the nature of competition within sport leagues is high on UEFA's wider agenda. Second, a number of academic researchers in recent years have cited a decline in competitive balance in the EPL over time (e.g. Ramchandani, Plumley, Boyes and Wilson, 2018; Plumley, Ramchandani and Wilson, 2017; Ramchandani, 2012; Groot, 2008; Goossens, 2006). Aligned to this, there has also been a suggestion in the extant literature that *theoretically* the more games played the less uncertain is the championship race, reducing fan interest in the league (Pawlowksi and Nalbantis, 2015).

The rest of the paper is structured in the following order. The next section covers relevant literature relating to competitive balance in professional team sports. We then proceed to the methods used and the analysis undertaken before presenting our results and discussion. The paper concludes by identifying the main issues and practical implications and a direction for future research.

Literature Review

The concept of competitive balance was pioneered by Rottenberg (1956) and has played a central role in shaping the literature around modern-day sport economics. Furthermore, the increasing amount of revenue generated for teams from broadcasters, sponsors and fans places competitive balance (and sport finance) at the heart of any contemporary debate about professional team sport owing to the fact that in professional team sport revenues and cash reserves are primarily spent on the acquisition of new playing talent, which in turn has the potential to effect competitive balance within any given league.

Consequently, the discourse on competitive balance in professional team sports is extensive. Its origins lie in U.S. professional leagues, where revenue sharing has become a common mechanism to maintain competitive balance. The European model of professional team sports is uniquely different although both models (European and North American) consider the importance of competitive balance in their structure and the implications it may have on demand for the 'product'. Indeed, in relation to successful sport leagues, Groot (2008) stated that "each competitor has an inherent interest in maintaining the health of their rivals" (p. 25). A potential implication in this context is that an excessively imbalanced competition might have a negative effect on fan interest and, hence, on demand (Kesenne, 2006; Zimbalist, 2003). There has been extensive academic coverage surrounding the impact of competitive balance on fan attendance and whilst a full review of this literature is outside the scope of this particular paper we will refer to certain studies where appropriate.

This is because there are two distinct strands of academic literature on competitive balance in team sports as outlined in a seminal paper by Fort and Maxcy (2003). They categorise

the theoretical and empirical literature on competitive balance in terms of: (1) analysis of competitive balance (ACB) literature, which focuses on what has happened to competitive balance over time or as a result of changes in the business practices of sports leagues; and, (2) literature on competitive balance that analyses its effect on fans, i.e. which tests the longstanding uncertainty of outcome hypothesis (UOH). Given the scope of this paper, and explicit emphasis on the organisational structure of a sports league, we focus our literature review more on the ACB strand of research.

There have been a number of studies that cover ACB with substantial research focusing on sports leagues in North America (for examples see: Lenton, 2015; Maxcy and Mondello, 2006; Mills and Fort, 2014; Price and Sen, 2003; Salaga and Fort, 2017; Zimbalist, 2002). Competitive balance literature has been naturally (given the origins of the concept) dominated by American sports which are structured under closed leagues - in direct contrast to the European team sport model which has predominantly open leagues (especially in football). One study that articulates the difference between these two structures and competitive balance is the work of Buzzacchi, Syzmanski and Valetti (2003). They analysed the number of teams that had the highest win percentages, in the regular season of the MLB, NFL and NHL, and the number of teams that won the league championships in soccer in England, Italy and Belgium between 1950 and 1999 and found that open leagues are less balanced than closed leagues in general.

In relation to European professional team sports, there have been several studies that have focused on competitive balance, most notably in football but occasionally in other sports such as rugby union (e.g. Williams, 2012). Previous research examining competitive balance in football has almost exclusively focused on the aforementioned 'big five' leagues (England, France, Germany, Italy and Spain) with very few focusing on smaller leagues. Pawlowski and Nalbantis

(2015) examined competitive balance and championship uncertainty in the Austrian and Swiss leagues (although this paper also considered stadium attendance and UoH). Aside from this paper, it appears that little attention has been given to football leagues in other European countries. Ramchandani (2012) also cited the paucity of competitive balance literature outside of the 'big five' leagues in Europe. In relation to previous studies, the findings present an inconclusive picture. For example, Goossens (2006) found no significant changes in competitive balance across the German, French and Spanish first divisions (1963/64 - 2004/05). Likewise, Groot (2008) presented similar findings for the French and Spanish first divisions (1946-2006), as did Koning (2000) in relation to the Dutch first division (1970-2000). Michie and Oughton (2004) and Szymanski (2001) also found no significant changes in competitive balance in the French first division (1948-2004) and English first division (1978-1998) respectively.

Contrastingly, a number of other authors do report a decline in competitive balance in some European leagues, with some findings even being cited in the same studies above. For example Goossens (2006) found a decline in competitive balance in the English and Italian first divisions, whilst Groot (2008) reported similar findings for the English, German, Italian and Dutch first divisions. Additionally, a number of more recent studies have stated a decline in competitive balance in the Spanish first division between 1928/29 - 2011/12 (Montes, Sala-Garrido and Usai, 2014) and the English first division (both as an individual league over time and compared to the rest of the English football league industry (three other divisions) between 1992/93 - 2015/16 (Ramchandani, Plumley, Boyes and Wilson, 2018; Plumley, Ramchandani and Wilson, 2017). Findings in this regard were partially influenced by the financial disparity between teams in the EPL and the Football League in the case of England.

Interestingly, a number of these papers cite a decline in competitive balance in the EPL in particular with the exception of Szymanski (2001). However, Szymanski's time period for analysis only accounted for six years of EPL data following its inception in 1992. Given the more recent literature that has stated a decline in competitive balance in the EPL, it could be that the old football league system in England (pre-1992) was conceivably more competitively balanced than the present day industry. Despite this, however, the EPL still commands the highest broadcasting rights fees in European football, showing significant growth in the overseas market in recent years as well. On paper at least, it appears that the EPL currently has a very attractive product to take to market.

One further angle of academic enquiry has been on the competitive balance of the UEFA Champions League group stages (Plumley and Flint, 2015). This study found flaws in the ranking and seeding system used by UEFA and provided statistical evidence that, historically, the group stages of the Champions League have seen competitive imbalance. Furthermore, the paper argued that the seeding system employed by UEFA (which has since been altered slightly) was benefitting the 'bigger' clubs in Europe and providing them with a greater opportunity of progression to the knockout rounds of the competition. Put simply, the dominant teams in their respective domestic leagues were being given a more favourable opportunity in Champions League which enabled them to benefit from further lucrative revenue streams which they could then put towards further strengthening their position in their own domestic league.

Hypothetically, this could lead to a situation whereby a league is dominated by a select number of clubs; something which both Kesenne (2006) and Zimbalist (2003) argued would have a negative impact on fan interest. Indeed, there has already been evidence to suggest that this is potentially happening in the EPL in a paper by Curran, Jennings and Sedgwick (2009).

Their paper focused more on measures of dominance to track competitive balance over time in the EPL. The authors formulated a "Top 4 Index" by counting the number of occasions that each team finished a league season in the top four places, summing the incidence of the four teams with the most occurrences and expressing the total as a proportion of the total number of available places over the period of the measure. They calculated values from the 1948/49 to 2007/08 seasons (inclusive) and for ten year intervals. Their findings suggested that competitive balance in the English top league has decreased and that the league is in danger of becoming a monopoly of the few.

The contrast in findings in studies relating to competitive balance is also reflective of wider issues in relation to the research area. As Pawlowski (2013) states, it may be that the empirical evidence is 'wrong' because the proxies used to measure competitive balance are inadequate. A similar argument is presented by Martinez and Willner (2017) who state that measuring competitive balance in a sports league has a long history of competing methods. Additionally, there have been a number of studies that have shown that competitive balance is not as important as previously suggested in past studies (e.g. Andreff and Scelles, 2015; Pawlowski and Anders, 2012; Scelles, Durand, Bonnal, Goyeau and Andreff, 2013). However, these papers focus more on analysing competitive balance against the concept of UoH and fan attendance. Our paper is concerned with the concept of ACB over time in respect of league structures.

There is little doubt that the economics of professional team sports as a theoretical field has developed substantially since the work of Rottenberg in the mid-1950s and there may even now be an argument to suggest that the theoretical position of the literature needs revisiting given the changing dynamics of the industry. However, for now, taking into account the extant

literature and the message from UEFA's president that competitive balance is a priority for the industry in the coming years, our paper is both timely and justified. Our approach is to focus on ACB over time in the EPL considering the current league structure of 20 teams (which has been in operation since 1995/96) and then to reduce the numbers of teams (and results) progressively to see if competitive balance indices changed significantly when the number of teams in the league were reduced. The next section of the paper details the precise methodological approach and the key questions that guided this research are outlined below:

1. How has competitive balance in the EPL at an overall league level changed over time?
2. Does the current 20 team league structure offer better, worse or the same level of overall league competitive balance in comparison with a league with fewer teams hypothetically?
3. What is the best league size in the EPL from the perspective of promoting competitive balance between teams?

Methods

Measuring competitive balance

There are a variety of measurement techniques used when considering competitive balance in professional team sports, which have their respective strengths and weaknesses (see Mills and Fort, 2014; Owen and King, 2015). A review of the empirical literature on competitive balance including game and season uncertainty, primarily in the context of North American sports leagues by Fort et al. (2016), indicated that the most commonly used measure, where drawn games are rare or non-existent, is the standard deviation of team winning percentage within a season. By contrast, in sports such as European football, where drawn games are possible and common, it is argued that winning percentages might be a biased indicator (Pawlowski et al.,

2010). Our analysis utilises a normalised version of Mitchie and Oughton's (2004) Herfindahl Index of Competitive Balance (HICB) to measure within-season competitive balance, which is hereafter referred to as NHICB. The rationale for using NHICB to measure overall league concentration was to facilitate a like-for-like comparison to be made between a league consisting of a different number of teams. This is particularly relevant given the focus of the study looking at competitive balance in the EPL under different hypothetical league sizes.

Analysis procedure

There are 55 UEFA national member associations and 54 of them have a football league system, with clubs from Liechtenstein playing their league football in the Swiss pyramid. The number of teams that make up the top football league division in each country is shown in Figure 1. The EPL is one of only four top division leagues across Europe to have 20 teams. The most common league sizes in Europe are 10 or 12 teams.

<Figure 1 about here>

It is not known whether reducing the size of a particular league would impact upon the overall competitive balance of the league. In order to test the influence of league size on competitive balance in the EPL, we first calculated NHICB scores for 22 seasons between 1995/96 and 2016/17 under the existing 20 team system (NHICB20). NHICB scores were calculated using the following formula:

$$NHICB = [\sum pi^2 / (1/N)] * 100 * Max\ HICB(20) / Max\ HICB(N) \quad (1)$$

where pi corresponds to the share of points achieved by club i compared to all points allocated in the league in any given season;

i = 1, 2…, N, with N corresponding to the number of clubs in the league in the season;

Max HICB(20) is HICB for the most unbalanced distribution of points with 20 clubs;

Max HICB(N) is HICB for the most unbalanced distribution of points with N clubs.

For a perfectly balanced league of any size, the index takes a value of 100. As the index rises, competitive balance declines. We then calculated a further ten NHICB scores for each EPL season by adjusting the league size to isolate the following:

1. the top 19 teams, by excluding their results against the team that finished in 20th place (NHICB19);
2. the top 18 teams, by excluding their results against the bottom two teams (NHICB18);
3. the top 17 teams, by excluding their results against the bottom three teams (NHICB17);
4. the top 16 teams, by excluding their results against the bottom four teams (NHICB16);
5. the top 15 teams, by excluding their results against the bottom five teams (NHICB15);
6. the top 14 teams, by excluding their results against the bottom six teams (NHICB14);
7. the top 13 teams, by excluding their results against the bottom seven teams (NHICB13);
8. the top 12 teams, by excluding their results against the bottom eight teams (NHICB12);
9. the top 11 teams, by excluding their results against the bottom nine teams (NHICB11); and,
10. the top 10 teams, by excluding their results against the bottom 10 teams (NHICB10).

Using this stepwise approach, a total of 242 data points were generated (i.e. 11 NHICB scores per season x 22 seasons). By comparing the NHICB scores derived based on the different

number of teams included in the calcuation process, it was possible to examine the league size threshold at which competitive balance in each season of the EPL was at its best level.

Prelimary analysis showed that all HICB scores were normally distributed as determined by a Shaprio-Wilk test ($p > 0.05$). Three types of parameteric statistical analyses were conducted on this data. First, a Pearson correlation was used to examine the time trend of NHICB20 in the EPL over time. Second, paired sample t-tests were used to determine whether the mean NHICB20 score was signficantly different from the mean scores of NHICB19, NHICB18, NHICB17, NHICB16, NHICB15, NHICB14, NHICB13, NHICB12, NHICB11 and NHICB10. Third, for league sizes that showed signficantly better competitive balance (i.e. lower NHICB scores) in comparison with NHICB20 using the above procedure, a one-way ANOVA was conducted to establish whether the differences in NHICB scores observed between these league sizes were statistically significant.

Results

Since the 1995/96 season, the EPL has consisted of 20 teams. As per the data presented in Figure 2, the NHICB20 score for the league as it has operated between 1995/96 and 2016/17 has ranged from a low of 105.32 in 1996/97 (the most competiviely balanced season) to a high of 113.68 in 2007/08 (the most imbalanced season). When considering the time trend of NHICB20 over the 22 EPL seasons (where 1996/97 = 1 and 2016/17 = 22), there has been a moderate and statistically signifianct decline in competitive balance, as in this case is indicated by a positive Pearson correlation coeffient (r) of 0.598 ($p = 0.003$).

<Figure 2 about here>

Table 1 illustrates the frequency with which the best (lowest) and worst (highest) NHICB scores were found to occur in the EPL under different league size scenarios. In 16 of the 22 seasons examined, the worst HICB score occured under the incumbent league scenario of 20 teams. By contrast, there were no instances where the 20 team league scenario produced NHICB scores better than all of the other league size scenarios. Hence the difference between the occurrence of best and worst competitive balance with 20 teams was -73%, as shown in the last column of Table 1. The league size thresholds at which best NHICB occurred most frequently were 10 and 11.

<Table 1 about here>

For each league size, the mean, lowest (best) and highest (worst) NHICB scores across the 22 EPL seasons are presented in Figure 3. Paired sample t-tests confirmed that the mean NHICB20 score was signficantly higher (worse) compared with the NHICB scores for all of the 10-19 league size scenarios ($p < 0.001$). No statistically significant differences in the mean NHICB scores were detected between the 10-19 league size scenarios as determined by a one-way ANOVA ($F(9,210) = 1.589$, $p = 0.120$).

<Figure 3 about here>

Discussion

Our study had three key questions. The first research question was concerned with the state of competition in the EPL over time. We found that across the last 22 seasons, when the league has been contested by 20 teams in each season, there has been a moderate decline in the overall

competitive balance of the league. From an academic perspective, this finding is in line with previous research by Goossens (2006), Ramchandani (2012), Plumley et al. (2017) and Ramchandani et al. (2018), all of whom reported a decline in competitive balance in the English first division over varying time periods, but different from Szymanski (2001), who reported no significant changes in competitive balance in the English first division between 1978-1998. From a practical point of view, a statistically significant reduction in competitive balance over time in the EPL, which is regarded as one of the 'big five' football leagues in Europe (alongside the French Ligue 1, German Bundesliga, Italian Serie A, Spanish La Liga), reinforces the perception that this represents a big challenge at a policy level for developing football in Europe (see Inside World Football, 2017).

The second research question was to test whether the overall level of competitive balance in the EPL under the incumbent 20 team structure was better, worse of the same relative to a hypothetical scenario of a league with fewer teams (between 10 and 19). In response to this research question, we established that there was some variation in the overall level of competitive balance in the league when different numbers of teams are considered. A key finding from our analysis indicates that the current league structure of 20 teams appears to compromise the overall level of competitive balance in the EPL in comparison with a league comprising between 10 and 19 teams.

Our third research question was to determine the specific league size at which overall league competitive balance reached its best level. One the one hand, we can reasonably conclude based on the data that the number of teams in the EPL for promoting competitive balacnce is somewhere between 10 and 19. However, we cannot pinpoint the precise league size at which

EPL is most competively balanced as no significant differences were observed between the competitive balance indices for these league sizes.

Past literature relating to this particular area of research is scarce, although there has been a suggestions in a couple of papers that, theorectically, it might be reasonable to expect that the number of teams that constitute a league (i.e. market size) has an effect on the level of competitive balance (see Pawlowski and Nalbantis, 2015; Ramchandani, 2012). However, with reference to the latter study, the author actually concluded that the higher number of teams in a league, the more competitively balanced the league. This finding was based on comparing leagues with 20 teams (England, France, Italy and Spain), 18 teams (Germany and the Netherlands), 16 teams (Portugal and Russia), 12 teams (Scotland) and 10 teams (Switzerland). A limitation of this study is that the multiple league comparison was only conducted for one season. Our study differs from this by analysing the difference in competitive balance within one league exclusively (over a longitudinal time period) and by reducing the number of teams systematically. Consequently, we present an alternative finding that the lower the number of teams in the league, the more competitively balanced the league (in relation to the EPL).

There has also been a previous suggestion that the perceived quality of the UEFA member associations (and the clubs contained within each member asssociation) have some bearing on competitive balance (e.g. smaller associations such as Scotland or Switzerland have perceived 'poorer' teams competing in their league compared to bigger associations such as England and Germany). However, in relation to competitive balance, Ramchandani (2012) found the UEFA coefficient ranking (for member associations) to have no effect on the competitive balance of the league itself.

Given that our study focuses on hypothetically reducing the league size in the EPL, it is pertinent to discuss the complex situation of a breakaway European super league - a concept previously suggested whereby the 'top' clubs in the largest European leagues form a break-away European closed league and effectively disband from their own league association (see Vrooman, 2007). This has been a controversial topic in recent years, yet there have been findings that allude to dominance of a league by a select number of clubs in relation to competitive balance within individual leagues in England, Germany, Italy and Spain (Ramchandani et al., 2018). In this context, dominance is defined as the number of clubs in each league that have won the title and finished in the top four during the last twenty years. Thus, a breakaway European Super League (by removing the 'top' teams in respective leagues) may bring about the potential for a more balanced league comprising of the clubs left behind in their own domestic leagues. In respect of previous findings by Curran et al. (2009), there may also be an advantage for the breakaway teams if the European Super League was a closed league as their findings suggested that closed leagues are more competitively balanced than open leagues (aligned with much of the extant literature that focuses on American team sports).

Furthermore, it has been suggested that changes in competitive balance in domestic football leagues are related to the increased value of pay-outs from Pan-European competitions such as the UEFA Champions League (Pawlowski et al., 2010) meaning that the current European competitions that the top clubs compete in also provides them with a competitive financial advantage in their own respective domestic league versus those clubs that do not compete in European competitions. Whilst our study has not isolated the 'top' clubs specifically (in the EPL), there is scope here for future research based on our findings that the best league size of the EPL is between 10-19 teams for the time period studied.

Our study is the the first of its kind to consider competitive balance through reducing the number of teams in a league from an academic perspective. However, this is not a completely new phenonemenon in relation to industry discusssions. The Football Association (FA) suggested a reduction in the number of teams in the EPL in 2015 - although this suggestion was designed to aid the performance of the national team by reducing the number of domestic matches players had to play rather than anything linked to competitive balance (de Menezes, 2015). The Italian Football Federation also suggested a reduction of Serie A (the premier division in Italy) from 20 to 18 teams in 2016 with the idea of increasing the skill level of the league and to attract more fans to try to compete better with the EPL and Spanish La Liga (Kesari, 2016). At present, both these leagues remain at 20 teams but in line with the directive from the President of UEFA and the industry focus on competitive balance in European football in coming years, it is likely that these discussions will at least be revisited.

Conclusion

Our findings suggest one clear recommendation for the EPL and its league organisers. Given our analysis that suggests that 20 is the worst size of the league of all the permuations we calculated, it would be wise to revisit the structure of the league given the fundamental economic premise of competitive balance within sport leagues. We appreciate that this recommendation is controversial and would be extremely difficult to implement given the lucrative revenue streams available to clubs in that league from the broadcasting deals (and given that the member clubs of the league itself get to vote on matters regarding the league) but it is clear that these discussions will continue to take place given the recent evidence cited in our discussion and the directive of UEFA.

The findings from this research also provide a useful starting point for wider comparative reviews. The European football market consists of 55 national football associations; therefore a natural extension of this research would be to analyse competitive balance across all UEFA member associations to provide a full picture of the state of competitive balance on the continent. Additionally, future research could replicate our analysis (hypothetically reducing the number of teams in the league) for the other 'big' leagues in Europe (e.g. those with the most teams) to see whether or not the findings of our study for the EPL hold true for other leagues. Future research could also consider competitive balance in relation to the discussion surrounding a break-away European Super League by removing the top 4-6 teams from each of the 'big' five leagues in Europe to see whether or not any given league might be more balanced without the 'top' teams.

References

Andreff, W. & Scelles, N. (2015). "Walter C. Neale fifty years after: Beyond competitive balance, the league standing effect tested with French football data", *Journal of Sports Economics,* Vol. 16 No. 8, pp.819-834.

Brandenburger, A. & Nalebuff, B. (1996). *Co-Opetition: A Revolutionary Mindset That Combines Competition and Cooperation: The Game Theory Strategy That's Changing the Game of Business.* New York, NY: Doubleday.

Buzzacchi, L., Szymanski, S. and Valetti, T.M. (2003), "Equality of opportunity and equality of outcome: open leagues, closed leagues and competitive balance", *Journal of Industry, Competition and Trade,* Vol. 3 No. 3, pp. 167-186.

Curran, J., Jennings, I. and Sedgwick, J. (2009), "Competitive balance in the top level of English football, 1948-2008: an absent principle and a forgotten ideal" *The International Journal of the History of Sport,* Vol. 26 No. 11, pp. 1735-1747.

de Menezes, J. (2018). FA chairman Greg Dyke wants to reduce Premier League from 20 clubs to 18 in bid to improve England national team, http://www.independent.co.uk/sport/football/premier-league/fa-chairman-greg-dyke-wants-to-reduce-premier-league-from-20-clubs-to-18-in-bid-to-improve-england-a6752596.html, accessed 9th January 2018.

Dobson, S. and Goddard, J. (2011), *The Economics of Football*, 2nd ed, Cambridge, University Press.

Fort, R., Maxcy, J., and Diehl, M. (2016), "Uncertainty by regulation: Rottenberg's invariance principle", *Journal of Sports Economics*, Vol. 17 No. 3, pp. 454–467.

Fort, R., and Maxcy, J. (2003), "Competitive balance in sports leagues: An introduction." *Journal of Sports Economics*, Vol. 4 No. 2, pp. 154-160.

Goossens, K. (2006), "Competitive balance in European football: comparison by adapting measures: national measure of seasonal imbalance and top 3", *Rivista di Diritto ed Economia dello Sport*, Vol. 2 No. 2, pp. 77-122.

Groot, L. F. M. (2008), *Economics, uncertainty and European football: trends in competitive balance*, Cheltenham, Edward Elgar.

Inside World Football. (2017) Ceferin puts 'competitive balance' top of UEFA agenda, http://www.insideworldfootball.com/2017/09/05/ceferin-puts-competitive-balance-top-uefa-agenda/, accessed 22nd December 2017.

Kesari, A. (2018) Serie A could see a return to the glory days after revamp is planned", https://www.sportskeeda.com/football/serie-a-could-seereturn-glory-days-after-revamp-planned, accessed 9th January 2018.

Kessene, S. (2006), "The win maximization model reconsidered. Flexible talent supply and efficiency wages", *Journal of Sports Economics*, Vol. 7 No. 4, pp. 416-427.

Koning, R. H. (2000),"Balance and competition in Dutch soccer", *The Statistician*, Vol. 49 No. 3, pp. 419-431.

Leach, S. and Szymanski, S. (2015). "Making money out of football", *Scottish Journal of Political Economy*, Vol 62 No. 1, pp. 25-50.

Le Roy, F. & Czakon, W. (2016). “Managing coopetition: the missing link between strategy and performance”. *Industrial Marketing Management*, Vol 53, pp.3-6.

Lenten, L.J. (2008). "Unbalanced schedules and the estimation of competitive balance in the Scottish Premier League". *Scottish Journal of Political Economy*, Vol. 55 No. 4, pp. 488–508.

Martinez, M. and Willner, J. (2017), "Competitive balance and consumer demand in the English football league", *Applied Finance and Accounting,* Vol. 3 No. 2, 49-60.

Maxcy, J. and Mondello, M. (2006), "The impact of free agency on competitive balance in North American professional team sports leagues", *Journal of Sports Management*, Vol. 20 No. 3, pp. 345-365.

Mills, B., and Fort, R. (2014), "League-level attendance and outcome uncertainty in US pro sports leagues" *Economic Inquiry*, Vol. 52 No. 1, pp. 205–218.

Mitchie, J. and Oughton, C. (2004). *Competitive balance in football: Trends and effects*. (Research paper 2004 No.2). London: University of London, Football Governance Research Centre.

Montes, F., Sala-Garrido, R. and Usai, A. (2014), "The lack of balance in the Spanish first division football league", *European Sport Management Quarterly*, Vol. 14 No. 3, pp. 282-298.

Owen, P.D., and King, N. (2015), "Competitive balance measures in sports leagues: the effects of variation in season length", *Economic Inquiry* Vol. 53 No. 1, pp. 731–744.

Pawlowski, T. (2013), "Testing the uncertainty of outcome hypothesis in European professional football: A stated preference approach", *Journal of Sports Economics*, Vol. 14 No. 4, pp. 341-367.

Pawlowski, T., & Anders, C. (2012). "Stadium attendance in German professional football: The (un)importance of uncertainty of outcome reconsidered". *Applied Economics Letters*, Vol. 19 No. 16, pp.1553-1556.

Pawlowski, T., and Nalbantis, G. (2015). "Competition format, championship uncertainty and stadium attendance in European football–a small league perspective", *Applied Economics*, Vol. 47 No. 38, pp. 4128-4139.

Pawlowski, T. Breuer, C. and Hovemann, A. (2010), "Top clubs' performance and the competitive situation in European domestic football competitions", *Journal of Sports Economics*, Vol. 11 No. 2, pp. 186-202.

Plumley, D. and Flint, S. (2015), "The UEFA Champions League; maintaining the status quo?" *Team Performance Management*, Vol. 21 No. 5/6, pp. 247-258.

Plumley, D., Ramchandani, G., and Wilson, R. (2018). Mind the gap: an analysis of competitive balance in the English Football League system. *International Journal of Sport Management and Marketing*, Vol. 18 No.5, pp. 357-375.

Price, D. I., and Sen, K. C. (2003), "The demand for game-day attendance in college football; an analysis of the 1997 Division I-A season", *Managerial and Decision Economics*, Vol. 24 No. 1, pp. 35-46.

Ramchandani, G., Plumley, D., Boyes, S. and Wilson, R. (2018). A longitudinal and comparative study of competitive balance in five European football leagues. *Team Performance Management*, (online first) https://doi.org/10.1108/TPM-09-2017-0055.

Ramchandani, G. (2012), "Competitiveness of the English Premier League (1992-2010) and ten European football leagues (2010)", *International Journal of Performance Analysis in Sport*, Vol. 12, pp. 346-360.

Rottenberg, S. (1956), "The baseball players' labor market" *The Journal of Political Economy*, Vol. 64, pp. 242-258.

Salaga, S., and Fort, R. (2017). Structural change in competitive balance in big-time college football. *Review of Industrial Organization*, Vol. 50 No.1, pp. 27-41.

Scelles, N, Durand, C., Bonnal, L., Goyeau, D., & Andreff, W. (2013). "Competitive balance versus competitive intensity before a match: Is one of these two concepts more relevant in explaining attendance? The case of the French football Ligue 1 over the period 2008-2011". *Applied Economics,* Vol 45 No 29, pp. 4184-4192.

Scelles, N., Mignot, J.F., Cabaud, B., & François, A. (2017). "Temporary organizational forms and coopetition in cycling: What makes a breakaway successful in the Tour de France? *Team Performance Management: An International Journal.* Earlycite, doi: 10.1108/TPM-03-2017-0012.

Smith, A.C.T., and Stewart, B. (2010). The special features of sport: A critical revisit. *Sport Management Review*, Vol. 13 No.1, pp. 1-13.

Szymanski, S. (2001), "Income equality, competitive balance and the attractiveness of team sports: some evidence and a natural experiment from English soccer" *The Economic Journal*, Vol. 111 No. 469, pp. 69-84.

Vrooman, J. (2015). "Sportsman leagues", *Scottish Journal of Political Economy*, Vol. 62 No. 1, pp. 90-115.

Williams, P. (2012), "Any given Saturday: competitive balance in elite English rugby union", *Managing Leisure*, Vol. 17 No. 2-3, pp. 88-106.

Zimbalist, A. S. (2003),"Reply: Competitive balance conundrums. Response to Fort and Maxcy's comment", *Journal of Sports Economics*, Vol. 4 No. 2, pp. 161-163.

Zimbalist, A. S. (2002), "Competitive balance in sports leagues: an introduction", *Journal of Sports Economics*, Vol. 3, pp. 111-121.

Table 1: Frequency of best and worst NHICB in the EPL by league size

League Size	Best NHICB (B)		Worst NHICB (W)		Difference (B -W)	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
20	0	0.00%	16	72.73%	-16	-72.73%
19	0	0.00%	1	4.55%	-1	-4.55%
18	2	9.09%	0	0.00%	2	9.09%
17	0	0.00%	0	0.00%	0	0.00%
16	0	0.00%	0	0.00%	0	0.00%
15	1	4.55%	0	0.00%	1	4.55%
14	1	4.55%	0	0.00%	1	4.55%
13	2	9.09%	3	13.64%	-1	-4.55%
12	1	4.55%	0	0.00%	1	4.55%
11	6	27.27%	1	4.55%	5	22.73%
10	9	40.91%	1	4.55%	8	36.36%

Figure 1: Leagues sizes of top football divisions in Europe

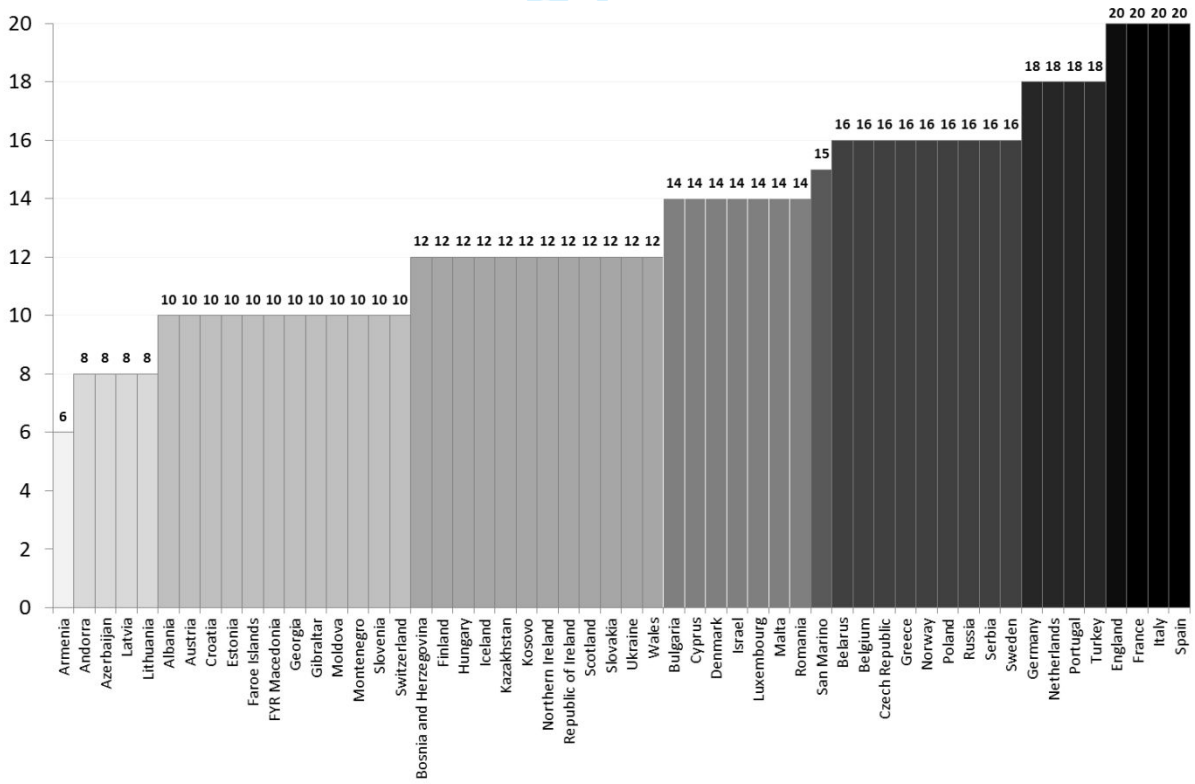


Figure 2: NHICB20 by season

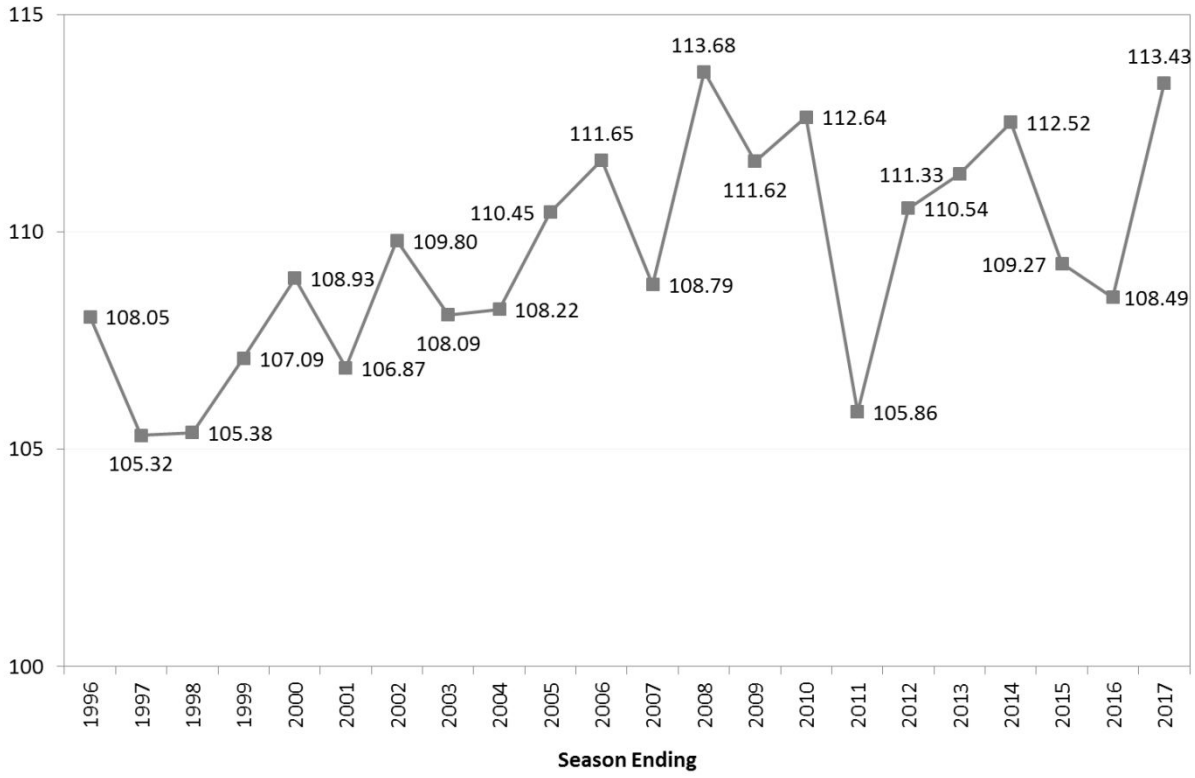
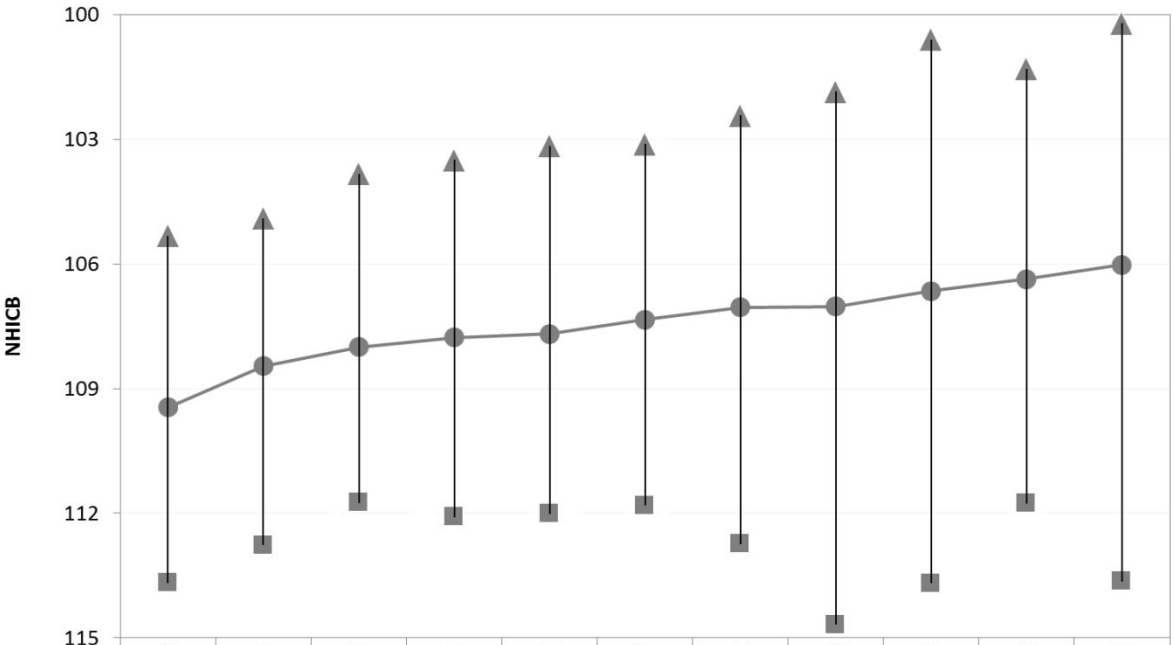


Figure 3: NHICB scores by league size



	20	19	18	17	16	15	14	13	12	11	10
▲ BEST	105.32	104.90	103.83	103.50	103.16	103.11	102.43	101.85	100.60	101.31	100.21
—●— MEAN	109.46	108.46	108.00	107.77	107.68	107.34	107.04	107.02	106.65	106.36	106.02
■ WORST	113.68	112.77	111.75	112.09	112.01	111.81	112.74	114.69	113.69	111.76	113.64