The Effect of Different Point Systems on European League Positions

Costas J. Efthimiou[1,*], Barry J. Griffiths[1], and David C. Wright[2]

[1] University of Central Florida, Orlando, FL, USA
[2] Oregon State University, Corvallis, OR, USA
Email: costas@ucf.edu (C.J.E.)
*Corresponding author

Abstract—**The introduction of three points for a win in European football during the 1980s and 90s was intended to promote a more attacking style of play and thus more goal scoring and entertainment for viewers. However, subsequent studies showed that the change did not have the desired effect and led to unexpected outcomes such as a rise in foul play, as measured by the number of red cards. In this paper, we investigate the outcome of assigning points in alternate ways. We consider several modifications of both the current system (with 3 points awarded for a win and 1 point for a draw) and the original system (with 2 points awarded for a win and 1 point for a draw), including the effect of awarding bonus points for large margin victories and a deduction of points for large margin defeats. Combinations of these modifications led to 175 different systems being analyzed. Based on data from the top five European leagues, we conclude that solely modifying the point system does not have a significant impact on the standings, with the average change in the ordinal rankings ranging from 0.44 to 0.95 placings per season, and that the final ranking of the teams at the end of the season is largely independent of the point system and based on the relative playing strength of the teams. However, a much greater variation is seen once bonus and penalty points are added for large margin victories and defeats.**

Keywords—**point systems, European football, league positions**

I. INTRODUCTION

The three-point rule was gradually introduced into football leagues worldwide, beginning with the English top division in 1981. The idea behind the change was that by creating a bigger incentive for teams to win their games, there would be fewer drawn matches and more goals scored. By the mid-1990s, every major league had transitioned from the old system that gave teams two points for a win. However, few studies substantiate the original rationale for implementing the three-point rule. Among those, Dilger and Geyer [1] looked at data from German football covering the periods ten years before and ten years after the rule change. The percentage of league games that ended in a draw decreased significantly, even when compared with cup data. This was in line with the hypothesis that a greater reward for winning would decrease the number of drawn games. However, the authors also noted that the goal difference in decisive games was reduced, as teams appeared to be more concerned with protecting their lead rather than adding to it. Moschini [2] tested a similar hypothesis using a larger dataset that spanned 30 years and 35 countries. The results supported the notion that the three-point rule led to a statistically significant increase in the expected number of goals (up 8.5%) and a decrease in the proportion of drawn matches (down 16.2%).

To the contrary, there are many studies such as that by Hon and Parinduri [3] that refute the assertion that the three-point rule leads to more exciting play and does not work as FIFA intended. Guedes and Machado [4] conducted one of the earliest studies, using data from Portugal to show that when the asymmetry between opposing teams is large enough, an increase in the reward for victory induces the weaker team to play more defensively, rather than the intended opposite. This was substantiated by Dewenter [5], who also looked at the effect of the three-point rule in the Portuguese top division and found (even more so than the results produced in [4]) that the empirical evidence supported the hypothesis that matches have seen a reduction in the number of goals scored since the advent of the three-point rule. He found this to be true regardless of whether the home or away teams are considered, but a follow-up study by Dewenter and Namini [6] found that increasing the rewards for a victory induces the home team to play less offensively due to the existence of a home bias, but not the away team, who adopt a more attacking strategy. This was confirmed by Duhautois and Eyssautier [7] who looked at data from France's Ligue 1. Fernandez-Cantelli and Meeden [8] went further and analysed data from ten European countries, finding little evidence to support either the hypothesis that the three-point system led to increased scoring or the hypothesis that it led to fewer draws. Half the countries did see an increase in scoring after the change, but the others saw a decrease. Six of the ten had fewer drawn games, but only Turkey and Italy saw significant decreases. The authors attributed this to the fact that no matter what the state of the game and the relative strengths of the teams, it is always in the best interest of one team to try to limit the likelihood of a goal, with the only exception being when the teams are of equal ability and the scores are level.

Shepotylo [9] speculated that the potential danger of the new rule is that it penalizes "quality" drawn games and encourages teams to collude in order to maximize the expected number of points. He concluded that the new system of points was beneficial for traditionally defensive leagues such as Serie A in Italy, as it promoted a more attacking style of play and increased the number of goals. However, he also alluded to the possibility that the rule change could lead to more corruption and manipulation of the outcomes of games – which soon proved prophetic given the 2006 match fixing scandal in Italy that led to significant punishments for many of the top teams, most notably Juventus, who were relegated to Serie B. Shepotylo [10] published a second study which found that teams who had previously relied more heavily on tactics to produce a drawn game dramatically changed their behaviour towards a more

attacking style in away games, considerably reducing the probability of a draw. However, even though he found that the three-point rule significantly reduced the proportion of draws, it did not bring more goals into the game since the increased rewards of scoring when the scores were level was offset by the increased incentive to defend the current score when one team led.

In addition to the studies already mentioned, which focused on results and goals scored, there have been more nuanced analyses that have looked at the unintended consequences of the three-point rule. Palacios-Huerta [11] found that although teams increased their offensive effort as a result of more points being awarded for a win, it also increased foul play, resulting in no net change in scoring. They also noted that when ahead, teams became more conservative, increasing the number of defenders, scoring fewer goals, and allowing fewer attempts to score by their opponents. Corral *et al.* [12] tested Lazear's broad hypothesis [13], whereby if rewards were dependent solely on the relative performance, then an increase in the rewards would incentivize players to engage in foul play to reduce the output of their rivals. They found, consistent with the hypothesis, that teams in a winning position were more likely to commit offences punishable by dismissal of a player after the implementation of the three-point system. Another unintended consequence was considered by Soto-Valero and Pic [14] who looked how the points change has affected competitiveness in Spain's top division. They found that the overall competitive balance decreased after the adoption of the new scoring system. However, the impact was not the same for all teams, being more significant for top teams and less significant for teams at the bottom.

In this study, we look at the effect that different point allocation systems would have had on the final league positions in five countries over the twenty seasons from 1999–2000 to 2019–2020. This not only puts the effect of the three-point rule into a tangible context, but also allows us to see if other proposed systems would have changed the final outcomes. Such alterations have been considered to a lesser extent in the past. Halicioglu [15] looked at three alternatives to the current (3-1-0) system and the old (2-1-0) system. He found that competitive balance in Europe's leading five leagues is maximized using a (3-2-1) system, based on a seasonal coefficient variation arising from end-of-season points to measure the competitiveness in each country. Bring and Thuresson [16] cite an example from Spain's La Liga in 2008–09 where the scoring system may have influenced the relegated teams and found that the two-point system provided a slightly better correlation with scoring intensity than the three-point system. However, they also found that both were better than fictitious systems that they created involving 1.1 or 10 points for a win.

In addition, we consider reward and penalty systems whereby teams are given additional points for a large margin of victory (defined as three more goals than the opposing team) or a very large margin of victory (defined as five more goals than the opposing team), with penalty points deducted from teams losing by the same margins. A similar system has been used in rugby union tournaments for several years, with the effect that more points are scored at the end of the game due to the increased reward. A similar analysis looking at

world football was conducted by Fernandez-Cantelli and Meeden [8], who considered five different point distribution systems incorporating rewards and penalties for games ending with a large margin of victory (and no points awarded to either team if the game is drawn). They analyzed how teams should react to the changes from a mathematical viewpoint during the different phases of the game but admitted that the complexity of their systems makes them difficult to realistically implement. Likewise, Riedl *et al.* [17] looked at five specific point systems used in leagues around the world (three of which included bonus or penalty points) to test the theory that teams will only push for a win rather than accepting a draw if the potential gain of points is at least 2.25 times greater than the potential loss. They looked to see if the percentage of drawn games decreases significantly once the ratio exceeds 2.25 and found that teams were more loss averse than previously thought, with sporting considerations often superseding what statistical theory would predict. They suggested that a 4-1-0 system might incentivize teams to push for a win, but that the risk of match fixing would increase as a result.

In this paper we consider a much wider range of bonus point systems than those discussed above, using only integer values to simplify the practicalities of implementation, with the number of points gained by a team from one game ranging from 6 to −3. We look at how the different systems would have retrospectively altered the league positions in the top five European leagues and consider the effect on whether they would have produced a different champion, different teams qualifying for the Champions League by finishing in the top four positions or being relegated by finishing in the bottom three positions.

II. METHOD

Data was gathered from the top division of the five most prominent leagues in Europe: England, Spain, Germany, Italy, and France. The data were used to compile the results from each game played during a twenty-year period between the 1999–2000 season and the 2019–2020 season. Using a data reduction pipeline in Python we calculated point tallies and final positions by considering the current three-point system, the old two-point system, and various other systems proposed by researchers and football organizations, along with others that we included, resulting in 175 different systems being considered.

In order to represent each system, we initially created a six-digit tuple, where the first three digits represent the points awarded to the home team for a victory, draw, or loss, and the last three digits represent the points awarded to the away team for a victory, draw, or loss. So henceforth, the original two-point system will be denoted by (2,1,0,2,1,0) and the current three-point system will be denoted by (3,1,0,3,1,0).

The metric used to compare the difference between the different point allocations systems was the average change in the ordinal ranking (see Appendix, Table A1). For example, if a team finished fourth using one point system and sixth using another, this would be a change of 2 places. (Note that a team moving from fourth to second would also be a change of 2 points, rather than −2, as the latter would result in the average change always being zero when all the teams are considered and violate the requirements of symmetry and

transitivity necessary for a mathematical metric.) In addition to finding the average change in ordinal ranking, we also computed the average number of seasons where the winner changed using each point system, the average number of teams that moved out to the top four positions compared with the current three-point system, and the average number of teams that moved out of the bottom three (see Appendix, Tables A2–A4).

In addition to the modifications of the base point system, we also considered alternative schemes whereby teams were awarded or penalized additional points based on the margin of victory or defeat in each game. The goal differential scheme adds four more digits to the six-digit tuple described above, with the digits (in bold) corresponding to the bonus points awarded to the winning team for a very high goal differential victory (five goals or more), the penalty points awarded to the losing team for a very high goal differential loss (five goals or more), the bonus points awarded to the winning team for a high goal differential win (three or four goals), and the penalty points awarded to the losing team for a high goal differential loss (three or four goals). For example, the system yielding the highest difference from the current system was (2,1,1,2,1,1,2,−2,1,−1). This indicates that two points are awarded for a win (either at home or away), one point is awarded for a draw or a defeat (either at home or away), with a bonus and penalty of two points if the margin of victory is five goals or more, and a bonus and penalty of one point if the margin of victory is three of four goals.

III. Results

The data analysis shows that many of the alternative point systems considered have a minimal effect on the ordinal rankings of the teams in the five leading European leagues. These modified point systems are presented as a sequence of digits, the first four of which correspond to the number of points awarded for home wins, home draws, away wins, and away draws. The original two-point system (with a corresponding 6-tuple of (2,1,0,2,1,0), along with the (3,1,0,4,1,0) and (3,1,0,4,2,0) alternatives led to an average change of approximately 0.5 placings, meaning that on average each team would finish only half a place higher or lower in the table at the end of the season relative to the current 3-1-0 system. It is interesting to note for all three of these systems the French and Spanish leagues yield the highest values, meaning that the placings would have seen the most fluctuation in those countries (see Fig. 1 and Table 1).

The other point systems considered, namely the (3,2,0,3,2,0) and (3,2,0,4,2,0) systems, produced slightly higher values when considering the average difference in final placing. This was true in all five countries, with the biggest differences again being found in France and Spain; however, the average change when considering all the countries was less than one placing.

In addition to the modifications of the base point system, we also considered alternate schemes whereby teams were awarded or penalized additional points based on the margin of victory or defeat in each game. This bonus point scheme is presented as a four-digit sequence, with the digits corresponding to a very high goal differential win, a very high goal differential loss, a high goal differential win, and a

high goal differential loss. For the purpose of this paper, we considered a very high goal differential to be greater than or equal to five goals and a high goal differential to be three or four goals. We also considered schemes whereby teams were penalized based on heavy defeats in a similar manner using a two-digit sequence corresponding to home and away losses, respectively. The combination of modifications to the base system along with the bonus points and penalty points yielded 175 systems that were considered (see Tables A1–A4 in the Appendix).

After including these perturbations to the base systems, we found that the final league placings fluctuated far more, with the (2,1,1,2,1,1,2,−2,1,−1) system yielding the highest average change in ordinal ranking of 1.39 placings per team each season. In fact, the top seven systems ranked by the amount of fluctuation are perturbations of the (2,1,0,2,1,0) base system, and the results generally showed that assigning bonus points based on margin of victory had a bigger effect on the rankings than merely changing the points awarded for wins, losses, and draws.

We also explored the changes to the top team (the champion), the composition of the top 4 teams (who typically qualify for the Champions League during the following season), and the three teams at the bottom (who are typically relegated or participate in relegation playoff games). We again found that there is little difference in the placings when the different systems are considered. Before including the effect of bonus and penalty points, the average change to the team finishing top under the current system ranged between 0.01 places and 0.34 places per team each season, with the vast majority (92%) of the systems considered producing an average of 0.20 placings or less. This indicates that altering the point system will generally not alter the team that comes out on top. Similarly, with the teams finishing in the top 4 places under the current system. The average number of teams that would have left the top 4 when compared with the current system ranged between 0.00 and 0.44 teams per season, with almost all (93%) of the systems considered producing an average difference of 0.3 teams or less. Looking at the three teams finishing at the bottom of the league under the current system there was slightly more variation when we considered the different point systems, with the average change ranging between 0.02 teams and 0.88 teams. Again, a preponderance (91%) of the systems considered produced an average difference of 0.7 teams or less.

It was noticeable that a much greater effect on league placings was seen when bonus points were awarded for large-margin victories and a deduction of penalty points for large-margin defeats. As mentioned, no system without bonus and penalty points produced an average change of league positions greater than 1 placing per team in all five countries (see Table 1), but there were 42 systems involving bonus and penalty points that saw an average fluctuation of one placing per team or more, including the top 9 systems listed in Table 2. The fluctuations were greatest in France and Spain, with a maximum average change in the ordinal rankings of 1.62 places per team. Similarly, when considering the top 4 places, the top 50 systems as ranked by the average fluctuation per team involved bonus and penalty points, though even here, the average number of teams moving out of the top 4 remained very low, with the

maximum average value per season across the five countries being 0.19 (see Appendix, Table A3). For the three teams finishing at the bottom of each league, the top 100 systems as ranked by the average number of teams moving out of the bottom 3 involved bonus and penalty points, though only 15 systems resulted in an average across all five countries of more than 0.5 teams per season (see Appendix, Table A4).
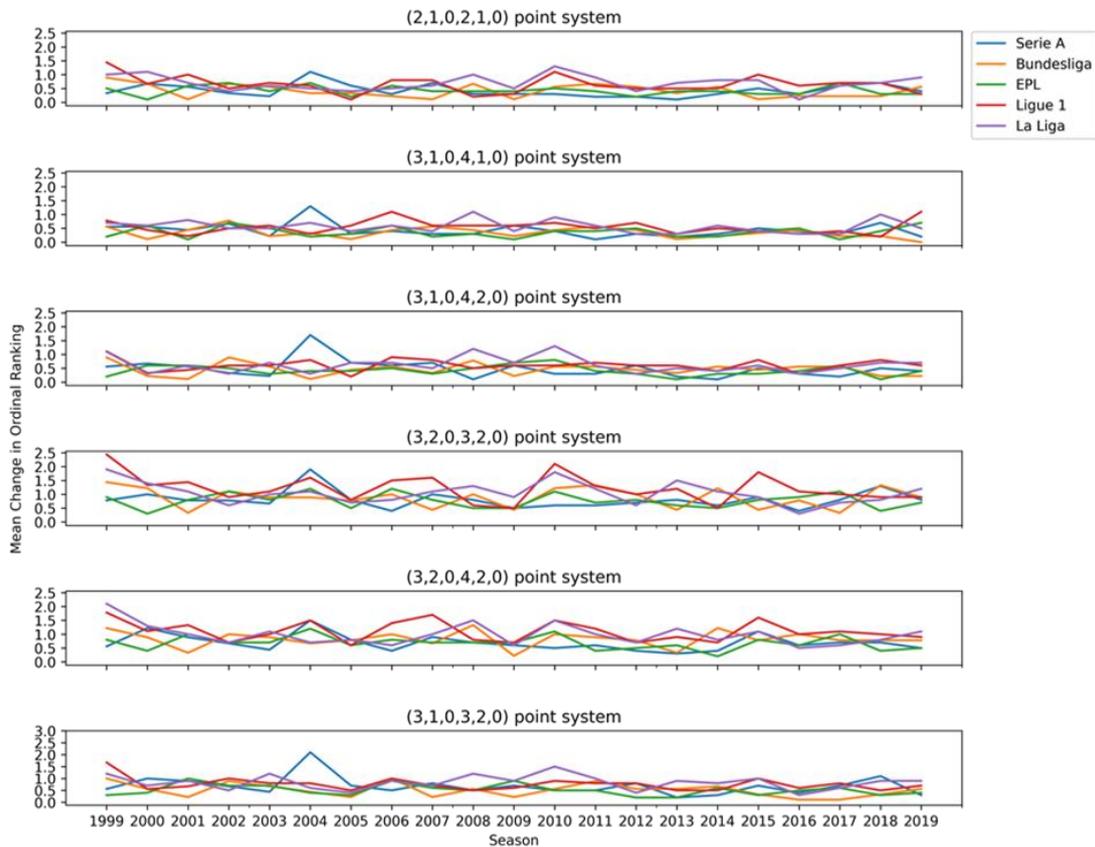
Fig. 1. Line graphs showing the average change in ordinal ranking per team in the top five European leagues when adopting six alternative point systems compared with the current (3,1,0,3,1,0) system (Italy – Blue, Germany – Orange, England – Green, France – Red, Spain – Purple).

Table 1. Average change in ordinal rankings per team in the top five European leagues when adopting six alternate point systems compared with the current (3,1,0,3,1,0) system (standard deviations in parentheses)

Point System	Italy	Germany	England	France	Spain	Overall
(2,1,0,2,1,0)	0.40 (0.19)	0.41 (0.24)	0.40 (0.31)	0.65 (0.29)	0.59 (0.19)	0.49 (0.12)
(3,1,0,4,1,0)	0.47 (0.30)	0.34 (0.19)	0.35 (0.24)	0.54 (0.23)	0.52 (0.22)	0.44 (0.09)
(3,1,0,4,2,0)	0.52 (0.36)	0.46 (0.23)	0.42 (0.21)	0.61 (0.26)	0.62 (0.17)	0.53 (0.09)
(3,2,0,3,2,0)	0.79 (0.31)	0.88 (0.36)	0.78 (0.50)	1.22 (0.40)	1.07 (0.26)	0.95 (0.19)
(3,2,0,4,2,0)	0.67 (0.29)	0.83 (0.28)	0.68 (0.36)	1.11 (0.36)	0.92 (0.26)	0.84 (0.18)
(3,1,0,3,2,0)	0.68 (0.40)	0.51 (0.28)	0.51 (0.23)	0.76 (0.27)	0.83 (0.30)	0.66 (0.15)

Table 2. Average change in ordinal ranking per team in the top five European leagues for the top nine bonus point systems when compared with the current (3,1,0,3,1,0) system (standard deviations in parentheses)

Point System	Italy	Germany	England	France	Spain	Overall
(2,1,1,2,1,1,2,−2,1,−1)	1.17 (0.39)	1.29 (0.42)	1.30 (0.40)	1.58 (0.48)	1.62 (0.33)	1.39 (0.20)
(2,1,1,2,1,1,1,−1,1,−1)	1.06 (0.32)	1.18 (0.45)	1.22 (0.41)	1.51 (0.36)	1.55 (0.38)	1.30 (0.21)
(2,1,0,2,1,1,2,−2,1−1)	1.03 (0.30)	1.21 (0.37)	1.16 (0.34)	1.45 (0.48)	1.56 (0.39)	1.28 (0.22)
(2,1,1,2,1,1,2,0,1,0)	1.12 (0.31)	1.24 (0.39)	1.20 (0.35)	1.42 (0.37)	1.35 (0.32)	1.27 (0.12)
(2,1,0,2,1,1,1,−1,1,−1)	0.97 (0.37)	1.10 (0.34)	1.14 (0.30)	1.43 (0.41)	1.52 (0.34)	1.23 (0.23)
(2,1,1,2,1,1,1,0,1,0)	1.07 (0.33)	1.17 (0.40)	1.13 (0.35)	1.41 (0.37)	1.31 (0.29)	1.22 (0.14)
(2,1,0,2,1,1,2,0,1,0)	1.00 (0.35)	1.08 (0.37)	1.09 (0.28)	1.37 (0.30)	1.31 (0.42)	1.17 (0.16)
(3,2,−1,3,2,1,1,−1,1,−1)	0.99 (0.32)	1.17 (0.38)	0.97 (0.32)	1.39 (0.56)	1.32 (0.41)	1.17 (0.19)
(3,2,−1,3,2,1,2,−2,1−1)	0.97 (0.37)	1.18 (0.38)	0.99 (0.31)	1.37 (0.53)	1.31 (0.39)	1.17 (0.18)

IV. Discussion

The results show that retrospectively altering the point system without awarding additional points based on the margin of victory would have had little effect on league placings. None of the systems that were explored saw the average change in league placings altered by more than one place per team (see Appendix, Table A1). This indicates that the final ranking of the teams at the end of the season is largely independent of the point system and can be assumed to be based instead on the relative playing strength of the teams. However, the primary reason why we cannot read too much into this is the obvious fact that the results don't consider how teams would alter their strategy to factor in the altered point systems. For example, when the Bulgarian league temporarily awarded no points to either team for a scoreless draw starting in 1984, it had the immediate effect of 0.52 more goals per game being scored, with the percentage of games that ended scoreless falling from 8.9% to 2.6% (with only 4 such games during the 1986–1987 season).

There was a much greater effect on league placings when bonus and penalty points were factored in, and so if this were implemented, we might expect that it would lead to an immediate increase in the total number of goals scored and the goal differential per game. However, these assumptions were also made prior to the implementation of the three-point rule, and there is a lot of evidence to suggest that the reality turned out to be different, with unforeseen consequences that did not enhance the game. Even if the long-term effect is as we expect, Aylott and Aylott [18] alluded to the fact that changes to the rules can take several seasons to be fully incorporated into the strategies employed.

Given the popularity of football around the world, and attention it generates, it is certain that any changes to the point system would be subject to immense scrutiny and discussion. While games with more goals tend to be viewed as more enjoyable by spectators, and the enhanced prospect of more goals at the end of games might keep television viewers from losing interest, it is questionable whether a 6-1 scoreline should be viewed as being preferable to 3-1, and the inclusion of bonus and penalty points could lead to more outcomes whereby both teams are dissatisfied with the result. Given that the sport is enjoyed by countless children, it is also open to debate whether large margin victories should be encouraged and strived for. At the professional level, it would certainly alter the substitution patterns of coaches whose team is leading, as they would be more likely to introduce attacking players at the end of a game to gain the bonus points on offer. However, given the lop-sided goal differences already enjoyed by the marquee teams at the top of the five main European leagues, any incentive to score more goals could dilute the competitive balance still further, lead to more injuries due to greater effort being given at the end of games, and reduce the playing opportunities for younger squad members when the result of the game has already been determined. Weather conditions and the quality of the playing surface would also become bigger factors if teams tried to win by enhanced margins.

V. Conclusion

By considering a large number of different systems, we have shown that when points are awarded in ways that deviate from the current three-point system without the added proviso of bonus and penalty points for large margins of victory and there is minimal effect on the final league placings. It rarely alters the teams that finish as champions and has little effect on the teams that make up the top four, and hence qualify for the Champions League. The effect on the teams that finish in the bottom three, and hence subject to relegation is slightly larger, but not markedly so. However, the effects are shown to be much more significant when points are added or deducted based on the margin of victory, and so should be considered when national associations indicate a willingness to deviate from their current system. As we have also alluded to, it would almost certainly have an impact on the way that teams approach the game strategically, both beforehand and while it is ongoing, and that there may be unintended negative consequences if teams continue to strive for bonus points once the result of the game is beyond doubt, such as a greater number of injuries and red cards. Further work could be done to explain the differences seen between countries, and to explore how the philosophy and game strategies of teams might be altered if a large margin of victory is rewarded, with examples from other sports such as rugby union being a natural starting point. However, the consequences brought about by the former change from the two-point system to the three-point system should serve as a warning that any future changes might not have the impact that national associations desire.

Appendix

The four tables below display a more detailed analysis of the bonus point and penalty point systems that were considered in this study. Table A1 shows the average ordinal ranking change per team in the top 5 European leagues during the 20-year period considered. Table A2 shows the average number of seasons where each specified point system would have produced a different champion. Table A3 shows the average number of teams per season that would have finished out of the top four positions compared with their actual finishing position. Table A4 shows the average number of teams per season that would have finished out of the bottom three positions compared with the actual finishing position.

Table A1. Average change in the ordinal rankings per team in the top five European leagues when adopting different bonus point systems compared with the current (3,1,0,3,1,0) system (standard deviations in parentheses)

Point System	Italy	Germany	England	France	Spain	Overall
(2,1,1,2,1,1,2,−2,1,−1)	1.17 (0.39)	1.29 (0.42)	1.30 (0.40)	1.58 (0.48)	1.62 (0.33)	1.39 (0.20)
(2,1,1,2,1,1,1,−1,1,−1)	1.06 (0.32)	1.18 (0.45)	1.22 (0.41)	1.51 (0.36)	1.55 (0.38)	1.30 (0.21)
(2,1,0,2,1,1,2,−2,1,−1)	1.03 (0.30)	1.21 (0.37)	1.16 (0.34)	1.45 (0.48)	1.56 (0.39)	1.28 (0.22)
(2,1,1,2,1,1,2,0,1,0)	1.12 (0.31)	1.24 (0.39)	1.20 (0.35)	1.42 (0.37)	1.35 (0.32)	1.27 (0.12)
(2,1,0,2,1,1,1,−1,1,−1)	0.97 (0.37)	1.10 (0.34)	1.14 (0.30)	1.43 (0.41)	1.52 (0.34)	1.23 (0.23)
(2,1,1,2,1,1,1,0,1,0)	1.07 (0.33)	1.17 (0.40)	1.13 (0.35)	1.41 (0.37)	1.31 (0.29)	1.22 (0.14)
(2,1,0,2,1,1,2,0,1,0)	1.00 (0.35)	1.08 (0.37)	1.09 (0.28)	1.37 (0.30)	1.31 (0.42)	1.17 (0.16)
(3,2,−1,3,2,−1,1,−1,1,−1)	0.99 (0.32)	1.17 (0.38)	0.97 (0.32)	1.39 (0.56)	1.32 (0.41)	1.17 (0.19)
(3,2,−1,3,2,−1,2,−2,1,−1)	0.97 (0.37)	1.18 (0.38)	0.99 (0.31)	1.37 (0.53)	1.31 (0.39)	1.17 (0.18)
(3,2,−1,3,2,−1,0,0,0,0)	0.97 (0.35)	1.13 (0.38)	0.96 (0.29)	1.41 (0.52)	1.23 (0.42)	1.14 (0.19)
(3,2,−1,3,2,0,2,−2,1,−1)	0.92 (0.32)	1.13 (0.40)	0.94 (0.27)	1.36 (0.50)	1.35 (0.43)	1.14 (0.21)
(2,1,0,2,1,1,1,0,1,0)	0.99 (0.34)	1.03 (0.34)	1.05 (0.26)	1.30 (0.26)	1.31 (0.44)	1.14 (0.15)
(3,2,−1,3,2,−1,2,0,1,0)	0.95 (0.33)	1.09 (0.42)	0.95 (0.31)	1.38 (0.52)	1.23 (0.38)	1.12 (0.18)
(3,2,−1,3,2,0,1,−1,1,−1)	0.90 (0.33)	1.11 (0.39)	0.91 (0.24)	1.36 (0.49)	1.30 (0.44)	1.12 (0.21)
(3,2,−1,3,2,−1,1,0,1,0)	0.95 (0.33)	1.07 (0.42)	0.95 (0.33)	1.36 (0.53)	1.22 (0.39)	1.11 (0.18)
(3,2,−1,3,2,0,0,0,0,0)	0.96 (0.39)	1.03 (0.39)	0.94 (0.26)	1.34 (0.55)	1.22 (0.45)	1.10 (0.17)
(3,2,0,3,2,1,2,−2,1,−1)	0.83 (0.38)	1.09 (0.41)	0.95 (0.32)	1.27 (0.49)	1.32 (0.38)	1.09 (0.21)
(2,1,−1,2,1,0,2,−2,1,−1)	0.83 (0.34)	1.09 (0.41)	0.95 (0.32)	1.27 (0.49)	1.30 (0.38)	1.09 (0.20)
(2,1,−1,2,1,−1,2,−2,1,−1)	0.88 (0.44)	1.10 (0.38)	0.92 (0.30)	1.22 (0.48)	1.31 (0.36)	1.09 (0.19)
(3,2,0,3,2,0,2,−2,1,−1)	0.85 (0.43)	1.10 (0.38)	0.92 (0.30)	1.22 (0.48)	1.31 (0.34)	1.08 (0.20)
(2,1,0,2,1,0,2,−2,1,−1)	0.85 (0.35)	1.09 (0.38)	0.99 (0.36)	1.14 (0.43)	1.30 (0.32)	1.07 (0.16)
(3,2,−1,3,2,0,2,0,1,0)	0.87 (0.32)	1.03 (0.43)	0.93 (0.24)	1.32 (0.48)	1.19 (0.46)	1.07 (0.19)
(3,2,0,3,2,1,1,−1,1,−1)	0.83 (0.37)	1.05 (0.35)	0.90 (0.30)	1.23 (0.44)	1.30 (0.40)	1.06 (0.20)
(2,1,−1,2,1,0,1,−1,1,−1)	0.82 (0.37)	1.05 (0.35)	0.90 (0.30)	1.23 (0.44)	1.30 (0.40)	1.06 (0.20)
(2,1,−1,2,1,−1,1,−1,1,−1)	0.87 (0.38)	1.06 (0.36)	0.87 (0.31)	1.22 (0.50)	1.26 (0.40)	1.06 (0.19)
(3,2,0,3,2,0,1,−1,1,−1)	0.84 (0.36)	1.06 (0.36)	0.87 (0.31)	1.22 (0.50)	1.28 (0.38)	1.06 (0.20)
(3,2,1,3,2,1,2,−2,1,−1)	0.80 (0.38)	1.09 (0.38)	0.99 (0.36)	1.14 (0.43)	1.26 (0.32)	1.06 (0.17)
(3,2,−1,4,2,−1,2,−2,1,−1)	0.86 (0.40)	1.09 (0.37)	0.88 (0.25)	1.28 (0.50)	1.18 (0.39)	1.06 (0.18)
(3,2,−1,3,2,0,1,0,1,0)	0.87 (0.33)	1.02 (0.42)	0.90 (0.28)	1.31 (0.48)	1.17 (0.47)	1.05 (0.19)
(3,1,1,3,1,1,2,0,1,0)	0.96 (0.30)	0.95 (0.29)	0.93 (0.28)	1.25 (0.37)	1.11 (0.30)	1.04 (0.14)
(3,1,1,4,1,1,2,0,1,0)	0.93 (0.30)	0.94 (0.31)	0.91 (0.35)	1.23 (0.27)	1.17 (0.34)	1.04 (0.15)
(3,1,1,4,1,1,1,0,1,0)	0.93 (0.30)	0.93 (0.30)	0.90 (0.35)	1.22 (0.26)	1.17 (0.32)	1.03 (0.15)
(3,1,1,3,1,1,2,−2,1,−1)	0.90 (0.32)	0.94 (0.35)	0.94 (0.33)	1.22 (0.34)	1.16 (0.32)	1.03 (0.15)
(3,2,−1,4,2,−1,0,0,0,0)	0.88 (0.35)	1.02 (0.36)	0.88 (0.30)	1.25 (0.45)	1.12 (0.38)	1.03 (0.16)
(3,2,−1,4,2,−1,1,−1,1,−1)	0.83 (0.40)	1.05 (0.38)	0.85 (0.27)	1.25 (0.48)	1.16 (0.39)	1.03 (0.19)
(3,1,1,3,2,1,2,−2,1,−1)	0.88 (0.29)	0.97 (0.36)	0.94 (0.34)	1.18 (0.40)	1.15 (0.24)	1.03 (0.13)
(3,1,1,4,1,1,2,−2,1,−1)	0.90 (0.41)	0.90 (0.34)	0.93 (0.28)	1.21 (0.27)	1.16 (0.25)	1.02 (0.15)
(2,1,0,2,1,0,1,−1,1,−1)	0.82 (0.33)	1.04 (0.38)	0.90 (0.33)	1.07 (0.44)	1.25 (0.34)	1.02 (0.16)
(3,1,1,4,1,1,0,0,0,0)	0.97 (0.33)	0.87 (0.26)	0.91 (0.35)	1.14 (0.32)	1.18 (0.33)	1.01 (0.14)
(3,1,1,3,1,1,1,0,1,0)	0.93 (0.30)	0.94 (0.30)	0.89 (0.28)	1.24 (0.35)	1.06 (0.29)	1.01 (0.14)
(3,2,1,3,2,1,1,−1,1,−1)	0.78 (0.36)	1.04 (0.38)	0.90 (0.33)	1.07 (0.44)	1.22 (0.34)	1.00 (0.17)
(3,1,1,4,1,1,1,−1,1,−1)	0.90 (0.42)	0.85 (0.33)	0.88 (0.27)	1.22 (0.25)	1.16 (0.23)	1.00 (0.18)
(3,1,1,3,1,1,1,−1,1,−1)	0.84 (0.23)	0.89 (0.39)	0.93 (0.31)	1.18 (0.29)	1.15 (0.24)	1.00 (0.16)
(3,2,−1,4,2,0,1,−1,1,−1)	0.81 (0.27)	1.03 (0.36)	0.77 (0.27)	1.19 (0.49)	1.16 (0.42)	0.99 (0.19)
(3,2,−1,4,2,0,2,−2,1,−1)	0.76 (0.26)	1.02 (0.40)	0.79 (0.30)	1.22 (0.51)	1.17 (0.39)	0.99 (0.21)

Table A2. Average number of seasons where each specified point system would have produced a different champion compared with the current (3,1,0,3,1,0) system (standard deviations in parentheses)

Point System	Italy	Germany	England	France	Spain	Overall
(2,1,1,2,1,1,2,−2,1,−1)	0.43 (0.51)	0.29 (0.46)	0.29 (0.46)	0.05 (0.22)	0.29 (0.46)	0.27 (0.14)
(2,1,1,2,1,1,2,0,1,0)	0.48 (0.51)	0.29 (0.46)	0.29 (0.46)	0.00 (0.00)	0.24 (0.44)	0.26 (0.17)
(2,1,1,2,1,1,1,−1,1,−1)	0.38 (0.50)	0.24 (0.44)	0.24 (0.44)	0.05 (0.22)	0.33 (0.48)	0.25 (0.13)
(2,1,1,2,1,1,1,0,1,0)	0.43 (0.51)	0.24 (0.44)	0.24 (0.44)	0.00 (0.00)	0.29 (0.46)	0.24 (0.15)
(3,2,1,3,2,1,2,−2,1,−1)	0.38 (0.50)	0.19 (0.40)	0.24 (0.44)	0.14 (0.36)	0.19 (0.40)	0.23 (0.09)
(2,1,0,2,1,0,2,−2,1,−1)	0.33 (0.48)	0.19 (0.40)	0.24 (0.44)	0.14 (0.36)	0.24 (0.44)	0.23 (0.07)
(2,1,0,2,1,1,2,−2,1,−1)	0.33 (0.48)	0.24 (0.44)	0.24 (0.44)	0.00 (0.00)	0.24 (0.44)	0.21 (0.12)
(3,2,1,3,2,1,2,0,1,0)	0.33 (0.48)	0.19 (0.40)	0.19 (0.40)	0.14 (0.36)	0.19 (0.40)	0.21 (0.07)
(3,1,1,3,1,1,2,−2,1,−1)	0.43 (0.51)	0.24 (0.44)	0.10 (0.30)	0.05 (0.22)	0.19 (0.40)	0.20 (0.15)
(2,1,0,2,1,0,2,0,1,0)	0.29 (0.46)	0.19 (0.40)	0.19 (0.40)	0.14 (0.36)	0.19 (0.40)	0.20 (0.05)
(3,2,−1,4,2,−1,0,0,0,0)	0.24 (0.44)	0.14 (0.36)	0.24 (0.44)	0.24 (0.44)	0.14 (0.36)	0.20 (0.05)
(2,1,0,2,1,1,1,−1,1,−1)	0.33 (0.48)	0.19 (0.40)	0.19 (0.40)	0.00 (0.00)	0.29 (0.46)	0.20 (0.13)
(2,1,0,2,1,1,2,0,1,0)	0.29 (0.46)	0.24 (0.44)	0.24 (0.44)	0.00 (0.00)	0.19 (0.40)	0.19 (0.11)
(2,1,0,2,1,1,1,0,1,0)	0.38 (0.50)	0.19 (0.40)	0.14 (0.36)	0.00 (0.00)	0.24 (0.44)	0.19 (0.14)
(3,1,1,3,2,1,2,−2,1,−1)	0.29 (0.46)	0.24 (0.44)	0.19 (0.40)	0.10 (0.30)	0.14 (0.36)	0.19 (0.08)
(3,2,0,3,2,1,2,−2,1,−1)	0.33 (0.48)	0.19 (0.40)	0.14 (0.36)	0.05 (0.22)	0.19 (0.40)	0.18 (0.10)
(3,1,1,3,1,1,2,0,1,0)	0.33 (0.48)	0.24 (0.44)	0.14 (0.36)	0.00 (0.00)	0.19 (0.40)	0.18 (0.12)
(3,1,1,3,2,1,2,0,1,0)	0.29 (0.46)	0.24 (0.44)	0.14 (0.36)	0.05 (0.22)	0.19 (0.40)	0.18 (0.09)
(3,1,−1,3,2,−1,2,−2,1,−1)	0.24 (0.44)	0.14 (0.36)	0.14 (0.36)	0.14 (0.36)	0.24 (0.44)	0.18 (0.05)
(2,1,−1,2,1,−1,2,−2,1,−1)	0.29 (0.46)	0.14 (0.36)	0.14 (0.36)	0.14 (0.36)	0.19 (0.40)	0.18 (0.06)
(3,2,1,4,2,1,2,−2,1,−1)	0.33 (0.48)	0.19 (0.40)	0.10 (0.30)	0.14 (0.36)	0.14 (0.36)	0.18 (0.09)
(2,1,−1,2,1,0,2,−1,1,−1)	0.29 (0.46)	0.19 (0.40)	0.14 (0.36)	0.05 (0.22)	0.19 (0.40)	0.17 (0.09)
(3,1,1,4,1,1,1,−1,1,−1)	0.33 (0.48)	0.19 (0.40)	0.05 (0.22)	0.05 (0.22)	0.24 (0.44)	0.17 (0.12)
(3,1,1,4,1,1,1,0,1,0)	0.33 (0.48)	0.19 (0.40)	0.05 (0.22)	0.00 (0.00)	0.29 (0.46)	0.17 (0.15)
(3,2,0,3,2,0,2,0,1,0)	0.19 (0.40)	0.14 (0.36)	0.14 (0.36)	0.14 (0.36)	0.24 (0.44)	0.17 (0.04)
(3,1,1,4,1,1,2,−2,1,−1)	0.33 (0.48)	0.19 (0.40)	0.10 (0.30)	0.05 (0.22)	0.19 (0.40)	0.17 (0.11)
(3,1,1,4,1,1,2,0,1,0)	0.33 (0.48)	0.19 (0.40)	0.10 (0.30)	0.00 (0.00)	0.24 (0.44)	0.17 (0.13)
(2,1,−1,2,1,−1,1,−1,1,−1)	0.24 (0.44)	0.14 (0.36)	0.14 (0.36)	0.14 (0.36)	0.19 (0.40)	0.17 (0.04)
(3,2,0,3,2,0,2,−2,1,−1)	0.24 (0.44)	0.14 (0.36)	0.14 (0.36)	0.14 (0.36)	0.19 (0.40)	0.17 (0.04)
(2,1,−1,2,1,−1,2,0,1,0)	0.19 (0.40)	0.14 (0.36)	0.14 (0.36)	0.14 (0.36)	0.19 (0.40)	0.16 (0.03)
(3,2,0,4,2,0,2,0,1,0)	0.19 (0.40)	0.19 (0.40)	0.10 (0.30)	0.19 (0.40)	0.14 (0.36)	0.16 (0.04)
(3,1,−1,3,2,−1,1,−1,1,−1)	0.14 (0.36)	0.14 (0.36)	0.14 (0.36)	0.14 (0.36)	0.24 (0.44)	0.16 (0.04)
(3,2,−1,3,2,−1,1,−1,1,−1)	0.24 (0.44)	0.10 (0.30)	0.14 (0.36)	0.19 (0.40)	0.14 (0.36)	0.16 (0.05)
(3,2,0,3,2,0,1,−1,1,−1)	0.19 (0.40)	0.14 (0.36)	0.14 (0.36)	0.14 (0.36)	0.19 (0.40)	0.16 (0.03)
(3,2,0,3,2,1,1,−1,1,−1)	0.29 (0.46)	0.10 (0.30)	0.14 (0.36)	0.05 (0.22)	0.24 (0.44)	0.16 (0.10)
(3,1,1,3,1,1,1,−1,1,−1)	0.29 (0.46)	0.19 (0.40)	0.05 (0.22)	0.05 (0.22)	0.24 (0.44)	0.16 (0.11)
(3,2,−1,3,2,−1,2,−2,1,−1)	0.19 (0.40)	0.14 (0.36)	0.14 (0.36)	0.19 (0.40)	0.14 (0.36)	0.16 (0.03)
(3,2,−1,4,2,−1,2,−2,1,−1)	0.19 (0.40)	0.14 (0.36)	0.14 (0.36)	0.19 (0.40)	0.14 (0.36)	0.16 (0.03)
(2,1,0,2,1,0,1,−1,1,−1)	0.19 (0.40)	0.14 (0.36)	0.14 (0.36)	0.10 (0.30)	0.24 (0.44)	0.16 (0.05)
(3,2,−1,3,2,−1,2,0,1,0)	0.24 (0.44)	0.10 (0.30)	0.14 (0.36)	0.19 (0.40)	0.14 (0.36)	0.16 (0.05)
(3,2,1,3,2,1,1,−1,1,−1)	0.24 (0.44)	0.14 (0.36)	0.14 (0.36)	0.10 (0.30)	0.19 (0.40)	0.16 (0.05)
(3,2,−1,3,2,−1,0,0,0,0)	0.19 (0.40)	0.10 (0.30)	0.19 (0.40)	0.24 (0.44)	0.10 (0.30)	0.16 (0.06)
(3,2,−1,3,2,−1,1,0,1,0)	0.24 (0.44)	0.14 (0.36)	0.14 (0.36)	0.14 (0.36)	0.14 (0.36)	0.16 (0.04)
(3,2,1,3,2,1,1,0,1,0)	0.19 (0.40)	0.14 (0.36)	0.10 (0.30)	0.10 (0.30)	0.24 (0.44)	0.15 (0.06)
(3,2,−1,3,2,0,2,0,1,0)	0.24 (0.44)	0.10 (0.30)	0.14 (0.36)	0.10 (0.30)	0.19 (0.40)	0.15 (0.06)

Table A3. Average number of teams per season that would have finished out of the top four positions compared with their actual finishing position when adopting the specified point systems (standard deviations in parentheses)

Point System	Italy	Germany	England	France	Spain	Overall
(2,1,1,2,1,1,2,0,1,0)	0.29 (0.46)	0.05 (0.22)	0.00 (0.00)	0.33 (0.48)	0.14 (0.36)	0.16 (0.15)
(2,1,1,2,1,1,1,0,1,0)	0.29 (0.46)	0.05 (0.22)	0.00 (0.00)	0.29 (0.46)	0.14 (0.36)	0.15 (0.13)
(2,1,0,2,1,1,2,0,1,0)	0.14 (0.36)	0.19 (0.40)	0.00 (0.00)	0.33 (0.48)	0.05 (0.22)	0.14 (0.13)
(2,1,1,2,1,1,1,−1,1,−1)	0.05 (0.22)	0.10 (0.30)	0.05 (0.22)	0.33 (0.48)	0.19 (0.40)	0.14 (0.12)
(2,1,1,2,1,1,2,−2,1,−1)	0.05 (0.22)	0.10 (0.30)	0.05 (0.22)	0.33 (0.48)	0.19 (0.40)	0.14 (0.12)
(2,1,0,2,1,1,2,−2,1,−1)	0.14 (0.36)	0.10 (0.30)	0.05 (0.22)	0.33 (0.48)	0.05 (0.22)	0.13 (0.12)
(2,1,0,2,1,1,1,−1,1,−1)	0.19 (0.40)	0.10 (0.30)	0.05 (0.22)	0.29 (0.46)	0.05 (0.22)	0.13 (0.10)
(2,1,0,2,1,1,1,0,1,0)	0.19 (0.40)	0.14 (0.36)	0.00 (0.00)	0.29 (0.46)	0.05 (0.22)	0.13 (0.11)
(3,2,0,3,2,0,2,−2,1,−1)	0.10 (0.30)	0.10 (0.30)	0.10 (0.30)	0.24 (0.44)	0.10 (0.30)	0.12 (0.06)
(3,2,−1,3,2,−1,1,0,1,0)	0.14 (0.36)	0.10 (0.30)	0.10 (0.30)	0.19 (0.40)	0.10 (0.30)	0.12 (0.04)
(3,2,0,3,2,1,2,−2,1,−1)	0.10 (0.30)	0.05 (0.22)	0.10 (0.30)	0.29 (0.46)	0.05 (0.22)	0.11 (0.10)
(3,2,−1,3,2,−1,2,−2,1,−1)	0.10 (0.30)	0.10 (0.30)	0.10 (0.30)	0.19 (0.40)	0.10 (0.30)	0.11 (0.04)
(3,1,1,3,1,1,2,0,1,0)	0.19 (0.40)	0.00 (0.00)	0.05 (0.22)	0.24 (0.44)	0.10 (0.30)	0.11 (0.10)
(3,1,−1,3,2,−1,0,0,0,0)	0.24 (0.44)	0.10 (0.44)	0.05 (0.22)	0.14 (0.36)	0.05 (0.22)	0.11 (0.08)
(3,2,0,3,2,1,1,−1,1,−1)	0.14 (0.36)	0.10 (0.30)	0.10 (0.30)	0.19 (0.40)	0.05 (0.22)	0.11 (0.05)
(2,1,−1,2,1,0,2,−2,1,−1)	0.10 (0.30)	0.05 (0.22)	0.10 (0.30)	0.29 (0.46)	0.05 (0.22)	0.11 (0.10)
(2,1,−1,2,1,−1,1,−1,1,−1)	0.05 (0.22)	0.10 (0.30)	0.10 (0.30)	0.24 (0.44)	0.10 (0.30)	0.11 (0.07)
(2,1,−1,2,1,−1,2,−2,1,−1)	0.05 (0.22)	0.10 (0.30)	0.10 (0.30)	0.24 (0.44)	0.10 (0.30)	0.11 (0.07)
(3,2,0,2,2,0,1,−1,1,−1)	0.05 (0.22)	0.10 (0.30)	0.10 (0.30)	0.24 (0.44)	0.10 (0.30)	0.11 (0.07)
(3,2,−1,3,2,0,1,−1,1,−1)	0.14 (0.36)	0.10 (0.30)	0.10 (0.30)	0.19 (0.40)	0.05 (0.22)	0.11 (0.05)
(2,1,−1,2,1,0,1,−1,1,−1)	0.14 (0.36)	0.10 (0.30)	0.10 (0.30)	0.19 (0.40)	0.05 (0.22)	0.11 (0.05)
(3,1,1,4,1,1,0,0,0,0)	0.05 (0.22)	0.24 (0.44)	0.05 (0.22)	0.10 (0.30)	0.10 (0.30)	0.10 (0.08)
(3,2,−1,3,2,−1,0,0,0,0)	0.14 (0.36)	0.10 (0.44)	0.10 (0.30)	0.10 (0.30)	0.10 (0.30)	0.10 (0.02)
(3,1,1,3,1,1,1,0,1,0)	0.19 (0.40)	0.05 (0.22)	0.00 (0.00)	0.24 (0.44)	0.05 (0.22)	0.10 (0.10)
(3,2,−1,3,2,0,2,−2,1,−1)	0.10 (0.30)	0.05 (0.22)	0.10 (0.30)	0.24 (0.44)	0.05 (0.22)	0.10 (0.08)
(3,2,−1,3,2,−1,2,0,1,0)	0.10 (0.30)	0.05 (0.22)	0.10 (0.30)	0.19 (0.40)	0.10 (0.30)	0.10 (0.05)
(3,1,−1,3,2,−1,1,−1,1,−1)	0.05 (0.22)	0.10 (0.30)	0.05 (0.22)	0.24 (0.44)	0.10 (0.30)	0.10 (0.08)
(3,1,1,3,2,1,2,−2,1,−1)	0.14 (0.36)	0.10 (0.30)	0.00 (0.00)	0.24 (0.44)	0.05 (0.22)	0.10 (0.09)
(3,1,−1,3,2,−1,2,−2,1,−1)	0.00 (0.00)	0.10 (0.30)	0.05 (0.22)	0.24 (0.44)	0.10 (0.30)	0.10 (0.09)
(3,1,1,3,2,1,0,0,0,0)	0.24 (0.44)	0.05 (0.22)	0.10 (0.30)	0.05 (0.22)	0.05 (0.22)	0.10 (0.08)
(3,1,0,3,2,1,2,−2,1,−1)	0.14 (0.36)	0.05 (0.22)	0.00 (0.00)	0.29 (0.46)	0.00 (0.00)	0.10 (0.12)
(3,1,1,3,2,1,1,−1,1,−1)	0.19 (0.40)	0.10 (0.30)	0.00 (0.00)	0.19 (0.40)	0.00 (0.00)	0.10 (0.10)
(3,1,0,3,1,1,1,0,1,0)	0.14 (0.36)	0.00 (0.00)	0.00 (0.00)	0.29 (0.46)	0.05 (0.22)	0.10 (0.12)
(3,2,−1,3,2,0,0,0,0,0)	0.19 (0.40)	0.10 (0.44)	0.05 (0.22)	0.10 (0.30)	0.05 (0.22)	0.10 (0.06)
(2,1,0,2,1,1,0,0,0,0)	0.29 (0.46)	0.00 (0.00)	0.00 (0.00)	0.10 (0.30)	0.10 (0.30)	0.10 (0.12)
(3,2,−1,3,2,−1,1,−1,1,−1)	0.00 (0.00)	0.10 (0.30)	0.10 (0.30)	0.19 (0.40)	0.10 (0.30)	0.10 (0.07)
(3,1,0,3,1,1,1,−1,1,−1)	0.10 (0.30)	0.05 (0.22)	0.00 (0.00)	0.24 (0.44)	0.05 (0.22)	0.09 (0.09)
(3,2,0,3,2,0,1,0,1,0)	0.05 (0.22)	0.10 (0.30)	0.10 (0.30)	0.14 (0.36)	0.05 (0.22)	0.09 (0.04)
(3,1,0,3,2,1,1,−1,1,−1)	0.19 (0.40)	0.05 (0.22)	0.00 (0.00)	0.19 (0.40)	0.00 (0.00)	0.09 (0.10)
(2,1,1,2,1,1,0,0,0,0)	0.14 (0.36)	0.14 (0.36)	0.00 (0.00)	0.10 (0.30)	0.05 (0.22)	0.09 (0.06)
(2,1,−1,2,1,−1,1,0,1,0)	0.05 (0.22)	0.10 (0.30)	0.10 (0.30)	0.14 (0.36)	0.05 (0.22)	0.09 (0.04)
(3,1,0,3,2,0,0,0,0,0)	0.24 (0.44)	0.05 (0.22)	0.00 (0.00)	0.10 (0.30)	0.05 (0.22)	0.09 (0.09)
(2,1,0,2,1,0,2,−2,1,−1)	0.10 (0.30)	0.10 (0.30)	0.05 (0.22)	0.19 (0.40)	0.00 (0.00)	0.09 (0.07)
(2,1,0,2,1,0,2,0,1,0)	0.14 (0.36)	0.10 (0.30)	0.05 (0.22)	0.14 (0.36)	0.00 (0.00)	0.09 (0.06)
(3,1,0,3,1,1,2,0,1,0)	0.10 (0.30)	0.00 (0.00)	0.00 (0.00)	0.29 (0.46)	0.05 (0.22)	0.09 (0.12)

Table A4. Average number of teams per season that would have finished out of the bottom three positions compared with the actual finishing position when adopting the specified point systems (standard deviations in parentheses)

Point System	Italy	Germany	England	France	Spain	Overall
(2,1,1,2,1,1,1,0,1,0)	0.71 (0.56)	0.76 (0.54)	0.67 (0.48)	0.81 (0.75)	0.62 (0.67)	0.71 (0.08)
(2,1,1,2,1,1,2,0,1,0)	0.71 (0.46)	0.76 (0.54)	0.67 (0.48)	0.81 (0.75)	0.62 (0.67)	0.71 (0.08)
(2,1,1,2,1,1,2,−2,1,−1)	0.67 (0.48)	0.71 (0.78)	0.57 (0.68)	0.71 (0.64)	0.67 (0.66)	0.67 (0.06)
(3,1,1,3,1,1,2,0,1,0)	0.48 (0.60)	0.76 (0.54)	0.62 (0.50)	0.71 (0.72)	0.52 (0.60)	0.62 (0.12)
(3,1,1,3,1,1,1,0,1,0)	0.48 (0.60)	0.71 (0.56)	0.62 (0.50)	0.76 (0.70)	0.52 (0.60)	0.62 (0.12)
(2,1,0,2,1,1,2,0,1,0)	0.57 (0.60)	0.57 (0.60)	0.52 (0.60)	0.62 (0.59)	0.81 (0.60)	0.62 (0.11)
(2,1,0,2,1,1,2,−2,1,−1)	0.67 (0.66)	0.52 (0.60)	0.48 (0.68)	0.67 (0.48)	0.76 (0.70)	0.62 (0.12)
(2,1,0,2,1,1,1,0,1,0)	0.62 (0.59)	0.52 (0.60)	0.48 (0.60)	0.62 (0.59)	0.81 (0.60)	0.61 (0.13)
(2,1,0,2,1,1,1,−1,1,−1)	0.71 (0.64)	0.29 (0.56)	0.48 (0.60)	0.76 (0.62)	0.76 (0.77)	0.60 (0.21)
(2,1,1,2,1,1,1,−1,1,−1)	0.57 (0.60)	0.67 (0.73)	0.43 (0.60)	0.71 (0.64)	0.62 (0.67)	0.60 (0.11)
(3,1,1,4,1,1,1,0,1,0)	0.38 (0.50)	0.71 (0.46)	0.57 (0.51)	0.81 (0.68)	0.52 (0.68)	0.60 (0.17)
(3,1,1,4,1,1,2,0,1,0)	0.38 (0.50)	0.76 (0.44)	0.57 (0.51)	0.76 (0.70)	0.52 (0.68)	0.60 (0.16)
(3,1,1,4,1,1,0,0,0,0)	0.43 (0.60)	0.57 (0.51)	0.57 (0.51)	0.67 (0.58)	0.52 (0.60)	0.55 (0.09)
(2,1,0,2,1,1,0,0,0,0)	0.67 (0.58)	0.29 (0.46)	0.48 (0.60)	0.57 (0.51)	0.76 (0.70)	0.55 (0.18)
(2,1,−1,2,1,0,0,0,0,0)	0.52 (0.60)	0.38 (0.59)	0.48 (0.60)	0.48 (0.51)	0.62 (0.59)	0.50 (0.09)
(3,1,0,3,1,1,1,0,1,0)	0.48 (0.51)	0.48 (0.51)	0.38 (0.50)	0.52 (0.60)	0.57 (0.68)	0.49 (0.07)
(3,2,0,3,2,1,1,−1,1,−1)	0.43 (0.51)	0.29 (0.46)	0.43 (0.60)	0.57 (0.51)	0.71 (0.64)	0.49 (0.16)
(2,1,−1,2,1,0,1,−1,1,−1)	0.43 (0.51)	0.29 (0.46)	0.43 (0.60)	0.57 (0.51)	0.71 (0.64)	0.49 (0.16)
(3,2,0,3,2,1,0,0,0,0)	0.48 (0.60)	0.38 (0.59)	0.48 (0.60)	0.48 (0.51)	0.62 (0.59)	0.49 (0.09)
(3,1,1,3,1,1,0,0,0,0)	0.43 (0.51)	0.43 (0.51)	0.48 (0.51)	0.52 (0.51)	0.52 (0.60)	0.48 (0.05)
(2,1,−1,2,1,0,2,−2,1,−1)	0.38 (0.50)	0.29 (0.46)	0.48 (0.60)	0.52 (0.51)	0.71 (0.64)	0.48 (0.16)
(3,2,0,3,2,1,2,−2,1,−1)	0.38 (0.50)	0.29 (0.46)	0.48 (0.60)	0.52 (0.51)	0.71 (0.64)	0.48 (0.16)
(3,2,−1,3,2,0,0,0,0,0)	0.48 (0.60)	0.38 (0.50)	0.38 (0.59)	0.48 (0.51)	0.67 (0.58)	0.48 (0.12)
(2,1,1,2,1,1,0,0,0,0)	0.48 (0.60)	0.43 (0.51)	0.48 (0.51)	0.52 (0.51)	0.48 (0.60)	0.48 (0.03)
(3,1,0,3,1,1,2,0,1,0)	0.43 (0.51)	0.48 (0.51)	0.38 (0.50)	0.52 (0.60)	0.57 (0.68)	0.48 (0.08)
(3,1,0,4,1,1,2,0,1,0)	0.38 (0.50)	0.52 (0.51)	0.43 (0.51)	0.52 (0.60)	0.48 (0.60)	0.47 (0.06)
(3,1,1,3,1,1,2,−2,1,−1)	0.43 (0.60)	0.62 (0.67)	0.43 (0.60)	0.48 (0.51)	0.38 (0.67)	0.47 (0.09)
(3,2,−1,3,2,0,2,−2,1,−1)	0.29 (0.46)	0.33 (0.48)	0.48 (0.60)	0.48 (0.51)	0.71 (0.64)	0.46 (0.17)
(3,1,0,4,1,1,1,0,1,0)	0.33 (0.48)	0.52 (0.51)	0.43 (0.51)	0.52 (0.60)	0.48 (0.60)	0.46 (0.08)
(3,1,1,3,1,1,1,−1,1,−1)	0.38 (0.59)	0.43 (0.60)	0.43 (0.51)	0.57 (0.60)	0.48 (0.75)	0.46 (0.07)
(3,1,1,4,1,1,2,−2,1,−1)	0.33 (0.58)	0.57 (0.68)	0.43 (0.51)	0.52 (0.60)	0.43 (0.60)	0.46 (0.09)
(3,2,−1,3,2,0,2,0,1,0)	0.33 (0.58)	0.38 (0.50)	0.38 (0.59)	0.48 (0.51)	0.71 (0.56)	0.46 (0.15)
(3,2,−1,3,2,0,1,−1,1,−1)	0.29 (0.46)	0.33 (0.48)	0.43 (0.60)	0.57 (0.51)	0.67 (0.58)	0.46 (0.16)
(3,1,1,3,2,1,2, −2,1,−1)	0.48 (0.51)	0.43 (0.60)	0.38 (0.59)	0.62 (0.50)	0.38 (0.67)	0.46 (0.10)
(2,1,0,2,1,0,2,−2,1,−1)	0.33 (0.48)	0.33 (0.58)	0.48 (0.51)	0.52 (0.60)	0.57 (0.51)	0.45 (0.11)
(3,2,−1,3,2,−1,2,−2,1,−1)	0.38 (0.50)	0.38 (0.50)	0.43 (0.51)	0.38 (0.50)	0.67 (0.58)	0.45 (0.12)
(3,2,−1,3,2,−1,2,0,1,0)	0.38 (0.50)	0.38 (0.50)	0.38 (0.50)	0.43 (0.51)	0.67 (0.58)	0.45 (0.12)
(3,2,1,3,2,1,2,−2,1,−1)	0.33 (0.48)	0.33 (0.58)	0.48 (0.51)	0.52 (0.60)	0.57 (0.51)	0.45 (0.11)
(3,1,1,4,2,1,1,0,1,0)	0.43 (0.60)	0.57 (0.51)	0.48 (0.51)	0.48 (0.68)	0.29 (0.46)	0.45 (0.10)
(3,1,1,3,2,1,2,0,1,0)	0.43 (0.51)	0.48 (0.51)	0.33 (0.48)	0.67 (0.66)	0.33 (0.58)	0.45 (0.14)
(3,1,1,4,2,1,2,0,1,0)	0.43 (0.60)	0.52 (0.51)	0.52 (0.51)	0.48 (0.68)	0.29 (0.46)	0.45 (0.10)
(3,2,−1,3,2,−1,1,0,1,0)	0.43 (0.51)	0.38 (0.50)	0.38 (0.50)	0.43 (0.51)	0.62 (0.59)	0.45 (0.10)
(3,2,−1,3,2,0,1,0,1,0)	0.33 (0.58)	0.38 (0.50)	0.38 (0.59)	0.48 (0.51)	0.67 (0.58)	0.45 (0.13)
(2,1,−1,2,1,0,2,0,1,0)	0.33 (0.48)	0.38 (0.59)	0.33 (0.58)	0.52 (0.51)	0.62 (0.59)	0.44 (0.13)
(3,1,0,3,1,1,2,−2,1,−1)	0.43 (0.51)	0.24 (0.54)	0.38 (0.50)	0.52 (0.51)	0.62 (0.59)	0.44 (0.14)

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Costas Efthimiou came up with the idea for the project and led meetings of the group; David Wright analyzed the data; Barry Griffiths wrote the paper; all authors have approved the final version.

REFERENCES

[1] A. Dilger and H. Geyer, "Are three points for a win really better than two? A comparison of German soccer league and cup games," *Journal of Sports Economics*, vol. 10, no. 3, pp. 305–318, 2009.

[2] G. Moschini, "Incentives and outcomes in a strategic setting: The 3-points-for-a-win system in soccer," *Economic Inquiry*, vol. 48, no. 1, pp. 65–79, 2010.

[3] L.Y. Hon and R. Parinduri, "Does the three-point rule make soccer more exciting? Evidence from a regression discontinuity design," *Journal of Sports Economics*, vol. 17, no. 4, pp. 377–395, 2016.

[4] J.C. Guedes and F. Machado, "Changing rewards in contests: Has the three-point rule brought more offense to soccer?" *Empirical Economics*, vol. 27, pp. 607–630, 2002.

[5] R. Dewenter, "Raising the scores? Empirical evidence on the introduction of the three-point rule in Portuguese football (Discussion Paper No. 22)," Hamburg, Germany: Department of Economics, University of the Federal Armed Forces, 2003.

[6] R. Dewenter and J. E. Namini, "How to make soccer more attractive? Rewards for a victory, the teams' offensiveness, and the home bias," *Journal of Sports Economics*, vol. 14, no. 1, pp. 65–86, 2013.

[7] R Duhautois and R. Eyssautier, "La victoire à trois points dans le football a-t-elle rendu les équipes plus offensives?" *Revue Economique*, vol. 67, no. 6, pp. 1245–1254, 2016.

[8] E. Fernandez-Cantelli and G. Meeden. "An improved award system for soccer," *Chance*, vol. 16, no. 1, pp. 23–29, 2003.

[9] O. Shepotylo. (2005). Three-point-for win in soccer: Are there incentives for match fixing? Discussion paper. [Online]. Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=755264

[10] O. Shepotylo. (2010). The law of unintended consequences in soccer: Impact of three-point-a-win rule on strategies and outcomes. Discussion paper, [Online]. Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1633386

[11] I. Palacios-Huerta, *Beautiful Game Theory: How Soccer Can Help Economics*, Princeton, NJ: Princeton University Press, 2014.

[12] J. D. Corral, J. Prieto-Rodriguez, and R. Simmons, "The effects of incentives on sabotage: The case of Spanish football," *Journal of Sports Economics*, vol. 11, no. 3, pp. 243–260, 2010.

[13] E. Lazear, "Pay equality and industrial politics," *Journal of Political Economy*, vol. 97, no. 3, pp. 561–580, 1989.

[14] C. Soto-Valero and M. Pic, "Assessing the causal impact of the 3-point per victory scoring system in the competitive balance of La Liga," *International Journal of Computer Science in Sport*, vol. 18, no. 3, pp. 69–88, 2019.

[15] F. Halicioglu, "The impacts of football point systems on the competitive balance: Evidence from some European football leagues," *Rivista di Diritto ed Economia dello Sport*, vol. 2, no. 2, pp. 67–76, 2006.

[16] J. Bring and M. Thuresson, "Three points for a win in soccer: Is it fair?" *Chance*, vol. 24, no. 3, pp. 47–53, 2011.

[17] D. Riedl, A. Heuer, and B. Strauss, "Why the three-point rule failed to sufficiently reduce the number of draws in soccer: An application of prospect theory," *Journal of Sport & Exercise Psychology*, vol. 37, no. 3, pp. 316–326, 2015.

[18] M. Aylott and N. Aylott, "A meeting of social science and football: Measuring the effects of three points for a win," *Sport in Society*, vol. 10, no. 2, pp. 205–222, 2013.