

Optimization of the Number of Teams and Format of the Portuguese Football Primeira Liga

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Abstract

This dissertation seeks to find alternative structures (format and membership) for the major Portuguese football league – Primeira Liga – so that they can provide better results in terms of competitive balance and attendances in stadiums than the current structure of the league. This objective is achieved through studying and afterwards applying the same methods for assessing competitive balance and attendances to new structures (each with different possible combinations) created based on European leagues and the league as is. Two major analyses are developed: the first combined all measures considered relevant while the second sees analyses being performed and compared by groups of methods related to their framework (attendances, goal gap and point gap). While the former offered limited positive results, the latter sees structures with several combinations that beat Primeira Liga as is and even one of them stands out from the rest and is considered a plausible alternative. It merges unpredictability throughout the season whether it be in finding the champion or the relegated teams, more matches between teams with the same financial and sport strength, a shorter season and even more opportunities for weaker teams in terms of European football competitions. However, the application of these methods to find leagues where new champions, other than the usual ones, emerge is not successful which demonstrates the excessive power of the biggest teams.

Key-words: football, competitive balance, attendances, optimization, Portuguese league, professional sports league.

1. Introduction

1.1. Context

Football has emerged into a billion-dollar business and the most recent statistics by FIFA (2016) demonstrate that there are 265 million football players worldwide strengthening the position of this sport as the world number one. FIFA, football's governing body, has even more members (211) than the United Nations (193). Portugal is today seen as an extremely football-oriented nation being it a phenomenon that mobilizes almost the entire society and its institutions.

According to the European Club Footballing Landscape elaborated by UEFA (2018) for the financial year of 2016, there is no Portuguese side in the Top 30 European clubs in terms of revenues. Primeira Liga is nowadays the only major league in Europe to sell its broadcasting rights separately (club by club). The Portuguese model echoes a huge gap between TV profits of the top three teams (SL Benfica, FC Porto and Sporting CP) and the rest of the teams. At the same time, participating in

European club competitions such as the UEFA Champions League or UEFA Europa League has a positive influence on the financial position of the Portuguese clubs as they generate revenues like no other source according to UEFA (2018). This unevenly distribution of broadcasting rights and UEFA revenue always benefiting the same clubs in Portugal has a direct impact on the competitive balance of the league which ultimately decreases the uncertainty of the matches' outcome that at the end of the day is considered one of the main reasons for fans engagement. As a direct result of this, attendances in stadiums may tend to decrease. The current league structure (number of teams and format) of Primeira Liga may ultimately have an impact on this as it is the way of accessing UEFA competitions and where teams compete consistently throughout the season.

1.2. Objectives

Over the course of this dissertation, two major types of decisions while designing a new league structure

for the Portuguese Primeira Liga will be addressed. League structure in terms of format (method for planning matches) and size (ideal number of teams). The aim of designing a new league is to try to bring more supporters to stadium and make the league as balanced as possible. To perform this, it will be necessary to build a computational tool able to generate results that include data from previous seasons and information about league structures across Europe so that a better league in terms of competitive balance and attendance is possible to be achieved. Afterwards, the objective is to gather techniques where data from Portuguese Primeira Liga's previous seasons including attendances and results on all matchdays are applied. To conclude, and after applying the previous competitive balance methods to relevant alternative league structures, it is expected that some of these alternatives would help increase attendances in stadiums and create an unpredictable championship.

2. Definition of the Problem

2.1. Membership and structures in Europe and Portugal

Team sports are usually structured into leagues. The structure of sports leagues differs enormously around the world and the main driver while building and developing a league should be its financial result. A league usually follows one of two kinds of schedules: an elimination format or a round-robin. In a round-robin, the league generates a schedule of games for a season for each team. All teams play a prearranged number of games against other championship members. In Europe, even though most of the leagues adopt a round-robin format where all teams play all others an equal number of matches, there are few leagues where teams play some teams more than others. In other sports, especially in North America, this usually happens mainly due to schedule or geographic limitations. On the other hand, in an elimination competition, teams are eliminated from the contest after losing a certain number of games, usually in one or two legs. In Football, this type of format is normally used in country cups where teams are drawn against each other in each round of the competition. There are advantages and disadvantages in both formats. In elimination competitions each game is of higher importance over the round-robin format since a loss can determine elimination and season ending as a result. This point is also seen as a disadvantage since most of the teams will have a shorter season and eventually less revenues.

From the 55 top-tier European leagues played under the jurisdiction of UEFA in the 2017/2018 season the great majority (38 leagues, 69%) adopt the traditional league format (round-robin) with each team playing each of the other teams twice (17), three times (10), four times (10) or six times (1, Armenia). The remaining 17 leagues use a different format, consisting of gathering teams into groups based on their standings in a certain point of the season being this a growing trend since there were only just 5 leagues using this format in 2005.

There are significant differences in the number of teams in the top divisions of European football, starting from 8 to 20 teams. In the following table the majority of the top 10 countries in the UEFA Ranking as of November 2018 (UEFA, 2018) and few other relevant countries (similar to Portugal in terms of population) are measured in terms of teams, number of games per season, population and number of inhabitants per team for the 2018/2019 season.

Table 1 - Comparison of European Leagues in terms of Number of teams, games, population and citizens per team

Major League	Nr of Teams	Nr of Games	Population	Citizens/ Team
Spain	20	380	46.397.452	2.319.873
England	20	380	66.573.504	3.328.675
Italy	20	380	59.290.969	2.964.548
France	20	380	65.233.271	3.261.664
Germany	18	306	82.293.457	4.571.859
Portugal	18	306	10.291.196	571.733
Turkey	18	306	79.817.849	4.434.325
Netherlands	18	306	17.084.459	949.137
Belgium	16	250	11.498.519	718.657
Russia	16	240	143.964.709	8.997.794
Greece	16	240	11.142.161	696.385
Czech Republic	16	240	10.625.250	664.078
Sweden	16	240	9.982.709	623.919
Austria	12	222	8.751.820	729.318
Switzerland	10	180	8.544.034	854.403

Deepening into Portugal, Primeira Liga is the highest professional association of the Portuguese Football league system and it is annually organized by LPFP. As for the 2018/2019 season, 18 teams take part in the competition. The format has always been the same since teams compete twice against each other with equal number of home and away matches totaling 306 games in 34 matchdays. It goes through a round robin system which is used by around 67% of major European Leagues and it is composed by 18 teams. As seen before, no country with the dimensions and population of Portugal has so many teams competing in its major league. This is quite important as Portugal has a limited number of citizens ready to consume a 18-team league. This

is additionally impacted by most of the population, that is a fan of football, supporting mostly one of the Big 3 teams which have a huge market size. The other 15 teams have a low fan base compared to those teams. Market size plays a crucial role on attracting supporters. The bigger it is the easier it is to generate more supporters. A country with around 10 million citizens cannot compare itself to those who have 80 million (Turkey or Germany).

Even though this structure can be considered one of the fairest as each team plays the same number of times against all other teams, some weak aspects can be identified. Using this structure, when the season approaches its final matchdays, some teams that are not fighting anymore for any objective might decrease competitiveness and some matches can even be considered of minor relevance attracting no viewers at home or at stadiums. This can damage competitive balance between teams and affect how supporters perceive the strength of the league and be an enemy of the progress of the competition. At the same time, even considering the fairness presented before, this structure can be beneficial for stronger teams as they only face each other a reduced number of times compared to the number of times they face weaker teams. Some aspects can help identify the problem such as several uninteresting matches may occur towards the end of the season reducing attendances especially in weaker teams' stadiums, teams who usually fight for the championship face each other a limited number of times and top placed teams are always the same which means the same teams access European competitions and its massive prize money year after year.

2.2. Changes and pursuit of optimal structures

Leagues across Europe are continuously studying methods to embrace more fans and sponsors while analyzing new formats for its major championships. One clear example is Belgium's Pro League. Over the past years, Belgian football has gone through a league format change aiming to attract home and stadium spectators as well as improving the competitiveness of the league. By concluding that its format was not fully potentiating the expectations of the league's administration, for the 2008/2009 season it was decided to switch from the widely seen 2 round robin format with 18 teams (equal to Primeira Liga) to a league with less teams (16) composed by a 2 round robin plus an additional playoff format that starts in middle of the season that separates the league in two equal halves. The goal to

increase competitive balance and fans' experience and attendance has been a success has both aspects were improved. Other leagues such as the Austrian Bundesliga concluded that it had a competitive problem since the same team kept winning the championship year after year with a wide advantage in terms of points obtained. It was as well decided to switch the competition format. The usual round robin format was maintained but an additional playoff was included. The top half and bottom half are divided, and a mini league is played in both halves. Even though RB Salzburg continues to win the league and to be main favorite year every year, the gap in terms of competitiveness has decreased. This trend related to playoffs is an interesting way to offer additional matches between teams that are closer in terms of points. Each group of teams is fighting for their specific objectives whether it be winning the league, clinching and European place or avoiding relegation.

3. Literature Review

3.1. Competitive Balance

It is normally recognized that any extremely unbalanced competition will affect customer interest in attending a sports event. Competitive balance relates to the equilibrium in sport and amongst sport teams (Michie and Oughton, 2004) and is at its peak when clubs facing each other have the same chances of winning a match. Quirk and Fort (1997) believe that one of the key elements of sports is the uncertainty of outcome of matches. In order to keep fan interest, a sports league has to guarantee that teams do not get too strong or too fragile relative to one another so that uncertainty of outcome is conserved. With this said, leagues should find and implement mechanisms to rise competitive balance in order to increase their attractiveness. According to Szimanski (2003) sporting contests are one of the most noteworthy branches of the performing industry measured by the amount of time that consumers dedicate to following them. The US Census Bureau predicted the annual attendance at sports events in 1997 to be 110 million (equivalent to 41% of the population of USA). Couture (2016) considers that competition inside sports is radically different than competition in other businesses. In other markets competitors fight hostilely to become leaders and totally destroy their opponents. Rivals in sports must rely upon themselves to make an income as one of the key reason's fans appreciate watching sports is that any side can win. As a result, a single club cannot exist

without “enemies”. Spectators will not be interested in attending or watching a game if the level between the teams is excessively unbalanced. The competitive balance within sports is increasingly important and there is a wide variety of literature on this matter. The uncertainty in sports results is studied through several methods. El-Hodiri and Quirk (1971) first found that attendance profits rely too much on the uncertainty of the outcome of a game and Forrest and Simmons (2002) discover that stadium attendance rises when the teams are more balanced. On the other hand, not only Lemke et al (2010) find that attendance rises when the home team is undoubtedly favorite while studying the 2007 MLB season but also other authors show that European football fans prefer to attend a match where the home club is likely to win by many goals as fans are more interested in matches with high scoring ranges (Buraimo et al, 2006) so there are opposite ideas on this subject. Szymanski (2003) also considers that there are three types of competitive balance: match uncertainty which relates to uncertainty about a result of a given match, season uncertainty as the uncertainty about results in the course of a season and league uncertainty that tells the supremacy of reduced number of teams in a championship in numerous seasons. In competitions where there is a massive difference of wealth across teams, money is the key effect of dropping the distribution of player talent and successfully creating unequal teams (McMillan, 1997). Peel and Thomas (1988) have also first discussed betting odds as a measure of assessing match uncertainty. The more identical these odds are, the more uncertain the result of a tie is. Goossens (2005) assessed 11 European leagues (Germany, Spain, France, England, Italy, Portugal, Greece, the Netherlands, Belgium, Denmark and Sweden) and the results are reasonably distinctive since, for example, in Portugal, SL Benfica, FC Porto or Sporting are difficult to be defeated but competition between other league teams is feisty. This research also showed that Belgium decreased in terms of competitive balance. Goossens concluded that the competitive balanced did not change much in the last few decades despite rule changes or entrance by investment groups in the world of football. On the other hand, football is attracting even more media, sponsor or spectator attention. However, Canes (1974) presented that if all the clubs have the same power, this will not result exactly in a benefit for the spectators, so some level of imbalance among teams is necessary.

3.2. Stadium attendance

The attractiveness of a competition can be evaluated by its effectiveness to attract spectators to matches. Supporters build an energetic atmosphere at stadiums, but they are also seen as financial contributors through match day tickets. Nowadays, teams are engaging fans even more and enhancing the fan experience not only inside stadiums but also outside where new facilities are built to bring supporters to fan zones several hours before kickoff time.

Dawson et al (2000) consider that ticket prices and the number of spectators attending a sports event says much about the team’s reputation for the fans. Top clubs can easily practice more elevated ticket prices than weaker teams as their demand will not change. Haugen and Hervik (2002) also consider that the higher the attendance, the higher the ranking of the team, the population of the region, the quality of the player roster and the history of the club. Humphreys and Zhou (2015) studied an enormous amount of baseball games to conclude that are mainly two important reasons to determine attendance. The first is related to home wins. Fans are always expected to attend matches where the probability of an home win is higher. The second is loss frustration as it is considered that a loss hurts more than the good feeling of a win. This feeling of defeat harms even more when a win was expected. This variable is an obstacle to competitive balance for team’s administration that would only focus on winning home clashes. Borland and Macdonald (2003) found five different categories that define demand for attending sports fixtures. The first relates to consumer preferences as it gathers consumer loyalty to a certain team or preferring attending a match rather than other activity. The second category is the economy factor associated: fee of a ticket, cost of travelling to the stadium or car parking actively influence a spectator. Opposing substitutes as possibility of watching the match at home also affect customer behavior. The quality of viewing such as reasonable seating with low influence of scarce weather conditions and the schedule of the event – time of the day as well as the weekday – is another fundamental aspect. Other important effect lies under certain characteristics of a match. Attendance will rise if successful and top ranked teams are competing. Connected to this, if there is a high unpredictability of outcome or relegation and promotion are on the line, fans interest in the clash may rise. Finally, the seating capacity of a stadium may be a restriction in case of

high demand for attendance since not all those who are interested will be able to attend the match.

4. Methodology

4.1. Measures of Competitive Balance and Attendance

Among several methods studied, the following were considered the most important for this dissertation. According to the CIES Football Observatory (2018), there is a wide-ranging decline as far as competitive balance is concerned in the European football leagues (including the Champions League and Europa League) while comparing 2016/2017 and 2017/2018 seasons. The measures used consist of analysing the percentage of matches with a gap of three or more goals and the average goal difference in 29 European competitions. Concentration ratios weigh the competitive balance based on gathering a subgroup of markets. It is defined as the amount of market shares of the k first companies in a market, with the N companies contending ordered by decreasing market shares. In championship rankings, the teams are positioned in decreasing order of points achieved. The index varies from k/N , where N is the total number of teams, and all have exactly the same points in the league and 1, where there is only one team gathering all the possible points. The 5-club concentration ratio (C5 ratio) suggested by Michie and Oughton (2004) is one of the concentration ratios and can be conveyed as:

$$C5\ ratio = \frac{Total\ points\ earned\ by\ the\ top\ 5\ teams}{Total\ number\ of\ points\ earned\ by\ all\ teams}$$

For the 18-team Portuguese Primeira Liga, this method as a minimum value of 0,27(7). The highest possible rate arises when all top 5 teams win their games and the other 13 teams draw their matches. Michie and Oughton (2004) brought a new version that allows a better interpretation of the C5 ratio. It is called the C5 Index of Competitive Balance (C5ICB):

$$C5ICB = \frac{C5\ ratio}{5/N} \times 100$$

N = Number of teams in the league

In this index a 100 value is only obtained when a league is perfectly balanced. The Herfindahl-Hirschman Index (HHI), first planned by Hirschman and brought to sports analysis by Michie and Oughton (2004) and Depken (1999), uses the same pattern of the Concentration ratios but is used for all the teams composing a league. The Repeated Title

Wins is a measure that indicates a level of dominance in a league. Szymanski and Kuypers (1999) enlighten that this measure can easily be used for the Scottish Premier League as Celtic FC and Glasgow Rangers have been the only winners and dominating the league for decades. The Number of Different Title Winners measure identifies title winner variation over the years meaning that the more different winners the more balanced the league is.

Regarding attendance it is relevant to measure differences encountered and that are impacted by changing the number of teams and format of Primeira Liga whether in terms of total number of supporters whether in terms of percentage of seats sold. When it comes to competitive balance it is possible to combine methods to sustain the study. The method by CIES Football Observatory (2018) is clearly necessary to be used meaning that more competitive leagues have closer matches meaning lower goal gaps. This method is only used to assess a 3-goal gap, but it requires deepen analysis, so an adaptation is needed in order to measure all goal gap that has occurred. Additionally, the Herfindahl-Hirschman Index (HHI) and Concentration ratios will be merged. So, apart from goal gap, it is also beneficial to measure point gap in all sections of the league. Lower point gaps also mean a more competitive league. To sum up, it is also necessary to see if different title winners emerge or if the chronical top placed teams maintain their dominance. The podium of the league rarely changes nowadays so methods such as Number of Different Title Winners and Repeated Title Wins are going to be brought into this study.

4.2. Measures applied to Primeira Liga

All previous literature connects with the measures of evaluating competitive balance and attendance discussed before. Starting with the measure used by CIES Football Observatory (2018) to evaluate the evolution in the number of matches where the goal difference was three or more goals: this measure gives us a good outlook on how unbalanced a league can be in extreme circumstances but does not provide a wider picture on the other results and difference in terms of goals scored by each team in a match so an adaptation of this measure seems necessary. With this said, it is more useful to look, evaluate and compare all goal differences from every match in different formats. It is also beneficial to get insights and combine other measures such as range (that relates the winning percentage of the best

and worst performed teams), concentration ratios or the Herfindahl-Hirschman index (that weigh the competitive balance based on gathering a subgroup of teams) and even the number of different title winners to find the most adequate measure that enables comparing performances from different placed teams across the final standings. An appropriate way to perform this would be to compare points obtained at the end of a season by the first, second, fifth, middle and bottom team across the recent editions of Primeira Liga providing a broader viewpoint on the success of different teams. When it comes to Attendance and following Forrest and Simmons (2002) it is important to evaluate attendance and stadium occupation in every match. Competitive balance can be achieved because of a lower goal difference in each match which ultimately would result in a reduction of the point gap in the league making it unpredictable and more remarkable. All things considered, as far as Attendance is concerned not only is it necessary to evaluate the average number of supporters at stadiums but also percentage of seats sold. When it comes to Competitiveness, the objective is to have the most unpredictable league in terms of results, so it is necessary to measure gaps in terms of points at the end of the season between different positioned teams and also look at the goal difference in each match played. Summing up, we are going to measure the following 7 aspects in a match/season for 5 seasons (from 2014/2015 to 2018/2019): Attendance, stadium occupation, goal difference and point gap ratio in final standings between 1st and last team, 1st and team in middle of the table, 1st and 5th team and 1st and 2nd team. Every season will be assessed independently, and the data extracted from every real championship will be used to generate all possible combinations for every format chosen. Every combination inside each format will be compared to the results of the actual league in each season.

Two different sorts of comparisons are going to be performed. The first: for one combination of a format to be considered better than the current league structure it must be better in all seven measures presented before. The second: instead of combining and comparing measures as one, 3 different groups of measures will be formed (each comprising measures from the same category) and one format will be considered better if surpasses the current league structure in at least one the group measures created: Attendance (attendance and stadium occupation) Goals (average goal gap per

game) or Standings: final standings point gap between champion and second placed team, champion and fifth placed team, champion and team in the middle of table and finally champion and team who sat bottom of the league.

5. Applications and Results

The process of selecting league formats to be compared starts by looking at what is currently being performed in other leagues. As it was mentioned before, by analyzing European countries like Portugal in terms of inhabitants while at the same time provide competitive leagues (top half of the UEFA ranking) it is possible to conclude that all of them have less than 18 teams. At the same time, when considering existing formats across Europe, not only do most of the previous mentioned countries like Portugal but also most of the other countries adopt a round robin format (which can be a 2, 3, 4 or 6 round format). In fact, 69% of Europe's first division leagues rely of this format (UEFA, 2018). Considering the additional 31% of cases, around half of these leagues (8 leagues and 14,5%) adopt a trending structure which UEFA calls Spit Two & Two, meaning that after a 2-round robin format is played, the league is spit in two halves considering the standings at that time and each half typically plays a supplementary 2 round robin format. This structure is, for example, encountered in Austria or in Belgium for the 2018/2019 season. Taking the previous paragraph into account, on the one hand the upper and lower tier in terms of members have been defined meaning that the Portuguese league as is will be compared to leagues with a minimum of 8 teams as well as less than 18 teams. On the other hand, all 4 possible simple round robin (2, 3, 4 or 6-round format) and Spit Two & Two formats will be tested and combined with different number of teams according to the preceding rule. All in all, 15 different leagues have been encountered.

For the first analysis these are the results: the first eyesight goes to the 16/17 season. In this season, all leagues have at least 2 combinations that outperform Primeira Liga and four leagues have at least 98 combinations with better results overall. The league with the best results in terms of combinations is the one with 12 teams and a Split Two & Two format. 433 out of 1716 combinations beat the structure that is currently used. These 433 combinations connect better attendances and significant lower gaps in terms of goals scored by each team in every match and points obtained at the end of the season between

different placed teams across the board making it a decent candidate to be suggested as an alternative. These are however small numbers if compared to the total combinations for every encountered and simulated structure. When analyzing in terms of percentage, the highest listed league is the same and demonstrates around 25% (433 out of 1716) of its combinations with better results. The second and third simulated leagues with the best results have only around 13% (10 out of 78) and 10% (8 out of 78) positive combinations (16 teams and 3 rounds where the 3rd round replicates 2nd round and 16 teams and a 2-round format, respectively). Even though other simulated leagues present more positive combinations than these two leagues, the total number of combinations simulated is far greater diminishing their positive percentage.

All other seasons present even poorer results (excluding the structure with 12 teams and a Split Two & Two format). Several structures present zero better combinations and, those who do not, show extremely small figures. Across all seasons (apart from 16/17) and structures (excluding 12 teams and Split Two & Two), only two numbers (out of 56) seem to be slightly relevant: 96 and 82. Both occur in the 18/19 season and in formats with 3 rounds where the 3rd round replicates 1st round. The first numbers derives from 12 team membership while the latter results from a 14-team league.

Overall, taking into consideration the average percentage of better combinations per season, a top 3 in terms of structure is encountered:

- 12 teams and Split Two & Two format (10,2%);
- 14 teams and 3 rounds (3rd round replicates 1st round) format (4,1%);
- 16 teams and 3 rounds (3rd round replicates 1st round) format (3,6%).

These low percentages and statistics seen above may seem an indicator that combining all seven measures could represent too big of a step to take to categorize an alternative league, so it is clearly necessary to perform additional analyses that do not aggregate so many methods making it possible to understand the results of each method.

For the second analysis (where all 7 measures have been divided into 3 categories, at least one of the subsequent must be superior to be considered better than the current league structure) these are the results: When looking at the results all together it is clear that no matter which season, alternative league or combination is chosen, the group measure Attendance is improved above 99% of the times.

This result is not surprising given the gap in terms of seats sold and stadium occupation between teams such as SL Benfica, FC Porto, Sporting CP, SC Braga or Vitoria SC – teams that are always part of the simulations – and all other teams in the league, that mostly fill their seats when one of the previous teams visits their grounds, especially SL Benfica, FC Porto or Sporting CP. This means that when reducing league members, attendance and stadium occupation are always better no matter the format of the league. This is reinforced by Haugen and Hervik (2002) who consider that the higher the attendance, the higher the ranking and historical success of the team. Borland and Macdonald (2003) also support this idea of greater teams generating more stadium visitors as the quality of viewing in terms of seating and facilities are generally offered in better conditions so these are also important when deciding to attend a match apart from the loyalty to the club.

The other categories, Standings and Goals, show that alternative leagues demonstrate better results than those seen in the first analysis. The 16/17 season provides again the most positive global outputs as it was seen while conducting the first analysis. For Standings, the 16/17 season goes from at least 7% (for 8 teams and 4 rounds and 8 teams and 6 rounds) to 41% (Split Two & Two and 12 teams) better encountered combinations. For the same season, when it comes to Goals, the worst results are seen in the league with 10 teams and 4 rounds (17%) while the best results are gotten again in the Split Two & Two league (a whopping 49% of better combinations). All other seasons provide not so good but relevant results. After seeing that Attendance is bettered in almost 100% of the combinations, Goals is second most improved category. At least around 10% (10 members and 4 rounds) combinations are improved in each league and this value escalates to 40% in the 12 teams and Split Two & Two league. Finally, considering Standings which is the category that creates the lowest number of combinations that beat Primeira Liga, the league with 8 teams and 4 rounds as well as the one with the same 8 teams but 6 rounds have only 3% of positive combinations. On the other hand, the trend continues as the 12 team Split Two & Two structure continues to deliver the best results with 25% better combinations. The results can be seen in table 2.

Table 2 - Combinations of each format that are better than the current league structure in at least 1 of the 3 groups of measures

Membership	Format	Attendance					Standings					Goals					Combinations
		14/15	15/16	16/17	17/18	18/19	14/15	15/16	16/17	17/18	18/19	14/15	15/16	16/17	17/18	18/19	
16	2 rounds	78	78	78	78	78	13	12	15	1	2	12	12	22	11	16	78
16	3 rounds (3rd round replicates 1st round)	78	68	73	78	78	-	14	12	-	13	4	10	23	21	63	78
16	3 rounds (3rd round replicates 2nd round)	78	78	78	78	77	8	-	18	5	-	43	20	27	3	5	78
14	2 rounds	715	715	715	715	715	59	88	160	23	42	58	83	146	77	119	715
14	3 rounds (3rd round replicates 1st round)	715	715	715	715	715	22	45	152	5	180	32	72	157	159	362	715
14	3 rounds (3rd round replicates 2nd round)	715	715	715	715	715	37	7	150	39	-	175	100	165	34	48	715
12	2 rounds	1716	1716	1716	1716	1716	111	81	287	21	73	107	128	335	107	281	1716
12	3 rounds (3rd round replicates 1st round)	1716	1716	1716	1716	1716	97	47	285	13	321	70	146	356	226	611	1716
12	3 rounds (3rd round replicates 2nd round)	1716	1716	1716	1716	1716	99	27	265	61	-	195	155	363	80	104	1716
12	Split Two & Two	1716	1716	1716	1716	1716	820	413	701	197	32	787	382	836	636	811	1716
10	3 rounds (3rd round replicates 1st round)	1287	1287	1287	1287	1287	115	29	152	4	100	59	78	272	141	446	1287
10	3 rounds (3rd round replicates 2nd round)	1287	1287	1287	1287	1287	42	39	129	25	-	127	92	275	83	112	1287
10	4 rounds	1287	1287	1287	1287	1287	81	56	166	6	34	72	83	221	81	196	1287
8	4 rounds	286	286	286	286	286	21	-	20	-	-	27	9	68	27	52	286
8	6 rounds	286	286	286	286	286	21	-	20	-	-	27	9	68	27	52	286

Overall, a top 3 structure is encountered:

- 12 teams and Split Two & Two format;
- 16 teams and 3 rounds (3rd round replicates 1st round) format;
- 14 teams and 3 rounds (3rd round replicates 1st round) format.

Increasing the number of rounds and diminishing the number of teams are indicators that both attendance and competitive balance are benefited. More rounds mean more unpredictable matches as teams with different objectives play against each other more times. A structure composed by 12 teams and a Split Two & Two format had the best results overall. What are the real advantages of embracing a structure like this and why did it stand out from the rest? Key benefits and reasons for success are presented below:

- 32 instead of 34 matchdays give teams 2 additional weeks for preparation for other competitions or more time to rest or practice;
- First half of season is not conclusive as there are fewer games for a team or group of teams to isolate at the top or bottom of the league;
- Second half of season offers decisive matches between teams fighting for the same objectives generating a more balanced league;
- Bottom half of the league may be given an additional incentive as they could not only be fighting to avoid relegation but also for an European spot;
- Top half is fighting for championship and European competitions as matches between these teams are double in this structure;
- Less league teams would allow every match to be televised in proper kick-off schedules;
- Attendances and TV audiences would increase as all matches are important during the season;

Even though each format can provide better results to some extent than the status of the League in terms of members and format, when looking at the top the league for the final standings in each generated combination, it is possible to understand that different champions than those who usually win are hard to be found. Out of the 13676 combinations studied in 15 alternative leagues created, 10 showed a new champion (SC Braga) that had not been placed in the top 3. Those 10 combinations occurred in the 17/18 season in 3 different formats. These results show the dominance of the Big 3. Even with efforts made to increase supporters at stadiums and produce the most competitive league possible, these

teams would eventually continue to be at the top season after season. However, this should not discourage other teams from aiming higher and continue to focus on building competitive teams that could challenge those bigger teams in the end. A new league structure would be helpful to reduce the gap between teams.

6. Conclusion

The main questions of this dissertation are related to finding ways for Primeira Liga to be maximized in terms of both attendance and competitive balance resulting in finding the best structure for Primeira Liga taking into consideration other major European leagues. Mixing both these questions resulted in finding 15 alternative league structures for Primeira Liga. First, by reducing the number of teams composing the league it was expected that no matter what structure was considered, attendances would increase due to the usually near sold out stadiums of the bigger teams that would bend the curve in their favour. When bigger teams visit grounds of weaker teams, these usually tend to be full of supporters, so this statistic was verified by the both of analyses that were performed. More than 99% of the combinations studied saw attendances rise both in number of seats sold and percentage of stadium occupation. This allowed to focus more on the second topic: competitive balance. The first analysis performed, that combined all competitive balance measures regarding goals scored and points obtained, showed that despite some measures saw improvements, it was penalised by aggregating all measures together for a combination to be considered better than the current league structure. Only few combinations saw their results outperform Primeira Liga. This measure is believed to be important after some adjustments had been performed in the league should they occur, in an advanced stage to assess if changes are generating positive results. At the time being this is an aggressive measure to be applied to a league that has never seen any significant change regarding its structure. Nevertheless, the top suggested candidate has a league structure composed by 12 teams and a Split Two & Two format. Despite overall results from all leagues studied being poor, this structure presented twice as much percentage of positive of leagues analysed than the second placed structure (10,2% vs 4,1%). The second performed analysis presented better results and saw one of the simulated leagues with outstanding results. A league composed by 12 teams and a Split Two & Two

format was found to be best again. This structure offers a combination between lower point gaps among the teams (25% of the simulated leagues) and lower goal gaps in matches (40% of the simulated leagues), apart from 100% of better attendances, in almost all simulations. Should this structure be implemented, it would reduce the championship calendar, allow the league to be closer offering more matches between teams with the same strength and make the race for the title, relegation and European spots livelier than ever and in every moment of the season. This would intrinsically generate attendance and media audience, more sponsors and revenues. When trying to find a league structure that could generate new champions apart from chronic winners, this was much harder to perform. None of the 15 structures offered reliable outputs as only 10 out of the 13676 combinations had a new winner (SC Braga) that was not the Big 3. This proves that methods such as Number of Different Title Winners failed immensely as the gap between top teams and the rest of the league members is huge.

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