Determinants of competitive balance across countries: Insights from European men's football first tiers, 2006-2018

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Rationale/Purpose: The aim is to investigate the determinants of competitive balance (CB) across countries in European men's club football. Determinants already tested previously in the literature include revenue sharing (proxied by countries' income inequality), differences in drawing power, prize money, talent market and sports contest format. New determinants include climate, countries' economic power, tradition, timing, number of clubs, financial regulation and international performance.

Methodology: Regressions explaining CB are tested in the European men's football first tiers over the 2006–18 period.

Findings: Results show that economic power and income inequality have a significant positive impact on CB; while climate (temperature), differences in drawing power, international performance and financial regulation have a significant negative impact.

Practical implications: Results question whether international performance is a legitimate objective given its negative impact on CB.

Research contribution: Results enable to add new determinants explaining CB, namely countries' economic power, financial regulation and international performance.

Keywords: competitive balance, European men's club football, economic power, financial regulation, international performance.

Introduction

The concept of competitive balance (CB) is well established in the sports economics literature (Andreff & Scelles, 2015; Bond & Addesa, 2019, 2020; Carreras & García, 2018; Fort & Maxcy, 2003; Plumley et al., 2018; Ramchandani et al., 2018; Rocke, 2019; Scelles, 2017; Weber et al., 2016; Wilson et al., 2018; Zheng et al., 2019). Simply put, it postulates the necessity of sporting equilibrium between playing strengths to generate outcome uncertainty and thus fan demand. According to Fort and Maxcy (2003), there are two lines of literature on CB: its evolution over time or as a result of the introduction, disappearance or change in redistribution mechanisms (Analysis of CB); the impact on fans (Uncertainty of Outcome

Hypothesis). Both lines are not limited to the study of a single league and, as such, can include comparisons between leagues or rely on several leagues (Rocke, 2019). Since Fort and Maxcy (2003), many studies on CB have continued to focus on these two lines, while others have attempted to improve the measurement of CB (see e.g. Avila-Cano & Triguero-Ruiz, 2018) or investigate the impact of participation in pan-continental competition on domestic performance (see e.g. Moffat, 2019). In this article, the aim is to investigate the determinants of CB across countries. To do so, we explore the European men's football first tiers over the 2006-18 period (54 first tiers over 12 seasons).

European men's football is well suited to investigate CB since it is acknowledged as the biggest challenge to develop football by the current UEFA President Aleksander Čeferin (Chaplin, 2017). The 2006-18 period is also appropriate. Indeed, during the 2006-07 season, Michel Platini was elected as President of UEFA, before being suspended in 2015. During his presidency, decisions likely to impact CB have been implemented. Such decisions include the Financial Fair Play (Dermit-Richard et al., 2019; Peeters & Szymanski, 2014). The latter is a system of financial regulation applied by UEFA to clubs qualifying into continental competitions. Its key requirement is that clubs should report a break-even position over a rolling three-year period. It became effective from 2013-14, based on clubs' financial results from season 2011-12 onwards. Although its objective is not to improve CB, it may still influence it as demonstrated by Peeters and Szymanski (2014), as well as Plumley, Ramchandani and Wilson (2019). Thus, it is worth controlling for its impact in the present research. Another decision likely to impact CB that was made by UEFA under the presidency of Michel Platini was the creation of different routes for champions of smaller countries and non-champions of bigger countries in the Champions League preliminary round so as to ensure that the former take part in its group stage. Such decision may have affected the CB in their domestic leagues.

Testing the determinants of CB across countries in European men's football first tiers is not new. For example, Peeters (2011) already investigated such determinants in 32 European men's football leagues over the 2000-09 period. Our theoretical framework builds on the model suggested by Peeters (2011), while extending it by testing additional variables potentially explaining CB. Peeters' (2011) model assumes that the revenue distribution between clubs within a league and the talent market affect the talent distribution which, together with the incentives related to the contest format, impact CB. The talent market in the leagues studied did not experience any significant change over the 2000-09 period so Peeters (2011) did not formally test its impact on CB. He identified three factors affecting revenue distribution: drawing power (local market sizes), revenue sharing and prize money (existence of sporting performance-related rewards). He tested the impact on CB of these factors and the incentives related to the contest format with both a cross-sectional and a panel model. Drawing power was proxied by attendances. Prize money was related to the Champions League and captured by two variables linked to performance in this pan-European competition, the number of teams qualifying for the group stage of the tournament and the total prize money earned by teams from the league in the previous season. For the contest format, Peeters (2011) used four variables: three dummy variables *po* taking the value 1 if a country had a conventional playoff system in a given season, *po2* taking the value 1 if a country had a competition involving two groups, and *efpo* taking the value 1 if a conventional playoff system was in place to decide on qualification for the European cup competitions, but not on the title race; and a fourth variable noted *relperc* representing the percentage of teams relegated to the second tier, where clubs forced to play a relegation playoff are counted as half.

In the cross-sectional model, a more equal distribution of drawing power and fewer teams participating in the Champions League had a significant positive impact on CB but not

revenue sharing and playoffs or relegation systems (total prize money from the Champions League not included to avoid multicollinearity with the number of teams participating in the competition, same results when including the former instead of the latter). Similar results were found in the panel model, the only differences being that both variables related to the Champions League were included with the total prize money having a significant negative impact on CB while the number of teams participating in the competition had no significant impact; and *po* had a significant negative impact and *po2* a significant positive impact, depending on how CB was calculated. As acknowledged by Peeters (2011), a limitation of the variables chosen for revenue sharing was that they did not consider the differences between different distribution schemes. Eventually, it may be the case that all three variables affecting revenue distribution had a significant impact on CB.

Compared to Peeters (2011), the additional variables potentially explaining CB in this paper come from the literature on the determinants of CB (other than Peeters, 2011) and stadium attendance, the gross domestic product (GDP) of the country within which the league is played, as well as the deviation to the optimal temperature for playing football (training and games), set as 14ºC in the literature (see e.g. Hoffmann et al., 2002; Scelles & Andreff, 2019). In his article, Peeters (2011) used average stadium attendance over the period studied to capture the drawing power of a club. As such, understanding the determinants of stadium attendance can help understand those of CB. With regards to the use of GDP, the rationale is as follows: in European men's football, the globalisation of the talent market means that leagues can rely (sometimes heavily) on foreign players and / or struggle to retain their best domestic players. Their ability to attract the best foreign players and retain the best domestic players depends on their economic power. Beyond average stadium attendance and, more generally, the drawing power specific to a club or a league, a key hypothesis in the present

article is that such elements depend in part on the economic power of the league's country, hence the use of GDP.

The next section describes the structure of European men's football club competitions and reviews the literature on the determinants of national CB and local stadium attendance in European men's club football, enabling the identification of variables forming the basis of a theoretical framework relevant to the present research. We then present our methodology before providing our results. The last section discusses our findings and concludes.

Background, literature review and theoretical framework

Structure of European men's club football

European men's football leagues operate on a merit-based pyramidal structure. Within any one country, the best performing teams are promoted from a given national league division to its immediately senior division on the basis of league ranking at the end of each season, with the poorest performing teams relegated to the immediately junior division on the same grounds (Szymanski, 2003). In the top division, the performance incentive is to achieve one of the highest ranking positions which offer qualification into Europe-wide continental competitions (the Champions and Europa Leagues). The number of places in continental competitions for a country depends on its UEFA country coefficient, which in turn is determined by the results of the clubs within a particular national association in the continental competition games over the previous five seasons.

The UEFA ranking determines the number of teams competing in the season after the next one, not in the immediate season after the publication of the ranking. Thus, the rankings at the end of the 2017-18 season determined the team allocation by association in the 2019-20 UEFA season. However, the actual teams that participated in the 2019-20 season are

determined at the end of the 2018-19 season when the individual association classifications and national cups are finalised. Table 1 sets out the impact of the UEFA country ranking on the number of places in continental club competitions.

Ranking 2017-2018	Member association	Country coefficients	Qualifying places (Champions League & Europa League)	Number of clubs	% places
1	Spain	106.998	7	20	35
2	England	79.605	7	20	35
3	Italy	76.249	6	20	30
4	Germany	71.427	7	18	39
5	France	56.415	6	20	30
…					
53	Andorra	1.331	3	8	37.5
54	San Marino	0.499	3	15	20
55	Kosovo	0.000	2	12	16.7

Sources: UEFA country rankings as of end of 2017-18 season (https://www.uefa.com/memberassociations/uefarankings/country/#/yr/2018).

Table 1: Influence of the UEFA country ranking on the number of places in continental club competitions.

For a national league organiser, the objective is to have successful teams in continental competitions as it improves the league prestige and increases its UEFA country ranking. As a result, there are more domestic teams in continental competitions, meaning more chances to be successful (virtuous circle). Besides, more places in continental competitions provides more incentives to reach a top ranking for teams and to attend games for fans (Scelles et al., 2016).

It is worth noting that the number of teams in the European men's football leagues in 2017-18 (the season chosen in Table 1) is not representative of the 2006-18 period for some

leagues where the number of teams has evolved over time. Appendix 1 provides the full breakdown over the whole period.

Determinants of national CB in European men's club football

As mentioned in introduction, CB is a well-established concept in sports economics. Looking more specifically at the determinants of national CB in European men's club football, the literature has investigated the impact of a number of variables. Some of these variables have been tested by Peeters (2011) and, as such, have already been highlighted in introduction. This is the case for example for revenue sharing, extensively investigated theoretically by Késenne (1996, 2000, 2005, 2009, 2015), Grossmann et al. (2010), Dietl et al. (2011) and Dietl et al. (2011), while Ramchandani et al. (2018) discuss the impact of broadcasting revenue sharing on CB and Plumley et al. (2018) more generally the impact of financial disparity between clubs.

In her article measuring CB within 11 European men's football leagues over the 1963-2005 period, Goossens (2006) discusses revenue sharing but also the impact of the Champions League becoming highly commercial with huge revenues to divide at the start of the 1990s. Based on her National Measure of Seasonal Imbalance (NAMSI) which is the most relevant for the present research, she finds that the leagues the most balanced are France, Spain, England and Germany, then Sweden, Denmark, Italy and Belgium (although all eight leagues are within the same cluster), while Greece, the Netherlands and Portugal are the least balanced. For France, Goossens (2006) suggests that the egalitarian revenue sharing may explain the CB of the league. The author also evidences a significant linear trend towards less balance over time in Belgium and England, no significant trend in Germany and France, and a significant linear trend towards more balance in Portugal. For the other six countries, the trend is not linear over time and unveils at the very end of the period a trend towards more balance

in Greece, the Netherlands and Spain but less balance in Denmark, Italy and Sweden. Goossens (2006) suggests that the Champions League becoming highly commercial at the start of the 1990s may explain the trends identified. It is worth noting that the Champions League has pursued a trend towards even more commercialisation since then, in particular with the decision to provide access to up to four domestic clubs for the best performing national leagues at the end of the 1990s. Pawlowski et al. (2010) evidence a decrease in CB for England, France, Germany, Italy and Spain over the 1992-2008 period as a consequence of such evolution.

Another variable impacting CB is the talent pool and its evolution, for example the one induced by the Bosman case of 1995 (Flores et al., 2010), i.e. the judicial ruling delivered by the European Court of Justice in December 1995 leading to measures easing nationality restrictions (Késenne, 2011). Schmidt and Berri (2003), Berri et al. (2005) and Flores et al. (2010) posit that a fixed number of places on professional teams is to be filled from an eligible playing population. Recruitment will be from the right tail of the distribution of talent. Strong clubs will hire the most talented players on the extreme right and weaker clubs the next best. For example, Paris Saint-Germain was able to recruit Kylian Mbappé from Monaco in 2017, with the latter replacing him with Stevan Jovetic. This means that CB will be impacted by the differences between the most talented players and the next best, as well as the number of clubs in the league that determines the distribution between strong clubs able to afford the most talented players and weaker clubs hiring the next best. Flores et al. (2010) add that if the eligible population is small, there will be a significant difference in ability between the best players and the remainder recruited, generating competitive imbalance. By contrast, if the eligible population is large, the difference between best and next best will be less pronounced, leading to a better CB. In other words, the number of players available affects CB, with a positive impact of more players on CB.

Under autarky (e.g. pre-Bosman era), the number of players available can be considered as a function of a country population, with a positive impact of a larger population on CB; under free trade (e.g. post-Bosman era, to which the period covered in the present research belongs), economic power should be taken into account to capture the ability of a league to retain the best domestic players and attract the best foreign players. Thus, GDP is more appropriate, with a positive impact of a higher GDP on CB. In line with this, Schmidt and Berri (2003) demonstrate that there were historically significant improvements in the North American Major League Baseball (MLB) when the sport was racially integrated and, later, when foreign players were introduced. More generally, it may be the case that CB improves over time in a league as a sport and its drawing power develop in the country, which relates to the notion of tradition.

Peeters and Szymanski (2014) analyse the financial and sporting impact of UEFA Financial Fair Play regulations in the English, Spanish, Italian and French first tiers. In particular, they simulate the impact of FFP on CB in these four leagues. Overall, they find slight improvements, except for Spain. The authors also distinguish between the least and most stringent regimes (from up to €15m loss a year in average to a strict break-even), the former being those applied initially by UEFA before the latter gradually replace them. In the least stringent regimes, Peeters and Szymanski (2014) establish that FFP might improve CB because it mainly restricts the large teams. Nevertheless, as the regime becomes more stringent, smaller teams are affected as well and CB starts to deteriorate again. Eventually, the authors conclude that FFP may ossify intra-league competition, because it protects the traditional big market teams from challenges by clubs who are backed by an outside investor. They add that, on top of that, they do not see any significant benefit to CB from the point of view of European (inter-league) competition. More exactly, they demonstrate that clubs from Germany (that applies domestic rules similar to FFP) and the smaller leagues are likely to

benefit from FFP in on-the-field play but such effect is likely to be negligible, given the gap in wage spending between the European dominant teams and clubs from the smaller leagues. More recently, Plumley et al. (2019) find a negative impact of FFP on CB for Spain, Germany and France but not for England and Italy.

Rocaboy (2017) proposes a microeconomic framework to model the trade-off between national CB and international performance of the national representative club. He assumes that the dominant factor explaining performance is wage expenditure. Based on this assumption and the framework developed, he suggests that an increase in the league stakeholders' interest for the international competition accentuates the imbalance of the national championships when the characteristics of the leagues are similar. Rocaboy (2017) adds that when a league is wealthier than the others, its average club performs better at the international level than the others. Thus, it is easier for this league to ensure its domestic CB since, even in that case, its representative club remains strong at the international level. Rocaboy (2017) illustrates this with a comparison between the English Premier League (the wealthiest league) and the French Ligue 1, arguing that the latter has to promote a less egalitarian distribution of TV rights revenue to obtain a relative improvement in its performance at the international level but that this may affect its CB. Interestingly, the variables used in Rocaboy (2017) echo Peeters (2011), while including explicitly international performance rather than prize money gained in the Champions League.

Determinants of local stadium attendance in European men's club football

As noted by Valenti et al. (2019, p. 2): "The sports economics literature has produced substantive amounts of empirical research on stadium attendance for professional team sports". Football is not exception, with recent examples including Sung and Mills (2018) on the North American Major League Soccer and Valenti et al. (2019) on the UEFA women's

Champions League. Looking more specifically at the determinants of local stadium attendance in European men's club football, several groups of variables are identified in the literature. In a highly cited article focusing on the Spanish men's football league, García and Rodríguez (2002) distinguish economic variables, variables proxying the expected quality of the match, those measuring the uncertainty of the result, and those capturing the opportunity cost of attending a match.

Among their economic variables, the authors include prices, real income per capita in the province of the team playing at home and its population (distributed when there are two or more teams in a province according to the number of season ticket holders corresponding to each team), all having a significant impact on attendance – negative for prices, positive for income and population. The latter is rather a socioeconomic variable, to use the terminology chosen by Scelles et al. (2016).

The expected quality of the match is captured by García and Rodríguez (2002) through two groups of variables proxying the quality of both teams at the beginning of the season as well as the current quality based on the most recent performance. The first group is relevant to the present research interested in average attendance per game over a season in a league. In this group, two variables included by the authors are the budgets of both teams as a proxy for the salaries of the players supposed to proxy their productivity. Both variables have a significant positive impact on attendance.

With respect to uncertainty, García and Rodríguez (2002) distinguish between match and seasonal measures. They find evidence of a significant positive impact for both. Andreff and Scelles (2015) and Scelles et al. (2016) confirm the positive impact of uncertainty in the French Ligue 1, although this is in relation to sporting prizes in their articles.

Finally, García and Rodríguez (2002) include a set of variables that capture the opportunity cost of attending a football match. In particular, they model the effect of weather conditions with dummy variables that correspond to the following situations: no rain, high temperature; no rain, low temperature; and rainy days. They find a significant positive impact on attendance of no rain. Although league organisers cannot act upon the weather, they can act upon the timing and schedule fixtures when such weather is more likely to be more convenient to attend games.

Theoretical framework

Based on the model about the factors that impact CB provided by Peeters (2011) that has been described in introduction and the literature review, a theoretical framework is suggested, extending Peeters' (2011) model (Figure 1). As mentioned previously, the latter assumes that revenue distribution within a league is impacted by revenue sharing, drawing power and prize money. This in turn affects talent distribution, which also depends on the talent market (echoing Flores et al., 2010). Talent distribution affects then CB, as does the sports contest format. As such, Peeters' (2011) model relies on eight variables.

In the theoretical framework used in this paper, seven additional variables are included (in bold in Figure 1). Three of them intend to explain the drawing power of a league rather than considering it as a given, namely climate (with fans more likely to attend and spend money for games if the climate is more favourable; derived from García & Rodríguez, 2002), the economic power of the country (derived from Flores et al., 2010) and tradition (derived from Schmidt & Berri, 2003). Compared to Peeters (2011), two variables are added to explain the revenue distribution between and within leagues, namely the timing of the league (i.e. whether it is played from summer to spring or winter to autumn) as a way to address a potentially less favourable climate (derived from García & Rodríguez, 2002) and its number

of clubs (derived from Flores et al., 2010). Next, it is considered that talent distribution is not only affected by revenue distribution and talent market but also by financial regulation (e.g. whether a club can spend more money than it generates thanks to its shareholders or not; derived from Dermit-Richard et al., 2019; Peeters & Szymanski, 2014; and Plumley et al., 2019). Also, talent distribution is not only supposed to affect CB but also international performance (derived from Rocaboy, 2017). The latter can influence the sports contest format since a better international performance can generate more positions qualifying for continental competitions in the domestic league. International performance also impacts prize money, with a better international performance translating in more revenue.

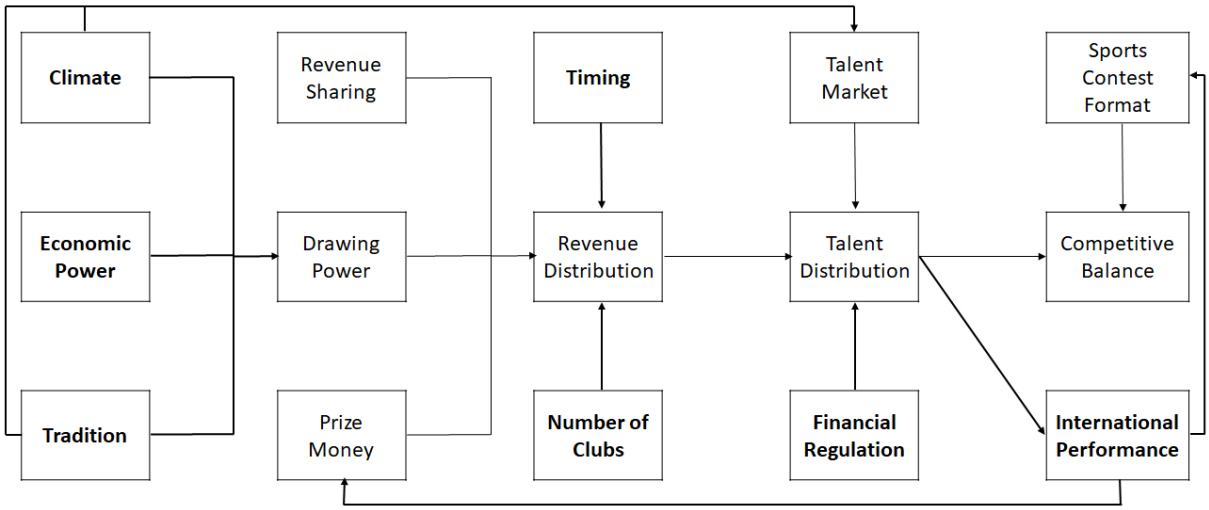

Figure 1. Theoretical framework for variables potentially explaining competitive balance (extended from Peeters, 2011)

The theoretical framework highlights some variables upon which confederation and league managers cannot act or have little control, namely climate, economic power, tradition and, as a result, drawing power, as well as talent market. By contrast, it suggests that they can act upon international performance, CB and revenue distribution through revenue sharing, timing, number of clubs, sports contest format (for league managers), prize money (for confederation managers) and financial regulation (for both).

Methodology

Measure of CB

CB can be measured through different dimensions: before kick-off for a match, intra-match, during a season, at the end of a season and over several seasons. In this paper, CB is measured at the end of the season. Many measures exist in the literature, e.g. the five club concentration ratio (C5) and the C5 index of CB, the Herfindahl index of CB and the Lorenz Seasonal Balance Curve (Michie & Oughton, 2004); the NAMSI already mentioned in the literature review (Goossens, 2006); the surprise index (Groot, 2008). Nevertheless, this is only recently that some measures controlling for the specific way points are allocated in the sporting tables of European men's football first tiers have been suggested. In European men's football, a win equals three points, a draw one point and a loss zero point. The usual measures of CB at the end of a season assume that a draw equals half a win, which is not accurate in European men's football. Avila-Cano and Triguero-Ruiz (2018) have developed a measure derived from Owen, Ryan and Weatherston (2007) and adapted to leagues with three-points win: the normalised Hirschman-Herfindahl index HHI_{norm}:

$$HHI_{norm} = (HHI - HHI_{min}) / (HHI_{max} - HHI_{min}) \quad (1)$$

HHI is the sum of the squares of the market shares (shares of points) captured by each club:

$$HHI = \sum(pi / \sum p)^2 \quad (2)$$

where p_i corresponds to the points captured by club i; i = 1, 2…, N, with N corresponding to the number of clubs in the league over the season; and Σp corresponds to the sum of the N clubs' points.

HHI_{min} is the lower-bound value of HHI and corresponds to perfect balance in terms of shares of points. Its value depends on the number of clubs in the league:

$$HHI_{min} = 1 / N \tag{3}$$

HHI_{max} is the upper-bound value of HHI and corresponds to the most unequal distribution in terms of shares of points. Its value depends on the number of clubs in the league too but also q*, the number of teams that won all matches except for those played against teams preceding them in the table, whereas the (N - q*) other teams tied all matches:

$$HHI_{max} = [2(q^*)^3 + (- 6N + 5 / 2)(q^*)^2 + (6N^2 - 5N + 1 / 2)q^* + N(N - 1)^2] / [(- (q^*)^2 - (1 - 2N)q^* + 2N(N - 1)) / 2]^2 \tag{4}$$

with q* such as:

$$0 > [- (1 / 2)q^5 + ((5 / 2)N - 9 / 4)q^4 + (- 8N^2 + 12N - 7 / 2)q^3 + (11N^3 - 27N^2 + 18N - 9 / 4)q^2 + (8N^4 - 6N^3 - 9N^2 + (15 / 2)N - 1 / 2)q - 4N^5 + 12N^4 - 13N^3 + 6N^2 - N] \tag{5}$$

Triguero-Ruiz and Avila-Cano (2019) note that a problem with HHI_{norm} and more generally the indices measuring CB in the literature is that either they are not a mathematical metric or they do not have the unit interval as a range. Therefore, they do not indicate the magnitude of the differences, and the measurements cannot be interpreted as percentages. The authors have established the Distance to CB (DCB) – a mathematical distance fulfilling the cardinality property and, as such, preserving the proportions – as the square root of HHI_{norm}:

$$DCB = \sqrt{HHI_{norm}} \tag{6}$$

The values obtained with the measurement of DCB and the differences (and proportions) between them have a meaning, i.e. the levels and differences in the levels of CB can be

accurately interpreted with this indicator, while this is not the case with other measures of CB used in the literature. Triguero-Ruiz and Avila-Cano (2019) illustrate this with the example of the English Premier League. Its DCB was 0.51 in 2016-17, i.e. 51% of the maximum concentration. It was 0.41 in 2015-16, meaning an increase by 10 percentage points between the two seasons. Due to the advantages of the approach, in the present research, DCB will be used.

Variables and data

Based on the theoretical framework above, GDP is an explanatory variable to be included as a potential determinant of CB. The question is to know if a broad economic indicator such as GDP is as good a predictor for CB as a more specific sport economic variable such as average attendance per game. The latter may increase with a better CB, suggesting a potential issue with endogeneity. To avoid this, average attendance per game the previous season can be used, the rationale being that a better attendance the previous season should lead to more money to be spent on players the current season, with a positive impact on CB.

The impact of tradition on CB will be tested to observe whether leagues in countries where football is historically more established benefit from a better CB.

The impact of climate will also be tested through two variables: temperature and (temperature - 14)^2. Temperature is supposed to affect the economic power of the league which, in turn, affects CB. It may be argued that a temperature too high may be detrimental to stadium attendance and, as such, drawing power. However, it is assumed that the highest temperature should be the most favourable in our sample. Indeed, this highest temperature is 20.68 degrees Celsius, considered as not too high. As such, temperature is used rather than (actual temperature - optimal temperature). Leagues with lower temperature may

counterbalanced its expected negative impact by playing more games during the summer, justifying the use of a timing dummy variable equals to 1 for leagues played from winter to autumn (0 for leagues played from summer to spring). For (temperature - 14)², its test comes from its expected impact on talent market (at least for its domestic part), with proportionally more players developing their skills in optimal conditions in countries around 14ºC and, as such, likely to be part of the eligible playing population, which, in turn, affects CB.

To test the idea that a fixed number of places on professional teams is to be filled from an eligible playing population, and the subsequent hypothesis of a negative impact on CB from a number of clubs too high to ensure that all have a sporting level credible at the highest tier in the different countries under investigation, the variable number of clubs / GDP will be included.

Revenue sharing seems an explanatory variable to be included too. Unfortunately, it was not possible to collect accurate information for all leagues over the period studied for this variable. Instead, the impact of (standardised) national income inequality (measured as the Gini index for disposable income within a country) will be tested. The hypothesis is that leagues in countries with lower income inequality (e.g. Belarus with a Gini index of 23.9% in 2017) are more likely to implement an equalitarian revenue sharing than leagues in countries with higher income inequality (e.g. Turkey with a Gini index of 39.9% in 2017), with a positive impact on CB. If this hypothesis is validated, this will support the idea that football is representative of the societies.

Following Peeters (2011), drawing power proxied by attendances is included. More exactly, the differences in drawing power are proxied by the coefficient of variation of the average attendances per game of the clubs over the period studied (called attendance variation). Average attendances over the period rather than for a specific season are used to

avoid endogeneity. Indeed, the sporting performance of the different clubs during a given season affects both CB (since by definition the latter depends on the respective sporting performance of the different clubs) and their respective attendances (the literature on the determinants of stadium attendance having demonstrated a positive impact of a better sporting performance, see e.g. Scelles et al., 2016).

Peeters (2011) also includes prize money from the Champions League in the previous season. Nevertheless, the impact of prize money depends on the level of income in the different leagues: the same amount of prize money would not generate the same effect in the English Premier League and the leagues generating the lowest income. Unfortunately, income are not available for all leagues over the period studied. As a proxy, international performance in the previous season will be used. International performance is measured through UEFA points at the end of a season. It is worth noting that the total number of points available per season changed over the 2006-18 period, with in particular a large increase in 2009-10. To control for this, adjusted UEFA points have been calculated so that their adjusted total per season equals the 2017-18 total, i.e. the values for season t have been multiplied by 2017-18 total divided by t total.

Peeters (2011) also tests the impact of different playoffs and relegation systems on CB through the four variables described in the literature review (*po*, *po2*, *efpo* and *relperc*). They will be used in this paper too.

Last, the impact of Financial Fair Play on national CB will be tested to assess whether the simulation made by Peeters and Szymanski (2014) for England, France, Italy and Spain which anticipates no significant impact is confirmed by the data. Two dummy variables will be alternatively used: one (Financial Fair Play) taking the value 1 for all league seasons played over the 2011-18 subperiod (0 otherwise); and Financial Fair Play 5 the value 1 for the

league seasons played over the 2011-18 subperiod for the 'big five' leagues only, i.e. England, France, Germany, Italy and Spain (0 otherwise).

Table 2 summarises the variables described previously and provides the sources of the data while Table 3 presents the descriptive statistics.

Variable	Description	Sources of the data
DCB	Distance to Competitive Balance applied to the number of points gained by teams in a league	Triguero-Ruiz & Avila-Cano (2019) Wikipedia
GDP	Gross domestic product based on purchasing power parity, constant 2011 international dollars	World Bank
Attendance t-1	Average stadium attendance per game in the league the previous season	European Football Statistics
Tradition	Number of years since the creation of the national association	Wikipedia
Temperature	Temperature in degrees celsius in the country of the league	World Bank Global Station Temperature Index
Climate	$(14 - \text{temperature})^2$	
Winter to autumn	Dummy variable equal to 1 if a league is played from winter to autumn (0 if played from summer to spring)	Wikipedia
Number of clubs / GDP	Number of clubs divided by gross domestic product based on purchasing power parity, constant 2011 international dollars	Wikipedia World Bank
Income inequality	Standardised world income inequality in the country of the league	Frederick Solt
Attendance variation	Coefficient of variation of the average attendances over the 2006-18 period for the clubs belonging to a league during a season	European Football Statistics

International performance t-1	Adjusted UEFA points of the league the previous season	Bert Kassies
po	Dummy variable equal to 1 if a country had a conventional playoff system in a given season, 0 otherwise	Wikipedia
po2	Dummy variable equal to 1 if a country had a competition involving two groups, 0 otherwise	
efpo	Dummy variable equal to 1 if a conventional playoff system was in place to decide on qualification for the European cup competitions but not on the title race, 0 otherwise	
relperc	Percentage of teams relegated to the second tier, where clubs forced to play a relegation playoff are counted as half	
Financial Fair Play	Dummy variable equal to 1 over the 2011-18 subperiod (Financial Fair Play affecting European clubs), 0 over the 2006-11 subperiod	UEFA (2019)
Financial Fair Play 5	Dummy variable equal to 1 over the 2011-18 subperiod for England, France, Germany, Italy and Spain, 0 otherwise	

Table 2. Variables and sources of the data.

Variable	Mean	Standard deviation	Min.	Max.
DCB	0.47	0.10	0.20	0.76
GDP	5.24^{e+11}	8.36^{e+11}	8.47^{e+09}	3.74^{e+12}
Attendance t-1	7549	9433	147	45116
Tradition	93.73	28.08	14	154
Temperature	9.05	4.25	-5.83	20.68
Climate	42.56	61.55	0.00004	393.06
Winter to autumn	0.24	0.42	0	1
Number of clubs / GDP	1.72^{e-10}	2.44^{e-09}	4.33^{e-12}	1.42^{e-09}
Income inequality	30.91	4.55	22.1	41.6
Attendance variation	0.59	0.22	0.23	1.37
International performance t-1	5.13	5.07	0	24.87
po	0.04	0.19	0	1
po2	0.14	0.34	0	1
efpo	0.04	0.20	0	1
relperc	0.14	0.05	0	0.44
Financial Fair Play	0.58	0.49	0	1
Financial Fair Play 5	0.06	0.22	0	1

Note: n = 561 observations, except for Attendance t-1 (532).

Table 3. Descriptive statistics.

Estimation strategy

The following equation is estimated in this study:

$$DCB_{it} = \beta_0 + \beta_1 * Ln(GDP_{it}) \text{ or } Ln(Attendance_{it-1}) + \beta_2 Tradition_{it} + \beta_3 * Temperature_{it} + \beta_4 * Winter\ to\ autumn_{it} + \beta_5 * (Temperature_{it} - 14)^2 + \beta_6 * (Number\ of\ clubs\ /\ GDP)_{it} + \beta_7 * Income\ Inequality_{it} + \beta_8 * Attendance\ Variation_{it} + \beta_9 * International\ Performance_{it-1} + \beta_{10} * po_{it} + \beta_{11} * po2_{it} + \beta_{12} * efpo_{it} + \beta_{13} * relperc_{it} + \beta_{14} * Financial\ Fair\ Play_{it} \text{ or } Financial\ Fair\ Play\ 5_{it} + \tau_t + \mu_i + \varepsilon_{it} \quad (1)$$

where the dependent variable is competitive (im)balance of league i in season t. The yearly effects are represented by τ. To control for unobserved heterogeneity across countries, μ is inputted.

Results

CB in European men's football leagues over the 2006-2018 period

DCB is provided for the 54 European men's football first tiers over the 2006-2018 period in Appendix 2. Overall, CB deteriorated by more than one percentage point in Europe from 2006-12 (DCB = 0.476) to 2012-18 (DCB = 0.488), with DCB indicating that the average CB reached around half of the possible level of concentration. The associated rankings for the different leagues in terms of CB are provided in Appendix 3. Due to their high variability from one season to another for a single league, it may seem initially difficult to draw a clear ranking between leagues over time. However, when calculating averages and identifying the best and worst rankings per league over the period, some conclusions can be drawn both for the most balanced and unbalanced leagues, as well as the richest and most performing leagues.

In average over the 2006-18 period, Poland was the most balanced league ahead of Norway, Finland, France, Kosovo and Austria. However, if Poland was the most balanced league over the 2012-18 subperiod, it is the only league among the six mentioned here (with Kosovo) that was not in the 10 most balanced leagues over both the 2006-12 and 2012-18 subperiods, being the 11th most balanced over the 2006-12 subperiod (14th for Kosovo over the 2012-18 subperiod). Over the 2006-12 subperiod, the most balanced league was Bosnia-Herzegovina but, over the 2012-18 subperiod, this league was the 37th most balanced league only (8th over the 2006-18 period). Over the 2006-18 period, France was the league with the best 'worst' ranking (20th in 2017-18) ahead of Norway, Russia and Sweden (29th) – the latter being 10th and Russia 18th in average over the period. Despite the emergence of Paris Saint-Germain as the dominating club in France since it is under Qatari ownership and a broadcasting revenue sharing less and less equalitarian (Feuillet et al., 2018), the French league remained balanced over the 2006-18, consistent with the findings from Goossens (2006) over the 1963-2005 period.

Andorra was the least balanced league in 75% of the seasons covered (9 out of 12) and, when it was not the case, the second least balanced league twice (Lithuania being the least balanced in 2011-12 and Gibraltar in 2016-17) and the third least balanced once (Gibraltar being the least balanced and Estonia the second least balanced in 2014-15). Consequently, it is not surprising that, in average, Andorra was the least balanced league over the 2006-18 period (true for 2006-12 as well as for 2012-18). Over the 2012-18 subperiod, in average, Gibraltar (not included for 2006-12) was the second least balanced league. Estonia was the second least balanced league over the 2006-12 subperiod and the third least balanced over the 2012-18 subperiod, i.e. the 52nd most balanced league over both subperiods. Over the 2006-18 period, the three other least balanced leagues were Lithuania (51st most balanced league), Moldova (50th) and Latvia (49th). It is worth noting that Latvia considerably

improved its CB over the last two seasons of the period studied, being 17th in 2016-17 and 5th in 2017-18. Interestingly, all the leagues listed among the least balanced are in countries with a GDP lower than the average in Europe, suggesting that GDP may have a positive impact on CB, consistent with expectations, although this has to be confirmed by the regressions to ensure there is not another common factor between these countries explaining their low level of CB rather than their low GDP.

If the focus is on the averages over the 2006-18 period for the four leagues generating the highest revenue (Deloitte, 2018) and having been the most performing in European competitions over the period studied (England, Germany, Italy and Spain), Germany was the most balanced league (11th) ahead of Italy (23th), Spain (25th) and England (27th). If Germany was the most balanced league over both the 2006-12 and 2012-18 subperiods and the ranking among the four leagues for the 2006-12 subperiod was similar as that for the 2006-2018 period, England became the second most balanced league over the 2012-18 subperiod (25th) ahead of Italy (28th) and Spain (36th). It is also worth noting that, while England was 25th in 2006-12 as well as in 2012-18 in Europe, the rankings for Germany, Italy and Spain deteriorated between the 2006-12 and 2012-18 subperiods, with Germany moving from 7th to 16th, Italy from 12th to 28th and Spain from 13th to 36th. The increasing domination of Bayern Munich in Germany, Juventus FC in Italy, and FC Barcelona and Real Madrid in Spain may explain such evolutions showing that the findings from Pawlowski et al. (2010) for the 1992-2008 period have been confirmed over a more recent period, in line with Plumley et al. (2019) and Ramchandani et al. (2018), except for Italy.

Regression results

Table 4 provides the regression results. The two regressions explaining DCB with Financial Fair Play rather than Financial Fair Play 5 are not displayed due to Financial Fair

Play being non-significant and their results being quite similar to the two regressions explaining DCB with Financial Fair Play 5.

Dependent variable	**DCB**	
Model	***With GDP***	***With attendance***
Log GDP	-0.11 ** (0.05)	
Log Attendance t-1		-0.01 (0.02)
Tradition	-0.0003 (0.002)	-0.002 (0.002)
Climate	0.002 (0.002)	0.002 (0.002)
Temperature	0.11 ** (0.04)	0.11 ** (0.04)
Winter to autumn	-0.02 (0.05)	-0.02 (0.05)
Number of clubs / GDP	1.13^{e+08} (1.06^{+08})	1.75^{e+08} (1.20^{e+08})
Income inequality	-0.01 * (0.005)	-0.01 (0.01)
Attendance variation	0.19 *** (0.07)	0.22 *** (0.08)
International performance t-1	0.002 * (0.001)	0.002 * (0.001)
po	0.003 (0.02)	0.001 (0.02)
po2	-0.004 (0.01)	-0.003 (0.01)
efpo	0.02 (0.03)	0.01 (0.03)
relperc	0.13 (0.09)	0.14 (0.10)
Financial Fair Play 5	0.05 *** (0.01)	0.06 *** (0.01)
Constant	2.24 (1.37)	-0.30 (0.50)
Observations	561	532
Groups	48	48
R^2 within	0.1007	0.0933
R^2 between	0.1054	0.0693
R^2 overall	0.0646	0.0397
Prob > chi^2 or F	0.0000	0.0000

Table 4. Results.

It is worth noting that DCB actually measures competitive imbalance so the signs of the determinants have to be inverted to discuss the impact on CB. Most results obtained with both regressions (GDP and attendance the previous year) are in the same vein.

GDP has a significant positive impact on CB, consistent with expectations. By contrast, attendance the previous year has no significant impact, contrary to expectations.

International performance the previous year and attendance variation have a significant negative impact, consistent with Peeters (2011). The latter result indicates that higher differences in drawing power generates more imbalance between clubs, consistent with expectations.

There is also a significant negative impact on CB of Financial Fair Play for England, France, Germany, Italy and Spain. This result is not consistent with Peeters and Szymanski (2014) who expected rather no impact or even a positive impact over the 2011-18 subperiod (least stringent regimes supposed to improve CB over this subperiod), but it is consistent with Plumley et al. (2019). It may be explained by the fact that the richest clubs have been able to increase their revenue and as such their spending in players, in particular through their internationalisation strategies (Scelles et al., 2017), while the other clubs have not been able to do it.

Temperature has also a significant negative impact on CB. This is contrary to expectations since it was anticipated that leagues in countries with higher temperatures attract more fans in stadia so more revenue allowing for better players in the league so a better CB. Both competitive imbalance and temperature slightly increased over the period studied. Nevertheless, their respective increases may not be related.

Income inequality has a significant positive impact on CB in the GDP regression (no significant impact in the attendance regression). If a more equalitarian revenue sharing has a positive impact on CB, this may indicate that revenue sharing in European men's football first tiers is not representative of and even opposite to income inequality in their respective countries.

Tradition, number of clubs / GDP, climate, winter to autumn and the four dummy variables related to sporting prizes have no significant impact.

Discussion and conclusion

In this article, data from European men's football first tiers over the 2006-18 period have been used to investigate the determinants of CB across countries. Findings provide interesting insights.

CB is positively impacted by national economic power (GDP) but negatively by the differences in drawing power. These variables can be seen as structural rather than policy variables in the sense that the different countries and local areas within a given country have structural economic differences that go beyond policy choices. In the European football context, this raises an important question as to whether UEFA and league organisers can achieve a better CB. The application of more equalitarian redistribution mechanisms is not welcomed by the richest clubs, with the perpetual threat of breaking away from the historical European football league system to play in a European Super League, again evoked at the end of 2019 (Wilson, 2019). However, this is relevant mainly for the 'big five' leagues. The case of Poland suggests that an equalitarian revenue sharing can be put forward, with a positive impact on CB. In the Polish league, over the 2016-17 season, the ratio between the club the most remunerated by the league (Legia Warszawa, PLN 16.13m) and the club the least remunerated (Górnik Łęczna, PLN 6.16m) was 2.62, with 55% of the media and marketing

rights paid to clubs equally shared and an additional 1.5% divided equally between eight clubs (out of 16) belonging to the lesser group (EY, 2017).

CB is negatively impacted by international rankings the previous year. This raises another important question as to whether international performance is a legitimate objective for a domestic league if this generates competitive imbalance.

CB is also negatively impacted by Financial Fair Play – a policy choice made by UEFA – in England, France, Germany, Italy and Spain, the 'big five' leagues. In other words, in these five countries, Financial Fair Play does not only ossify inequalities (Peeters & Szymanski, 2014) but it is even associated with an increase in such inequalities, consistent with Plumley et al. (2019) for France, Germany and Spain. This does not mean that Financial Fair Play is an inappropriate regulation system since it has improved the financial situation of European men's club football (UEFA, 2019), consistent with its main objective. Besides, the decrease in CB may have been encountered even without Financial Fair Play due to other events, e.g. the richest clubs' internationalisation strategies (Scelles et al., 2017). This suggests the need to conduct further research on the link between Financial Fair Play and CB in European men's club football, controlling for as many variables likely to interfere with Financial Fair Play as possible to evidence its actual impact on CB.

With regards to the theoretical framework suggested to support the research, it appears that four out of the seven new explanatory variables compared to Peeters (2011) are significant – namely climate (temperature), economic power (GDP), financial regulation and international performance – while tradition, timing and number of clubs are not significant. It has been suggested that the significant impact of temperature on CB has more to do with unrelated increases for both variables over the period studied rather than an actual impact of temperature on CB. As such, temperature is not represented in Figure 2 where only the new

significant variables compared to Peeters (2011) for which a rationale can clearly be established are retained compared to Figure 1.

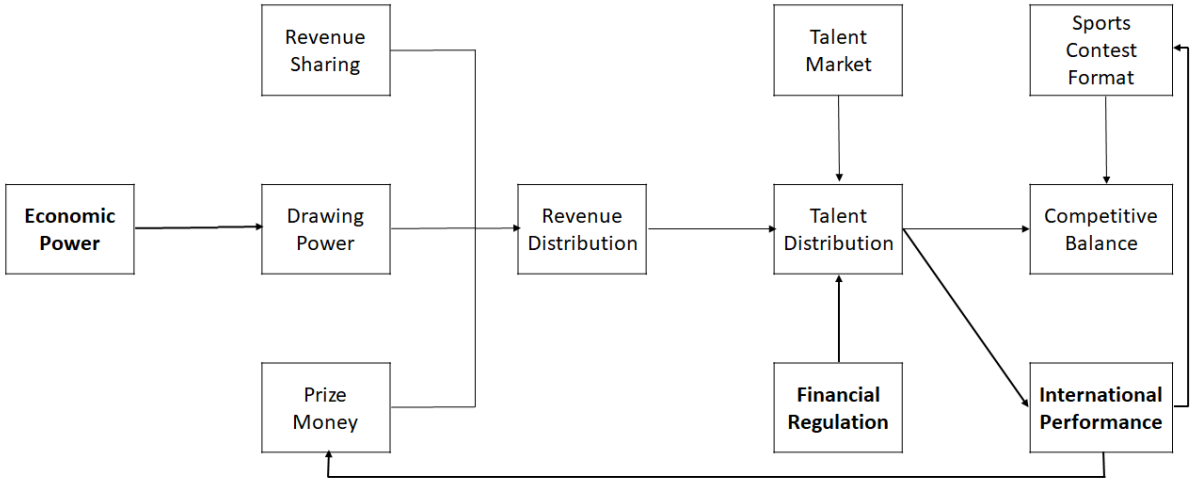

Figure 2. Variables explaining competitive balance (extended from Peeters, 2011).

In conclusion, this research provides insights based on all European men's football first tiers and not only the "big five" leagues, as this is often the case in the literature. As such, its findings are more likely to apply to the different leagues in Europe. Nevertheless, a limitation is that some leagues may present some features different from the general case so some caution should be taken before generalising the findings to all European leagues. Other limitations are the focus exclusively on European men's football first tiers and drawing power being solely measured through stadium attendance. Some directions for future research are the application of similar studies to other continents for men's football, to women's football and to other professional team sports, as well as measuring drawing power through TV audience, although data availability across countries might be a challenge for the latter.

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Appendices

	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	06-18
Albania	12	12	12	12	12	14	14	12	10	10	10	10	**11.67**
Andorra	8	8	8	8	8	8	8	8	8	8	8	8	**8**
Armenia	8	8	8	8	8	8	8	8	8	7	6	6	**7.58**
Austria	10	10	10	10	10	10	10	10	10	10	10	10	**10**
Azerbaijan	13	14	14	12	12	12	12	10	9	10	8	8	**11.17**
Belarus	14	14	16	14	12	12	11	12	12	14	16	16	**13.58**
Belgium	18	18	18	16	16	16	16	16	16	16	16	16	**16.5**
Bosnia-Herzegovina	16	16	16	16	16	16	16	16	16	16	12	12	**15.33**
Bulgaria	16	16	16	15	16	16	16	14	12	9	14	14	**14.5**
Croatia	12	12	12	16	16	16	12	10	10	10	10	10	**12.17**
Cyprus	14	14	14	14	14	14	14	14	12	14	14	14	**13.83**
Czech Republic	16	16	16	16	16	16	16	16	16	16	16	16	**16**
Denmark	12	12	12	12	12	12	12	12	12	12	14	14	**12.33**
England	20	20	20	20	20	20	20	20	20	20	20	20	**20**
Estonia	10	10	10	10	10	10	10	10	10	10	10	10	**10**
Faroe Islands	10	10	10	10	10	10	10	10	10	10	10	10	**10**
Finland	13	14	14	14	14	16	16	16	16	16	16	16	**15.08**
France	20	20	20	20	20	20	20	20	20	20	20	20	**20**
Georgia	14	14	11	10	10	12	12	12	16	16	14	10	**12.58**
Germany	18	18	18	18	18	18	18	18	18	18	18	18	**18**
Gibraltar							6	8	8	10	10	10	**8.67**
Greece	16	16	16	16	16	16	16	18	18	16	16	16	**16.33**
Hungary	16	15	16	16	16	16	16	16	16	12	12	12	**14.92**
Iceland	10	10	12	12	12	12	12	12	12	12	12	12	**11.67**
Ireland	11	12	12	10	10	10	11	12	12	12	12	12	**11.33**
Israel	12	12	12	16	16	16	14	14	14	14	14	14	**14**
Italy	20	20	20	20	20	20	20	20	20	20	20	20	**20**

Kazakhstan	16	16	15	14	12	12	14	12	12	12	12	12	**13.25**
Kosovo		16	16	12	12	12	12	12	12	12	12	12	**12.73**
Latvia	8	8	10	9	10	9	10	10	10	7	8	7	**8.83**
Lithuania	10	10	8	8	10	12	10	9	10	10	8	8	**9.42**
Luxembourg	14	14	14	14	14	14	14	14	14	14	14	14	**14**
Macedonia	12	12	11	9	12	12	12	12	10	10	10	10	**11**
Malta	10	10	10	10	10	12	12	12	12	12	12	14	**11.33**
Moldova	10	11	11	12	14	12	12	12	9	10	11	10	**11.17**
Montenegro	12	12	12	12	12	12	12	12	12	12	12	10	**11.83**
Netherlands	18	18	18	18	18	18	18	18	18	18	18	18	**18**
Northern Ireland	16	16	12	12	12	12	12	12	12	12	12	12	**12.67**
Norway	14	14	14	16	16	16	16	16	16	16	16	16	**15.5**
Poland	16	16	16	16	16	16	16	16	16	16	16	16	**16**
Portugal	16	16	16	16	16	16	16	16	18	18	18	18	**16.67**
Romania	18	18	18	18	18	18	18	18	18	14	14	14	**17**
Russia	16	16	16	16	16	16	16	16	16	16	16	16	**16**
San Marino	15	15	15	15	15	15	15	15	15	15	15	15	**15**
Scotland	12	12	12	12	12	12	12	12	12	12	12	12	**12**
Serbia	12	12	12	16	16	16	16	16	16	16	16	16	**15**
Slovakia	12	12	12	12	12	12	12	12	12	12	11	12	**11.92**
Slovenia	10	10	10	10	10	10	10	10	10	10	10	10	**10**
Spain	20	20	20	20	20	20	20	20	20	20	20	20	**20**
Sweden	14	14	16	16	16	16	16	16	16	16	16	16	**15.67**
Switzerland	10	10	10	10	10	10	10	10	10	10	10	10	**10**
Turkey	18	18	18	17	18	18	18	18	18	18	18	18	**17.92**
Ukraine	16	16	16	16	16	16	16	16	14	14	12	12	**15**
Wales	17	18	18	18	12	12	12	12	12	12	12	12	**13.92**
Average	**14.14**	**14.26**	**14.22**	**14.14**	**14.14**	**14.24**	**13.98**	**13.92**	**13.82**	**13.67**	**13.63**	**13.53**	**13.97**

Appendix 1. Number of teams in the European men's football first tiers, 2006-2018.

	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	06-18	06-12	12-18
Albania	0.434	0.454	0.326	0.247	0.433	0.485	0.486	0.364	0.620	0.519	0.521	0.423	**0.443**	**0.396**	**0.489**
Andorra	0.772	0.815	0.766	0.794	0.800	0.733	0.737	0.737	0.676	0.690	0.755	0.708	**0.749**	**0.780**	**0.717**
Armenia	0.675	0.530	0.569	0.598	0.665	0.459	0.441	0.340	0.478	0.347	0.587	0.318	**0.500**	**0.583**	**0.418**
Austria	0.323	0.363	0.423	0.530	0.400	0.366	0.445	0.373	0.379	0.330	0.358	0.474	**0.397**	**0.401**	**0.393**
Azerbaijan	0.627	0.587	0.654	0.587	0.600	0.536	0.426	0.466	0.478	0.549	0.504	0.512	**0.544**	**0.598**	**0.489**
Belarus	0.498	0.386	0.468	0.404	0.453	0.346	0.481	0.441	0.499	0.499	0.434	0.583	**0.458**	**0.426**	**0.489**
Belgium	0.444	0.439	0.438	0.474	0.482	0.453	0.479	0.435	0.426	0.362	0.415	0.359	**0.434**	**0.455**	**0.413**
Bosnia-Herzegovina	0.235	0.333	0.261	0.301	0.345	0.444	0.433	0.469	0.470	0.525	0.509	0.571	**0.408**	**0.320**	**0.496**
Bulgaria	0.632	0.543	0.513	0.445	0.565	0.669	0.574	0.557	0.525	0.453	0.493	0.608	**0.548**	**0.561**	**0.535**
Croatia	0.581	0.461	0.427	0.400	0.371	0.476	0.399	0.482	0.476	0.572	0.670	0.436	**0.479**	**0.453**	**0.506**
Cyprus	0.506	0.473	0.694	0.610	0.432	0.598	0.671	0.659	0.536	0.614	0.655	0.658	**0.592**	**0.552**	**0.632**
Czech Republic	0.469	0.402	0.346	0.441	0.463	0.459	0.406	0.460	0.469	0.508	0.466	0.429	**0.443**	**0.430**	**0.456**
Denmark	0.509	0.473	0.520	0.345	0.398	0.433	0.294	0.303	0.441	0.418	0.420	0.502	**0.421**	**0.446**	**0.396**
England	0.416	0.519	0.478	0.475	0.340	0.456	0.472	0.496	0.427	0.409	0.514	0.504	**0.459**	**0.447**	**0.470**
Estonia	0.745	0.755	0.665	0.719	0.682	0.677	0.708	0.656	0.736	0.585	0.673	0.683	**0.690**	**0.707**	**0.673**
Faroe Islands	0.514	0.547	0.417	0.416	0.476	0.616	0.525	0.440	0.551	0.588	0.634	0.444	**0.514**	**0.497**	**0.530**
Finland	0.387	0.344	0.475	0.428	0.300	0.445	0.285	0.379	0.392	0.316	0.411	0.406	**0.381**	**0.396**	**0.365**
France	0.282	0.342	0.392	0.396	0.318	0.383	0.354	0.427	0.386	0.401	0.458	0.461	**0.383**	**0.352**	**0.415**
Georgia	0.680	0.666	0.550	0.558	0.452	0.498	0.642	0.394	0.391	0.548	0.515	0.503	**0.533**	**0.567**	**0.499**
Germany	0.356	0.381	0.423	0.393	0.359	0.442	0.467	0.498	0.398	0.452	0.404	0.410	**0.415**	**0.392**	**0.438**
Gibraltar						0.764	0.659	0.716	0.754	0.636	0.776	0.650	**0.708**		**0.699**
Greece	0.469	0.494	0.521	0.473	0.419	0.468	0.456	0.448	0.473	0.547	0.470	0.540	**0.481**	**0.474**	**0.489**
Hungary	0.383	0.515	0.426	0.427	0.315	0.515	0.396	0.422	0.504	0.383	0.331	0.330	**0.412**	**0.430**	**0.394**
Iceland	0.300	0.481	0.458	0.509	0.416	0.440	0.387	0.536	0.534	0.520	0.393	0.370	**0.445**	**0.434**	**0.457**
Ireland	0.550	0.391	0.536	0.424	0.440	0.588	0.436	0.497	0.533	0.508	0.526	0.443	**0.489**	**0.488**	**0.491**
Israel	0.410	0.319	0.406	0.517	0.470	0.342	0.382	0.520	0.382	0.537	0.479	0.561	**0.444**	**0.411**	**0.477**
Italy	0.452	0.416	0.407	0.388	0.394	0.396	0.452	0.507	0.435	0.451	0.530	0.532	**0.447**	**0.409**	**0.485**
Kazakhstan	0.390	0.469	0.496	0.609	0.493	0.506	0.471	0.385	0.402	0.456	0.514	0.538	**0.477**	**0.494**	**0.461**
Kosovo		0.444	0.313	0.270	0.353	0.342	0.415	0.296	0.446	0.339	0.611	0.481	**0.392**	**0.344**	**0.432**
Latvia	0.642	0.641	0.576	0.701	0.715	0.648	0.580	0.659	0.636	0.617	0.460	0.350	**0.602**	**0.654**	**0.550**

Lithuania	0.551	0.575	0.577	0.612	0.696	0.755	0.649	0.672	0.564	0.667	0.629	0.553	**0.625**	**0.628**	**0.622**
Luxembourg	0.512	0.485	0.471	0.443	0.386	0.478	0.527	0.500	0.533	0.566	0.556	0.591	**0.504**	**0.463**	**0.545**
Macedonia	0.563	0.460	0.413	0.516	0.420	0.504	0.409	0.473	0.528	0.570	0.499	0.437	**0.483**	**0.479**	**0.486**
Malta	0.662	0.464	0.501	0.596	0.470	0.581	0.527	0.673	0.562	0.674	0.484	0.563	**0.563**	**0.546**	**0.581**
Moldova	0.567	0.653	0.527	0.579	0.627	0.562	0.559	0.700	0.674	0.635	0.662	0.523	**0.606**	**0.586**	**0.626**
Montenegro	0.476	0.478	0.430	0.463	0.428	0.533	0.305	0.315	0.519	0.367	0.374	0.391	**0.423**	**0.468**	**0.379**
Netherlands	0.495	0.423	0.456	0.601	0.458	0.477	0.463	0.382	0.490	0.516	0.500	0.503	**0.480**	**0.485**	**0.476**
Northern Ireland	0.520	0.533	0.412	0.369	0.392	0.517	0.538	0.474	0.489	0.518	0.547	0.644	**0.496**	**0.457**	**0.535**
Norway	0.308	0.373	0.345	0.391	0.452	0.319	0.374	0.348	0.425	0.493	0.388	0.304	**0.377**	**0.365**	**0.389**
Poland	0.450	0.556	0.411	0.401	0.265	0.345	0.340	0.332	0.252	0.309	0.338	0.334	**0.361**	**0.405**	**0.317**
Portugal	0.523	0.491	0.483	0.559	0.493	0.548	0.597	0.495	0.559	0.549	0.486	0.551	**0.528**	**0.516**	**0.540**
Romania	0.472	0.444	0.442	0.402	0.435	0.449	0.450	0.436	0.358	0.461	0.496	0.548	**0.449**	**0.441**	**0.458**
Russia	0.407	0.377	0.412	0.430	0.436	0.456	0.459	0.451	0.417	0.480	0.486	0.438	**0.437**	**0.420**	**0.455**
San Marino	0.543	0.526	0.513	0.586	0.493	0.506	0.464	0.546	0.503	0.489	0.621	0.665	**0.538**	**0.528**	**0.548**
Scotland	0.455	0.492	0.445	0.462	0.549	0.499	0.332	0.524	0.463	0.431	0.560	0.483	**0.475**	**0.484**	**0.466**
Serbia	0.535	0.537	0.443	0.479	0.590	0.551	0.474	0.442	0.451	0.479	0.565	0.508	**0.504**	**0.522**	**0.486**
Slovakia	0.413	0.566	0.386	0.411	0.341	0.452	0.239	0.374	0.458	0.501	0.506	0.485	**0.428**	**0.428**	**0.427**
Slovenia	0.400	0.393	0.195	0.324	0.385	0.459	0.419	0.431	0.482	0.347	0.441	0.539	**0.401**	**0.359**	**0.443**
Spain	0.353	0.370	0.376	0.487	0.432	0.438	0.460	0.475	0.543	0.472	0.537	0.473	**0.451**	**0.409**	**0.493**
Sweden	0.415	0.321	0.439	0.372	0.387	0.422	0.442	0.409	0.390	0.506	0.455	0.407	**0.414**	**0.392**	**0.435**
Switzerland	0.481	0.395	0.492	0.489	0.408	0.386	0.382	0.345	0.381	0.424	0.435	0.393	**0.418**	**0.442**	**0.393**
Turkey	0.302	0.477	0.397	0.462	0.484	0.405	0.331	0.348	0.461	0.446	0.423	0.477	**0.418**	**0.421**	**0.414**
Ukraine	0.475	0.547	0.527	0.562	0.477	0.593	0.564	0.559	0.595	0.685	0.688	0.504	**0.565**	**0.530**	**0.599**
Wales	0.532	0.493	0.543	0.596	0.596	0.577	0.347	0.433	0.546	0.374	0.589	0.495	**0.510**	**0.556**	**0.464**
Average	**0.483**	**0.479**	**0.464**	**0.481**	**0.461**	**0.496**	**0.463**	**0.472**	**0.491**	**0.493**	**0.514**	**0.492**	**0.484**	**0.476**	**0.488**

Appendix 2. DCB in the European men's football first tiers, 2006-2018.

	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	06-18	06-12	12-18	≠	Best	Worst
Albania	18	21	4	1	25	30	39	9	49	34	34	13	**19**	**9**	**31**	**-22**	**1**	**49**
Andorra	52	53	53	53	53	52	54	54	52	54	53	54	**54**	**53**	**54**	**-1**	**52**	**54**
Armenia	49	39	47	46	49	23	23	5	27	6	42	2	**36**	**47**	**12**	**35**	**2**	**49**
Austria	6	6	19	37	17	6	25	10	3	3	3	22	**6**	**10**	**5**	**5**	**3**	**37**
Azerbaijan	45	48	50	43	47	39	20	29	28	40	28	34	**44**	**49**	**33**	**16**	**20**	**50**
Belarus	30	11	30	15	31	5	38	24	32	27	12	46	**26**	**17**	**34**	**-17**	**5**	**46**
Belgium	19	18	23	29	38	20	37	21	14	7	9	6	**17**	**27**	**9**	**18**	**6**	**38**
Bosnia-Herzegovina	1	3	2	3	7	16	21	30	24	36	30	45	**8**	**1**	**37**	**-36**	**1**	**45**
Bulgaria	46	42	39	24	44	50	46	45	36	19	24	48	**45**	**45**	**41**	**4**	**19**	**50**
Croatia	44	23	21	12	10	27	15	34	26	44	50	15	**30**	**26**	**39**	**-13**	**10**	**50**
Cyprus	31	26	52	49	24	47	52	48	41	47	48	51	**48**	**43**	**51**	**-8**	**24**	**52**
Czech Republic	23	15	6	22	33	24	16	28	23	30	18	14	**20**	**20**	**19**	**1**	**6**	**33**
Denmark	32	27	40	5	16	12	3	2	17	13	10	28	**14**	**24**	**8**	**16**	**2**	**40**
England	17	37	33	30	5	21	35	36	15	12	31	31	**27**	**25**	**25**	**0**	**5**	**37**
Estonia	51	52	51	52	50	51	53	47	53	45	51	53	**52**	**52**	**52**	**0**	**45**	**53**
Faroe Islands	34	44	17	17	36	48	40	23	44	46	47	19	**40**	**37**	**40**	**-3**	**17**	**48**
Finland	10	5	32	20	2	17	2	12	9	2	8	10	**3**	**8**	**2**	**6**	**2**	**32**
France	2	4	9	11	4	7	9	18	6	11	16	20	**4**	**3**	**11**	**-8**	**2**	**20**
Georgia	50	51	46	38	30	31	49	15	8	39	33	30	**42**	**46**	**38**	**8**	**8**	**51**
Germany	8	10	18	10	9	15	33	38	10	18	7	12	**11**	**7**	**16**	**-9**	**7**	**38**
Gibraltar						54	51	53	54	50	54	50	**53**		**53**		**50**	**54**
Greece	24	35	41	28	20	26	28	26	25	38	19	39	**32**	**31**	**32**	**-1**	**19**	**41**
Hungary	9	36	20	19	3	36	14	17	34	10	1	3	**9**	**19**	**7**	**12**	**1**	**36**
Iceland	3	30	29	34	19	14	13	43	40	35	6	7	**22**	**21**	**20**	**1**	**3**	**43**
Ireland	40	12	44	18	28	45	22	37	39	31	35	18	**34**	**35**	**35**	**0**	**12**	**45**
Israel	14	1	11	36	35	3	11	41	5	37	20	43	**21**	**14**	**27**	**-13**	**1**	**43**
Italy	21	16	12	8	15	9	27	40	16	17	36	36	**23**	**12**	**28**	**-16**	**8**	**40**
Kazakhstan	11	25	36	48	41	34	34	14	11	20	32	37	**29**	**36**	**22**	**14**	**11**	**48**
Kosovo		19	3	2	8	2	18	1	18	4	44	24	**5**	**2**	**14**	**-12**	**1**	**44**
Latvia	47	49	48	51	52	49	47	49	50	48	17	5	**49**	**51**	**46**	**5**	**5**	**52**

Lithuania	41	47	49	50	51	53	50	50	47	51	46	42	**51**	**50**	**49**	**1**	**41**	**53**
Luxembourg	33	31	31	23	12	29	41	39	38	42	39	47	**37**	**29**	**44**	**-15**	**12**	**47**
Macedonia	42	22	16	35	21	33	17	31	37	43	26	16	**33**	**32**	**29**	**3**	**16**	**43**
Malta	48	24	37	44	34	44	42	51	46	52	21	44	**46**	**42**	**47**	**-5**	**21**	**52**
Moldova	43	50	43	41	48	42	44	52	51	49	49	35	**50**	**48**	**50**	**-2**	**35**	**52**
Montenegro	27	29	22	27	22	38	4	3	35	8	4	8	**15**	**30**	**3**	**27**	**3**	**38**
Netherlands	29	17	28	47	32	28	31	13	31	32	27	29	**31**	**34**	**26**	**8**	**13**	**47**
Northern Ireland	35	40	15	6	14	37	43	32	30	33	38	49	**35**	**28**	**42**	**-14**	**6**	**49**
Norway	5	8	5	9	29	1	10	8	13	26	5	1	**2**	**5**	**4**	**1**	**1**	**29**
Poland	20	45	13	13	1	4	7	4	1	1	2	4	**1**	**11**	**1**	**10**	**1**	**45**
Portugal	36	32	34	39	42	40	48	35	45	41	23	41	**41**	**38**	**43**	**-5**	**23**	**48**
Romania	25	20	25	14	26	18	26	22	2	21	25	40	**24**	**22**	**21**	**1**	**2**	**40**
Russia	13	9	14	21	27	22	29	27	12	24	22	17	**18**	**15**	**18**	**-3**	**9**	**29**
San Marino	39	38	38	42	40	35	32	44	33	25	45	52	**43**	**40**	**45**	**-5**	**25**	**52**
Scotland	22	33	27	25	43	32	6	42	22	15	40	25	**28**	**33**	**24**	**9**	**6**	**43**
Serbia	38	41	26	31	45	41	36	25	19	23	41	33	**38**	**39**	**30**	**9**	**19**	**45**
Slovakia	15	46	8	16	6	19	1	11	20	28	29	26	**16**	**18**	**13**	**5**	**1**	**46**
Slovenia	12	13	1	4	11	25	19	19	29	5	14	38	**7**	**4**	**17**	**-13**	**1**	**38**
Spain	7	7	7	32	23	13	30	33	42	22	37	21	**25**	**13**	**36**	**-23**	**7**	**42**
Sweden	16	2	24	7	13	11	24	16	7	29	15	11	**10**	**6**	**15**	**-9**	**2**	**29**
Switzerland	28	14	35	33	18	8	12	6	4	14	13	9	**12**	**23**	**6**	**17**	**4**	**35**
Turkey	4	28	10	26	39	10	5	7	21	16	11	23	**13**	**16**	**10**	**6**	**4**	**39**
Ukraine	26	43	42	40	37	46	45	46	48	53	52	32	**47**	**41**	**48**	**-7**	**26**	**53**
Wales	37	34	45	45	46	43	8	20	43	9	43	27	**39**	**44**	**23**	**21**	**8**	**46**

Appendix 3. Rankings from the most to the least balanced leagues based on HHI* in the European men's football first tiers, 2006-2018.