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ORIGINAL RESEARCH PAPER

A comparative study of the competitive balance of the Spanish and English top football leagues on the basis of sport performance during the four last seasons before the Covid-19 pandemic

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ABSTRACT

The topic of this study has been the examination and comparison of the competitive balance of the Spanish and the English first leagues of soccer, called La Liga Santander and Barclays Premier League. The basis for the research project has been provided by a database of sixteen hundred elements, containing the data of the two leagues starting from the 2014/2015 season up to the 2017/2018 season. When choosing the time period for the study, we intended to avoid having to deal with the impact of Covid-19, which is why we picked exactly these competition seasons. We have primarily used statistical indicators. In the case of sports-related data, our inquiries have included the following: comparing and averaging the winning percentages per season, furthermore, the winning percentages of championship seasons, the distribution of goals scored and conceded and, finally, the calculation of the Herfindahl-Hirschman Index. Although there is one aspect of investigation according to which the competition balance of La Liga is closer to the optimal, the dispersion of winning percentages and the indicator of the goals conceded as well as the HHI index show that the Premier League is the more balanced competition of the two.

KEYWORDS

football league, competitive balance, sport performance, goals, scores

INTRODUCTION

Sports clubs did not always consider the production of profit as their primary objective in the traditional sense; they rather regarded providing total utility for their members to be more important. However, the last quarter of the 20th century brought along changes in this tendency and the primary objective of sports clubs that operate on a professional basis now is to maximize the profit of the owners, which means that sports clubs today function practically as commercial enterprises in the various championships and leagues [1].

In the process of the development of professional sports, three chief components have played an essential part [2]:

- The increase of the level of organization of championships and competitions
- The appearance of paying spectators at sporting events, the improvement of sports infrastructure and the commercialization of sports consumption
- The establishment of formalized professional championships/leagues

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During the course of professionalization, the competitive systems have undergone continuous changes. While originally, the traditional straight knockout cup competitions were typically the basis of competition, as a consequence of the large-scale penetration of the economic components, round-robin tournaments or a combination of these two systems started to gain more and more ground. The best example for this change would be UEFA's Champions' League (UCL), which used to be called European (Champion Clubs') Cup and involved only the champions of Europe's domestic leagues, operating as a knockout cup competition. When it was rebranded and named Champions League, participation became available not only for the national league champions but also for a number of other high-ranking clubs as runners-up from the most prestigious European leagues to compete first at a round-robin group stage to qualify then for a double-legged knockout format and a single leg final. The economic background for the introduction of the double round-robin group stage was justified by the increase of the number of games played and the fact that chance or randomness caused by the draws in the knockout system could be further reduced. Notwithstanding, it needs to be noted that the minimalization of the chance factor could indeed be best attained through a full round-robin system. Regarding the future, the idea of an exclusive competition for European (super) clubs, which has been around for quite some time, could prove to be a next step in the evolution of the former process of development [1].

The fundamental economic model that characterizes sports competitions was described by [3], and its salient features are the following:

- The smaller the number of the clubs competing in a national championship, the more effort they put into becoming successful, which increases both the attractivity and the economic value of the championship. This is justified by the fact that entry into North American leagues depends on very strict conditions and the number of participating teams is rather restricted, unlike in the case of European cup series involving a higher number of competitors.
- The higher the value represented by a league is, the more effort the teams in it exert in order to become successful. That is to say, the higher the total amount of prize money in a competition series is, the higher the level of quality of that competition series will become and the chance of achieving outstanding peak performances will also be bigger.
- The higher the costs of achieving certain results, and as the marginal costs of the sports performance for the participants increases, the extent of effort the participants are able to exert will change in an inverse proportion, which means that the quality and the standards will decrease.
- The more the competition system of a championship rewards the "efforts" of a team or a club in order to achieve success and the less room is left for randomness and luck, the higher the quality of that championship will become as well as its economic value, which supports the justification of leagues operating in a round-robin system.

This last feature is the one that emphasizes how high a priority is attached to the creation of a balanced state within the individual championships. In fact, yet another instrument for creating such a balance is the system of home and away games, which seeks to compensate for the advantage of the home field. Further similar instruments include the distribution of the revenues and the restrictions imposed on the labor market of the players. Even replacing the two points with three for a victory in soccer is supposed to increase the efforts of the teams competing in a league to win and thus strengthen the economic worth of the championship.

OVERVIEW OF THE RELEVANT LITERATURE

Outcome uncertainty, as a decisive factor in professional sports

One of the basic premises in the related literature of studies on sports economy is that the uncertainty of outcome is a central issue of economic success. According to Cairns et al. [4], there are as many as four different types of uncertainty to be distinguished when examining outcome from the aspects of several temporal forms:

- the uncertainty of the outcome of individual games (short-run)
- the uncertainty concerning the season's winner (medium-term)
- within-season uncertainty of outcome where several teams are in contention (medium-term)
- persistent domination of the leagues by individual teams lasting for several seasons or the lack of this (long-term).

The uncertainty of the outcome of certain games and the factors influencing this uncertainty have been examined by a number of studies [5–11]. These studies typically use regression models in which the dependent variable is the number of fans attending the games and paying for the tickets. Obviously, the higher the level of uncertainty of the outcome of the game, the higher this value will be. Among the influencing factors, mention must also be made of whether it is a home game or an away game for the given team, the league position of the participating teams prior to the game, the distance between the competing teams in the standings as well as the results of recent home and away games. Furthermore, there have also been examinations carried out for measuring uncertainty that are based on the odds set by the bookmakers [12–18]. This procedure is also justifiable because, while the indicators described above typically reflect past performance, the odds set by bookmakers also take into consideration effects valid for the current game, such as injuries or the replacement of coaches. According to Alavy et al. [19], they have strong preference towards games where there is a winner or where an unexpected turn of events might occur during the game.

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For the examination of medium-term or within-season/seasonal uncertainty of outcome, the following indicators are used: the distance between the top and the bottom teams in the standings, the variance of the games won by the teams and the match gap of individual teams from the leading position. Examining the outcome uncertainty concerning the final winner of a championship, Jennett [20] as well as Borland and Lye [21] conducted research during the course of which they analyzed the changes in the level of uncertainty from round to round. However, they also came up with findings that did not regard medium-term uncertainty a significant economic factor. One of the chief assumptions in long-term uncertainty is that, if a few teams become significantly dominant for several seasons (resulting in what is called concentration), the consequence will be a decrease in the quality and the profit generating ability of the league. It should also be analyzed to what extent the home-ground factor influences the performance of the competing teams. Some believe that the huge crowds of fans at home games are of great significance, while others would refute this impact on the self-confidence of players or on the impartiality of the referees. Yet, the distance covered by the away team to get to the game premises can also be an important factor in this respect [1].

The emergence of possibilities for unequality/inequality in the field of sports.

Investigations concerning the issue of competitive balance have become topical and relevant mainly due to problems related to instances of unequality. Basically, there are four aspects in sports where they appear. These are the revenues, player salaries, winning percentages and league wins. These four phenomena are closely related to one another.

This study will focus on the examination of indicators within the field of sports. In this respect, the concentration metrics used for measuring the concentration of power include the victory rate and the so-called Herfindahl-Hirschman index.

A well-balanced competition means that, in a specific game and, consequently, in the entire series of games in the competition, each participant has the same and equal chance for winning and the points available throughout the championship are distributed evenly between the teams. As a consequence, it is evident that this type of distribution homogeneity of scores is measured with a dispersion metric and the concentration of power relations is measured with a concentration metric. In the case of the latter, however, it needs to be stressed that concentration refers exclusively to the concentration of points earned, which is to say that the financial situation does not play any part. Based on the above, it may be freely stated that the concentration measurement figures used in sports science investigations are essentially dispersion indicators. In our power concentration statistical research, we have used the win ratio and the HHI (Herfindahl-Hirschman index) related to the points earned.

In order to further explicate the two metrics, a championship/competition needs to be taken into consideration, in which the marking system and the characteristics are as follows:

n: the number of teams
k: the number of rounds
y: points earned for a victory
pi: point(s) earned by the ith team
$k\ (n\ (n-1))/2$: the number of games played
r: the market share of teams.
$\sum_{i=1}^{n} pi \leq y \times k\ \frac{n(n-1)}{2}$: the total number of points distributed in the championship
$k \times (n-1)$: the number of winning percentages played by a team
$y \times k \times (n-1) = p^*$: the maximum number of points that can be earned by a team.
Wi = pi/p^*: the number of points earned by the ith team in proportion to the number of points that can be earned.

$$\text{Win rate dispersion}: \sigma_w = \sqrt{\frac{\left(w_i - \frac{\sum_{i=1}^{n} w_i}{n}\right)^2}{n}}$$

which can also be rendered in a simplified form: $\sigma_w = \sigma_p/p^*$, in which case, σp is the standard deviation of the points earned by the teams.

The formula of Herfindahl-Hirschman index (HHI) is as follows [22]:

$$\text{HHI} = \sum_{i=1}^{n} r_i^2$$

The Herfindahl-Hirschman index (HHI) is a well-known concentration index and widely used in practice of sports competitions [22–27].

About the power-concentration measurement figures below, it can be stated that a competition series can be regarded less even and/or balanced when the dispersion level of the points earned by the teams is higher or more heterogeneous. Of course, if the teams earn the same number of points in the championship, that is to say, if every game ends in a draw or, in the case of a two-round championship, if always the home team wins, we get a perfectly even and balanced competition, which means that there is no power concentration present.

Materials and methods

The topic of this study has been the examination and comparison of the competitive balance of the Spanish and the English first leagues of soccer, called La Liga Santander and Barclays Premier League. The basis for the research project has been provided by a database of sixteen hundred elements, containing the data of the two leagues starting from the 2014/2015 season up to the 2017/2018 season. When choosing the time period for the study, we intended to avoid having to deal with the impact of Covid-19, which is why we picked exactly these competition seasons. In the individual seasons, the data assigned to the teams can be grouped in two different ways. One group includes data

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concerning the financial situation of the clubs, such as the market value of the squad, the transfer record income and expenditure of fees of arrivals and departures, and the income received from the given league by season. The other group contains the statistical data related to sports factors, such as points earned by the end of a season and the number of wins, draws and losses as well as the number of goals scored and conceded. In this article, we intend to give an account of the results of processing the latter group of data.

It is with the help of these that we wish to shed light on whether the competition series is more balanced or even in the English or the Spanish first league. For this purpose, we have primarily used statistical indicators. In the case of sports-related data, our inquiries have included the following: comparing and averaging the winning percentages per season, furthermore, the winning percentages of championship seasons, the distribution of goals scored and conceded and, finally, the calculation of the Herfindahl-Hirschman Index. These inquiries have been completed about all the four seasons (2014–2018) of both leagues under scrutiny.

RESULTS

The examination of winning percentages (WPCT)

The first phase of our research covered the examination of the winning percentages of the teams. In the seasons under scrutiny, we calculated the winning percentages of the twenty teams in both the Premier League and La Liga, and then we averaged the values obtained per season. We counted three points for wins, zero point for defeats and one point for draws. Following this, we calculated an average on the basis of the winning scores for the given season.

A league season is in perfect balance considering the winning percentages if the WPCT average is 0.5. In Fig. 1, we can see that, although none of the average winning percentages of any of the seasons reached the optimal value of 0.5, the results obtained for every season were pretty close to this value. If we compare the values of the seasons of the two leagues, it is clear that the 2017/2018 season of La Liga was the one closest to the perfect balance. Furthermore, considering all the four competition seasons examined, we notice that there is only one of them, season 2016/2017, in which the Premier League managed to overtake the Spanish league in terms of winning percentages. That is to say, the La Liga competition series in this respect can be regarded more balanced overall.

Figures 2 and 3 shows the season with the lowest average WPCT in both leagues, that of 2015/2016. On the basis of the number of points earned, it is discernible that, while in the case of the Spanish league, the imbalance results from the fact that the teams at the top of the championship are far ahead the others, in the case of the English league, the more significant differences in points scored between the teams are observable in the middle and lower parts of the championship.

Figure 4 illustrates that we looked at the total number of points scored by the corresponding teams in different positions of the championships in the most unbalanced season of the two leagues. We divided the teams into four different categories. The first group included the top five teams based on the points collected in the season. The second category contained the clubs occupying sixth to tenth place in the standings; they represented the upper half of the mid-table. In the third group, there were the teams occupying eleventh to fifteenth place; they represented the lower half of the mid-table. In the end, there were the last five teams remaining; they normally fight to avoid elimination/relegation.

It is obvious that the higher the teams are placed in the league table, the more points they earn. Nevertheless, if we compare the two different leagues on the basis of these aspects, we can figure out which category of teams contributes most to the imbalance of the competitive balance.

Figure 4 shows that, not surprisingly at all, the majority of the goals were scored by the top teams. However, if we compare the scores of the two leagues, it can be observed that, while in the Premier League, 34% of the total points earned was obtained by the teams at the top of the table, this figure was 38% in the case of La Liga. This allows us to

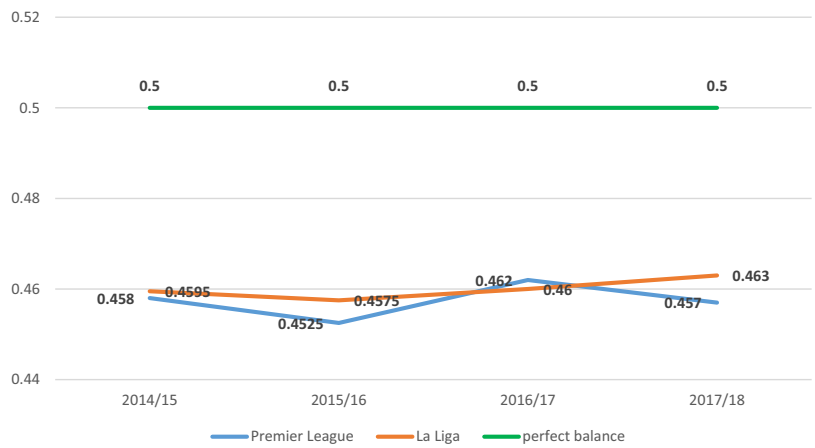

Fig. 1. The average of the winning percentages of the seasons in the Premier League and La Liga
Source: Own construction

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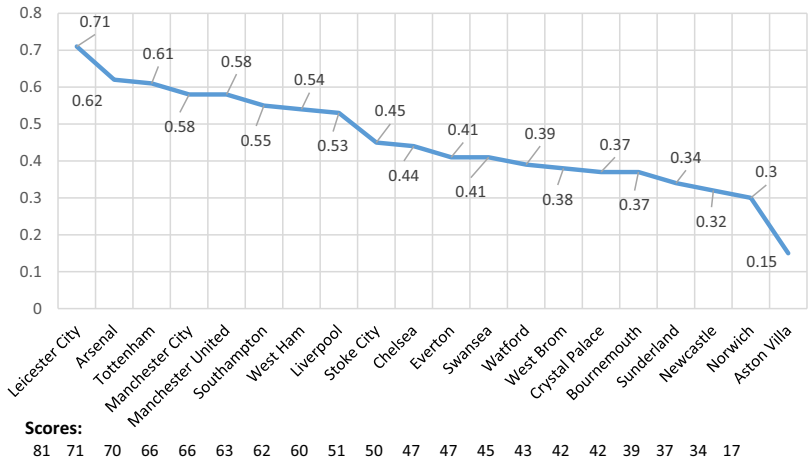

Fig. 2. Winning percentages and scores earned by the teams in the Premier League in season 2015/2016
Source: Own construction based on Transfermarkt

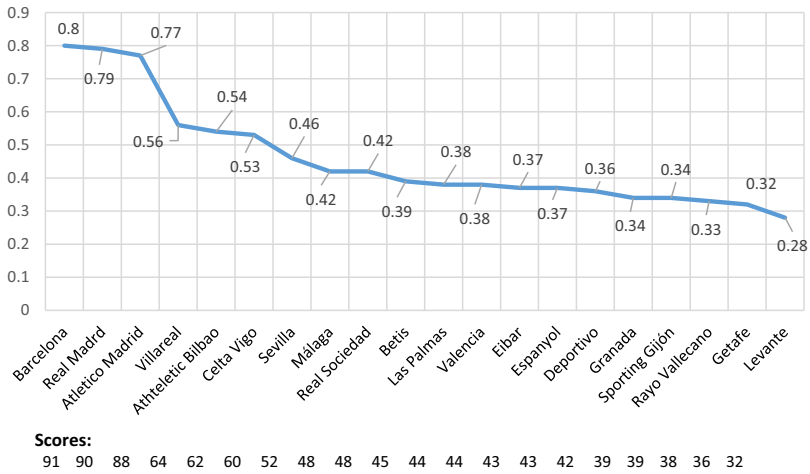

Fig. 3. Winning percentages and scores earned by the teams in the La Liga in season 2015/2016
Source: Own construction based on Transfermarkt

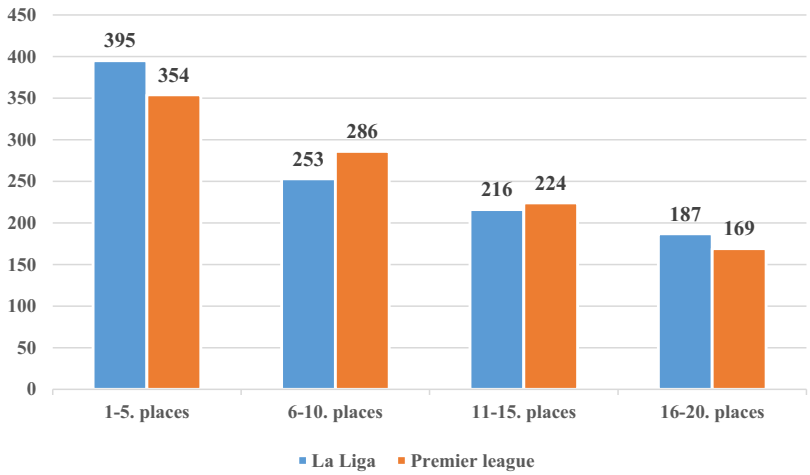

Fig. 4. Scores distribution by position in the standings of season 2015/2016 of La Liga
Source: Own construction based on Transfermarkt

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conclude that, in the Spanish league, the top clubs are more significantly above the rest of the teams in terms of performance than the top teams of the English league happen to be. Notwithstanding, as a consequence, there were fewer points available for the two categories of mid-table clubs, i.e. those placed 6th to 10th and 11th to 15th. For a comparison, in the Premier League, the clubs in these two categories collected more points, which means that they performed better than their Spanish counterparts. As regards the teams placed at the bottom of the table, i.e. in positions 16th to 20th, once again, it was the Spanish teams that performed better: they earned 18% of the total points obtained, while the English teams of the same category earned 169 points altogether, which represents only 16% of the total points obtained (Fig. 4).

As a next step, following the comparison of the most unbalanced seasons, we compared the most balanced competition seasons of the Premier League and La Liga. In the case of the former, it was the 2016/2017 season, while in the case of the latter, it was the 2017/2018 season. The number of points earned by the teams and the winning percentages of these two seasons are shown in Figs 5 and 6. It is striking that, while in the English league, there are ten teams with the same points as another team, in the Spanish league, there are only seven such clubs. A curious detail is that, in both competition seasons, there was a tie in points between the hardly surviving team and the third team to be relegated, while there were also as many as three teams in the Spanish league with the exact same number of points (49) collected. As a matter of course, these instances of point equality exert a positive influence on the competition balance.

In Fig. 7, we examined the most balanced seasons in the two leagues the same way as we had done in Fig. 4, except we had examined the least balanced seasons there.

Interestingly, the same results were obtained here as in the case of examining the most unbalanced seasons but now with an inverse conclusion. This time, it was the teams finishing in the first five positions of the Premier League that earned the majority of the points, ahead of the Spanish top teams, too. The former collected 408 points, which corresponds to 39% of all the points available, while the latter collected 382, which represents 36%. The mid-table trend was also reversed because, in the case of teams placed 6th to

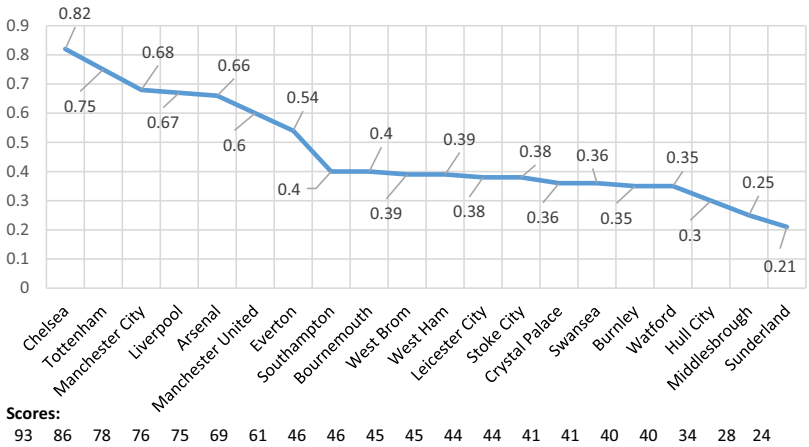

Fig. 5. Winrates and scores of the teams of the 2016/2017 Premier League
Source: Own construction based on Transfermarkt

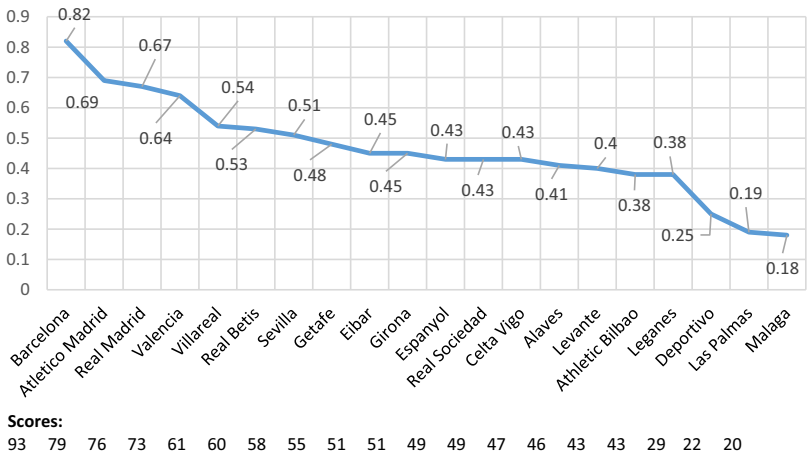

Fig. 6. Winrates and scores of the teams of the 2016/2017 La Liga
Source: Own construction based on Transfermarkt

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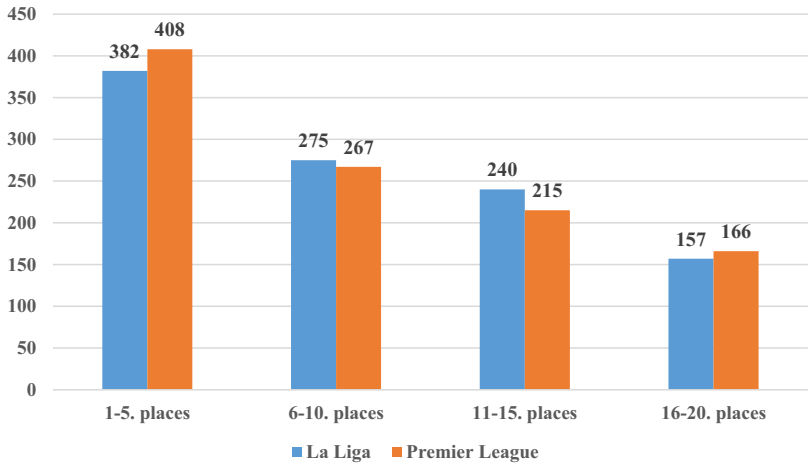

Fig. 7. Scores distribution by position in the standings of seasons 2017/2018 of La Liga and 2016/2017 of the Premier League
Source: Own construction based on Transfermarkt

10th and 11th to 15th, it was also the performance of the teams in the Spanish league that turned out to be more effective. They collected 1% more of the points in the former and 3% more of the points in the latter category. As far as the least effective teams are concerned, there, the English teams dominated by having collected a total of 166 points as opposed to the 157 points collected by the Spanish teams.

Dispersion of win percent per season (Standard deviation of winning percentage – SDWP)

In the dispersion of win percent per season (SDWP), we examined the extent to which the winning percentages of the given seasons deviated from the average winning percentage of the specific season. A perfect balance in this case would be possible if the values were zero; however, the probability of this is very low.

The data in Fig. 8 shows that, if we focus on the winners of the competition seasons and compare their results with the average winning percentages, the Premier League appears to be more balanced than La Liga. The reason for this is that, in three cases out of four among the values of the competition seasons, the dispersion of the winning percentages of the champions of the Premier League are closer to the optimal range of 0.

In Table 1, we compiled data on how far the champions of the given seasons were pointwise from the teams that failed to make it to the first three. In the case of the English league, there is a relatively big difference in points between the two positions of the standings; however, in the case of the Spanish league, this is even more true. Among the four seasons examined in both leagues, the two highest values are connected to the champions of La Liga, specifically to the 2015/2016 and the 2016/2017 seasons. In the case of the former, FC Barcelona became the champion with 27 points, while in the case of the latter Real Madrid became the champion with 26 points ahead of the team in the fourth place.

The examination of the goals

As the next step, we examined the goals and their dispersion. First, we looked at the distribution of goals according to

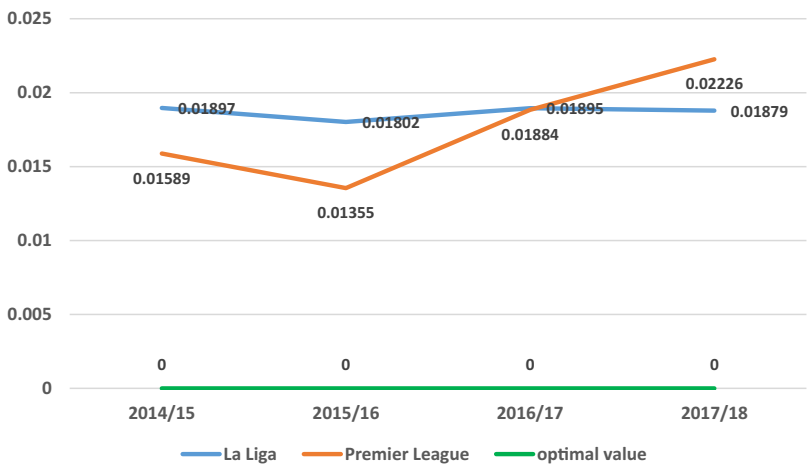

Fig. 8. Dispersion of win percent per competition season
Source: Own construction

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Table 1. The number of points earned by the winners of the Premier League and La Liga and their point differences compared to the teams placed fourth

	Premier League		La Liga	
Seasons	Scores of the Champion	Point difference calculated for fourth place	Scores of the Champion	Point difference calculated for fourth place
2014/15	87	23	94	17
2015/16	81	15	91	27
2016/17	93	17	93	26
2017/18	100	25	93	20

Source: Own construction based on Transfermarkt.

positions of the teams of the two leagues. The magnitude of the total number of goals during the season does not really affect the competitive balance but the distribution of these between the teams does to a greater extent.

As it can be seen in Table 2, the distribution trends of goals scored both in the Premier League and La Liga were more or less similar. However, the results in the latter were closer to the optimal competition balance requirements, even if by a small margin. The most balanced season from the aspect of goals scored was the 2015/2016 season of La Liga. In that season, the top teams scored 37% of the 1,043 goals, the teams placed 6th to 10th scored 21%, the teams placed 11th to 15th scored 22%, while the teams at the bottom of the table scored 20%. Nevertheless, in addition to this, there were two more seasons (2016/2017 and 2017/2018) of La Liga when the teams placed 6th to 10th and those placed 11th to 15th scored the same number of goals considering their proportions. Such a match did not occur in the Premier League in any of the seasons under scrutiny.

We also looked at the goals conceded by the teams. Table 3 shows that this is the aspect of investigation that displays the highest degree of overlap between the Premier League and La Liga. The distribution of the goals conceded by the teams in the five categories is almost the same. Perhaps, there is a slight difference in the proportion figures

Table 2. Distribution of goals scored according to position

Seasons	Total goals scored (100%)	1–5. places (%)	6–10. places (%)	11–15. places (%)	16–20. places (%)
Premier League					
2014/15	975	36%	25%	22%	17%
2015/16	1,014	31%	28%	21%	20%
2016/17	1,064	38%	24%	22%	16%
2017/18	1,018	39%	25%	20%	16%
La Liga					
2014/15	1,009	43%	23%	19%	15%
2015/16	1,043	37%	21%	22%	20%
2016/17	1,118	37%	23%	23%	17%
2017/18	1,024	36%	24%	24%	16%

Source: Own construction based on Transfermarkt.

Table 3. Distribution of goals conceded according to position

Seasons	Total goals conceded (100%)	1–5. places (%)	6–10. places (%)	11–15. places (%)	16–20. places (%)
Premier League					
2014/15	975	20%	23%	27%	30%
2015/16	1,014	18%	24%	25%	33%
2016/17	1,064	17%	22%	30%	31%
2017/18	1,018	16%	25%	30%	29%
La Liga					
2014/15	1,009	16%	22%	31%	31%
2015/16	1,043	15%	23%	29%	33%
2016/17	1,118	17%	21%	29%	33%
2017/18	1,024	18%	26%	26%	30%

Source: Own construction based on Transfermarkt.

of the teams in the top positions, which represents a higher degree of competition balance in the English league. This occurred in the 2014/2015 season of the Premier League. As a matter of course, in all the seasons of the two leagues that have been examined, it was the top five teams that conceded the lowest number of goals, yet, in the season of the Premier League mentioned above, the teams of this category conceded 20% of all the goals, which was the highest value in this category.

Application of the Herfindahl-Hirschman index (HHI)

The Herfindahl-Hirschman index (HHI) is an indicator to measure concentration. The higher the HHI index, the lower the competition balance will be. The basis used for calculating the HHI is the champions of the time periods examined and the number of their league titles.

Table 4 shows that, during the four seasons of the Premier League examined, the title was won twice by Chelsea (2014/15; 2016/17), once by Leicester (2015/16) and once by Manchester City (2017/18). In the case of La Liga, with the exception of one single season, it was always FC Barcelona that won the league title. It was only in the 2016/2017 season that Real Madrid could get ahead of the most prestigious Catalan club.

After calculating the Herfindahl-Hirschman indexes of the two leagues (Table 4), it became clear that the value belonging to the Premier League is lower than that of La Liga. As a consequence, it can be stated that, in the time period examined, the English top division had a more balanced competition balance in terms of the frequency of league title winners than the Spanish league.

Table 4. Application of the Herfindahl-Hirschman index (HHI)

League	Calculation with the formula of HHI	Herfindahl-Hirschman Index (HHI)
Premier League	$(0.2)^2 + (0.1)^2 + (0.1)^2$	0.06
La Liga	$(0.3)^2 + (0.1)^2$	0.1

Source: Own construction.

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CONCLUSIONS

During the course of analyzing and comparing the data concerning the Premier League and La Liga, our intention has been to provide a more comprehensive picture about the situation of the two national competitions' competition balance in the so-called "normal" (i.e. pandemic-free) seasons. Although there is one aspect of investigation according to which the competition balance of La Liga is closer to the optimal, the dispersion of winning percentages and the indicator of the goals conceded as well as the HHI index show that the Premier League is the more balanced competition of the two.

Our findings and results are well explained by the fact that, in the case of the Spanish league, the lion's share of the redistributed funds was received by the top teams. In addition, due to the organizational features of La Liga, there are no such investors in Spain as there are behind the teams of the Premier League. On the basis of these factors, our findings may be further nuanced if, next to the sports-related indicators, we get to examine also those that reflect economic efficiency.

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