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Tel brille au second rang, qui s'eclipse au premier.[1]

(Voltaire: Henriet)

Abstract

The 2018-19 UEFA Nations League is the inaugural season of this competition, which provides the basis of the seeding for the 55 men's national football teams participating in the qualification process of the UEFA European Championship 2020. In addition, unlike previous editions, the teams for the play-offs are also selected with the consideration of their performance in the 2018-19 UEFA Nations League. Thus 16 teams, which failed to qualify through their group, are divided into four paths of four teams each according to a complicated rule because the places vacated by the 20 directly qualified teams should be filled. We provide a critical examination of the relevant UEFA regulations and show that the articles may contradict to each other and may lead to an unfair formulation of play-off paths. Straightforward solutions for both problems are suggested.

Keywords: sports rules; UEFA Euro 2020; mechanism design; fairness; consistency

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1 Introduction

Qualification for the 2020 UEFA European Championship, commonly known as UEFA Euro, gives men's national football teams a secondary route through play-offs to compete in the final

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[1] "*He shines in the second rank, who is eclipsed in the first.*" Source: https://quotes.yourdictionary.com/author/quote/539979. Downloaded 26 March 2019.

tournament. Unlike previous editions, the participants of the play-offs will not be decided from the results in the qualifying group stage but on the basis of the inaugural season of the UEFA Nations League. This means that the current regulation (UEFA, 2018a) was never used in practice, hence it may probably contain more imperfections than usual. This note will reveal two potential problems.

In our opinion, analysis of sports rules from a theoretical perspective is an important duty of academic research. Szymanski (2003) argues that tournament design is a matter of significant financial concern for the parties, and a matter of personal interest for millions of fans. Furthermore, sports are of great interest to a high percentage of the world's population, so there is little that could be researched into that is more important (Wright, 2014). It is also known that sports rules may lead to unforeseen and/or unwanted consequences: Kendall and Lenten (2017) offers the first comprehensive review on this issue in the scientific literature.

The number of papers investigating similar questions has significantly increased in recent years. Pauly (2014) develops a mathematical model of strategic manipulation in complex sports competition formats such as the FIFA World Cup. Vong (2017) proves that the necessary and sufficient condition of incentive compatibility in multistage tournaments is to allow only the top-ranked player to qualify from each group. Arlegi and Dimitrov (2018) introduce two basic principles of fairness and apply these requirements to a class of sports competitions. Guyon (2018b) quantifies how often the suspicion of match fixing is expected to happen in groups of three with the top two teams advancing (the suggested format of the 2026 FIFA World Cup) and explain how to build the match schedule in order to minimise the risk of collusion. Csató (2019b) shows that tournament systems consisting of round-robin groups in the preliminary and main rounds – widely used in handball and other sports (Csató, 2019c) – are incentive incompatible when the results of the games played against teams qualified for the same main round group are carried over from the preliminary round.

A whole segment of literature deals with the fairness of penalty shootouts (Anbarcı et al., 2015, 2018; Brams and Ismail, 2018; Csató, 2019a; Echenique, 2017; Palacios-Huerta, 2012; Vandebroek et al., 2018) as the existing system (IFAB, 2018) seems to give an unfair advantage to the team kicking the first penalty (Apesteguia and Palacios-Huerta, 2010; Palacios-Huerta, 2014).

Some topics are particularly relevant for the Union of European Football Associations (UEFA). According to Dagaev and Sonin (2018), qualification for the UEFA Europa League was incentive incompatible until the 2015-16 season, in other words, a team might have benefited from losing instead of winning. Csató (2019e) shows that this problem emerged in practice in the 2011-12 season of the Eredivisie, the highest echelon of professional football in the Netherlands. Because of the same reason, qualification for the UEFA Champions League did not satisfy incentive compatibility in three seasons (Csató, 2019d). Qualification for some recent FIFA World Cups (Csató, 2017) and UEFA European Championships (Csató, 2018c) also allowed for such a manipulation, which can be eliminated by a marginal amendment of the rules (Csató, 2018a). Furthermore, it is even possible that the two teams playing a match are both interested in a draw (Csató, 2018b). Finally, Guyon (2018a) identifies several flaws in the design of the knockout bracket of UEFA Euro 2016 and suggests two fairer procedures.

The paper is organised as follows. Section 2 outlines the tournament to be analysed and discusses the relevant regulation. Two problems are identified in Section 3. Section 4 proposes a solution to these issues, while Section 5 concludes.

2 The play-offs of the UEFA Euro 2020 qualifying tournament

The [UEFA Euro 2020 qualifying tournament](#) is a football competition played from March 2019 to March 2020 in order to select the 24 men's national teams from the 55 UEFA members that will participate in the [UEFA European Championship 2020 final tournament](#). In the main qualifying tournament, organised between March 2019 and November 2019, teams are allocated into 10 groups, five of five teams each and five of six teams each such that the top two teams from each group qualify. The teams are seeded on the basis of another competition, the [2018-19 edition of the UEFA Nations League](#) with some restrictions (UEFA, 2018b).

The last four teams are determined by [the play-offs of the UEFA Euro 2020 qualifying tournament](#). Unlike previous editions of the UEFA European Championship, teams do not qualify for the play-offs from the qualifying group stage, but the 16 teams are selected on the basis of their performance in the 2018-19 UEFA Nations League according to the following rules: "*Sixteen teams enter the play-offs, which are played in four separate paths of four teams each, to determine the remaining four teams that qualify for the final tournament (UEFA, 2018a, Article 16.01).*

To determine the 16 teams that enter the play-offs, the following principles apply in the order given:

    a. Four play-off slots are allocated to each league from UEFA Nations League D to UEFA Nations League A, i.e. in reverse alphabetical order.

    b. The UEFA Nations League group winners enter the play-offs unless they have qualified for the final tournament directly from the qualifying group stage.

    c. If a UEFA Nations League group winner has directly qualified for the final tournament, the next best-ranked team in the relevant league ranking which has not directly qualified will enter the play-offs.

    d. If fewer than four teams from one league enter the play-offs, the remaining slots are allocated on the basis of the overall UEFA Nations League rankings to the best-ranked of the teams that have not already qualified for the final tournament, subject to the restriction that group winners cannot be in a play-off path with higher-ranked teams (UEFA, 2018a, Article 16.02).

The UEFA administration conducts a draw to allocate teams to the different play-offs path, starting with UEFA Nations League D, subject to the following conditions:

    a. A group winner cannot form a path with a team from a higher-ranked league in the overall UEFA Nations League rankings.

    b. If four or more teams from a league enter the play-offs, a path with four teams from the league in question must be formed.

    c. Additional conditions may be applied, subject to approval by the UEFA Executive Committee, including seeding principles and the possibility of final tournament host associations having to be drawn into different paths (UEFA, 2018a, Article 16.03)."

For the sake of simplicity, UEFA (2018a, Article 16.02) will be called the *team selection rule*, while UEFA (2018a, Article 16.03) will be called the *path formation rule* in the following.

The overall UEFA Nations League ranking ranks the 55 UEFA members from 1 to 55 such that (12) teams 1-12 are from League A, (12) teams 13-24 are from League B, (15) teams 25-39 are from League C, and (16) teams 40-55 are from League D. In addition, (four) teams 1-4 are

the group winners of League A, (four) teams 13-16 are the group winners of League B, (four) teams 25-28 are the group winners of League C, and (four) teams 40-43 are the group winners of League D. All teams will be denoted by these numbers.

3 Problems with the regulation

We formulate here two requirements for the play-offs of the UEFA Euro 2020 qualifying tournament and show that they are not guaranteed by the regulation (UEFA, 2018a, Article 16).

3.1 Consistency

The first condition deals with the logical connections between the rules.

Definition 3.1. A team selection rule is *consistent* if its principles do not contradict to each other. Otherwise, it is said to be *inconsistent*.

Inconsistency means a problem because a possible scenario not addressed by the rules can result in long controversies such as in the case of the qualification of the titleholder Liverpool F.C. for the 2005-06 UEFA Champions League. Unfortunately, UEFA (2018a, Article 16.02) can lead to an impossibility of the team selection problem, i.e. it might happen with a positive probability that 16 teams cannot be selected for the play-offs respecting all conditions.

Proposition 3.1. *The team selection rule of UEFA (2018a, Article 16.02) is inconsistent.*

Proof. It is enough to provide an example when the principles are contradictory.

Assume that the last 13 teams of the overall UEFA Nations League ranking, that is, teams 43-55 qualify for the UEFA Euro 2020 through the main qualifying tournament. It is possible because teams 43-55 are drawn from Pots 5 and 6, consequently, no group contains more than two teams from these 13 teams.

Teams 40-42 are group winners in League D, therefore they enter the play-offs. However, there exists no other team in League D that failed to qualify directly, hence these three group winners should be in a play-off path with higher-ranked teams. □

3.2 Fairness

The second condition concerns the strength of different play-off paths.

Definition 3.2. Play-off path P_i is *stronger* than play-off path P_j if there exists a mapping from the four teams in P_i to the four teams in P_j such that each team in P_i is ranked higher than its pair in P_j.

Obviously, this order is not complete, namely, it might happen that play-off path P_i is not stronger than play-off path P_j, and P_j is not stronger than P_i.

The following example illustrates Definition 3.2.

Example 3.1. Consider the play-off paths $P_i = \{13, 18, 19, 20\}$ and $P_j = \{17, 29, 30, 31\}$ where the numbers denote the teams. Then play-off path P_i is stronger than play-off path P_j according to the mapping $13 \to 17$, $18 \to 29$, $19 \to 30$, $20 \to 31$.

Definition 3.3. A path formation rule is *unfair* if a group winner may be in a stronger play-off path than a lower-ranked team of the same league.

The motivation of our fairness requirement comes from the idea behind UEFA (2018a, Article 16): the group winners of the UEFA Nations League are preferred in the play-offs.

Proposition 3.2. *The path formation rule of UEFA (2018a, Article 16.03) may be unfair.*

Proof. It is enough two show an example where the principles do not guarantee fairness.

Assume that all (12) teams 1-12 from League A, (six) teams 14-16, 18-19, 22 from League B, and (two) teams 26, 31 from League C qualify for the UEFA Euro 2020 through the main qualifying tournament. It is possible because (10) teams 1-10 are from Pot 1, (seven) teams 11-12, 14-16, 18-19 are from Pot 2, (two) teams 22, 26 are from Pot 3, and (one) team 31 is from Pot 4, thus no group may contain more than two teams from this set.

(Four) teams 40-43 are group winners in League D, so they enter play-off path D. (Three) teams 25, 27-28 are group winners in League C, which failed to qualify, so they enter play-off path C. Team 29 also enter the play-offs. Team 13 is a group winner in League B, which failed to qualify, so it enters the play-offs. (Five) teams 17, 20-21, 23-24 from League B, and (two) teams 30, 32 from League C enter the play-offs, too.

It is guaranteed by UEFA (2018a, Article 16.03) that one of (three) teams 29-30, 32 is in play-off path C because a group winner cannot form a path with a team from a higher-ranked league in the overall UEFA Nations League rankings. However, team 13 may form play-off path B together with (three) teams 20, 21, 24, while teams 17, 22 together with two of (three) teams 29-30, 32 may form play-off path A. Then play-off path B is stronger than play-off path A due to the mapping $13 \rightarrow 17$, $20 \rightarrow 22$, $21 \rightarrow 29/30/31$, $24 \rightarrow 29/30/31$, implying that team 13, a group winner in League B, faces stronger opponents in the play-offs than a second-placed team (possibly from the same group) 17 in League B. □

The situation outlined in the proof of Proposition 3.2 was "officially presented" in UEFA (2017, European Qualifiers Play-offs Scenario 1) without the observation of its unfairness.

4 Suggested solutions

This section provides our amendments in order to solve the issues discussed in Section 3.

4.1 Guaranteeing consistency

The inconsistency of the team selection rule can be handled in a straightforward way by supplementing UEFA (2018a, Article 16.02d) with a specific clause:
"*If fewer than four teams from one league enter the play-offs, the remaining slots are allocated on the basis of the overall UEFA Nations League rankings to the best-ranked of the teams that have not already qualified for the final tournament, subject to the restriction that group winners cannot be in a play-off path with higher-ranked teams, or, if it is not possible, they are in a play-off path with the lowest-ranked teams available for the play-off.*"

4.2 Guaranteeing fairness

Note that a group winner will not be in a stronger play-off path than a lower-ranked team from its league unless more than four teams from this league compete in the play-offs. Our proposal is to favour the highest-ranked group winner in such a case by placing it into a path with the lowest-ranked team available for this purpose without the violation of the principles described in UEFA (2018a, Article 16.03). Thus UEFA (2018a, Article 16.03) is worth supplementing with a new requirement, practically between the conditions b and c:
"*If more than four teams from a league, including at least one group winner, enter the play-offs, the highest-ranked team in this league entering the play-offs forms a path with the lowest-ranked team entering the play-offs from a league from which not exactly four teams enter the play-offs and is not a group winner there.*"

5   Conclusions

In this note, we have investigated the regulation of the UEFA Euro 2020 qualifying play-offs, and identified two shortcomings of it. While these issues may occur with a low probability, the integrity of sports rules require all possible scenarios to be considered in a fair way. Our reasoning will hopefully convince UEFA that the proposed amendments are worth implementing.

Acknowledgements

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