**Home Advantage during the COVID-19 Pandemic in European football**

The current 2019-2020 football season is unique. Due to the wide-spread safety concerns associated to COVID-19, around a quarter of games across major European leagues are currently being played ‘behind closed doors’ (i.e., without an audience). This is significant as crowd presence and noise has long been shown to predict sporting outcomes, as loyal crowds are thought to exert an invigorating, motivational influence on the competitors they support. Thus, the tendency of teams to win more games at their home stadium, relative to when they play away, has been coined ‘home advantage’.

This concept is by no means novel and has attracted research attention spanning over multiple decades (for review see, Pollard, 2006). However, never before have elite-level games been played, and therefore examined, without an audience present to assess if the effects of ‘home advantage’ persist. Equally, current views on the effects of ‘home advantage’ on referees are sparse, as much like players, it is likely their performance is influenced by the crowd. Therefore, this study will compare games played without an audience in the final quarter of the season against the earlier three quarters of the 2019-2020 season to test if the well-established effects for ‘home advantage’ extend to games played without an audience. In other words, we will inspect if the audience influences ‘home advantage’ via a positive effect on the home team (or negative effect on the away team) in addition to potential referee bias on each.

To address this, we will include a comprehensive overview of all the European football leagues that did not decide to curtail their season and for which data are available. These leagues are:

* The English Premier League
* The English Championship
* Spanish La Liga
* Spanish La Liga 2
* German Bundesliga
* German Bundesliga 2
* Italian Serie A
* Italian Serie B
* Greek Super League
* Portuguese Primeira Liga
* Turkish Super Lig
* Austrian Bundesliga
* Russian Premier League
* Danish Superligaen
* Swiss Super League

1. **Have any data been collected for this study already?**

The data is archive – yes. The games played from the start of the season – present day. Final data collection will fall in line with the final game played this season across the above leagues.

1. **What's the main question being asked or hypothesis being tested in this study?**

Research Question: To what extent does the absence of an audience influence the home advantage typically found in football across European domestic leagues?

Main Hypotheses:

1. Effects for ‘home advantage’ will be significantly reduced within the final quarter of games played without an audience (i.e., home teams will win significantly fewer games).
2. We will find some level of referee bias. Referees decisions (in the form of fouls, yellow cards & red cards) will favour the home team during the games played with an audience, such that the effects for each will be significantly reduced within games played without an audience.
3. **Describe the key dependent variable(s) specifying how they will be measured.**

We will examine two aspects of the data, one related to the outcome of the game, the other associated with the performance of the referees.

The outcome of the game will be assessed via points won and goals scored, as well as other indicators of dominance such as number of corners, shots, and shots on target.

Referees’ decisions will be examined by the number of fouls given, as well as the number of yellow and red cards.

1. **How many and which conditions will participants be assigned to?**

There are no participants and the data are based on archive data found in the media. However, the main data structure are factorial (i.e., venue; home vs away; COVID; pre-COVID vs post-COVID). Yet, to address potential confounds, and in addition to the primary analysis stated below, we also plan to explore other predictors of ‘home advantage’ influence. These are, i) the size of the crowd (operationalised by the attendance at each game summed before and after COVID); ii) travel fatigue (measured via distance travelled by the away team) and; iii) schedule strength (how challenging each teams ‘final quarter’ of games is via examining the respective positions of their opponents in their domestic leagues). These aim to account for the effect of ‘home advantage’ on; i) the size of the stadium/home club following (as “smaller teams”, who are typically less skilled, may rely on the crowd more relative to ‘larger teams” who are more skilled); ii) the distance travelled by the away team may be an important factor (as a shorter journey is less fatiguing than a longer one) and, iii) the impact of performance/expertise (as a team may, or may not, perform better against poorer opposition than one ranked 1st in the league, per se), respectively.

1. **Specify exactly which analyses you will conduct to examine the main**

**question/hypothesis.**

Due to the number of data available, and therefore the statistical boundaries presented to us, we aim to assess the general overall pattern across leagues – meaning teams, and not leagues/countries, are the main focus. To do this, and to account for potential confounds, we aim to use multilevel modelling (with the method varied for the data type/distribution: i.e., goals will be Poisson and fouls entered as Gauss) whereby games are nested within teams. We will assess the effect of audience on the ‘home advantage’ by examining the interaction effects of Venue (home vs away) and COVID period (pre vs post COVID). We expect that the ‘home advantage’ (as measured by the above mentioned dependent variables for both team and referee performance) will be reduced and be reflected in the significant Venue x COVID interaction.

1. **Any secondary analyses?**

Although individual teams are the basic units in our analysis, they are also nested within country and division. We therefore plan to include country and division as additional covariate of interest in our model. We do not expect, however, to find meaningful patterns between leagues and/or countries as the post-COVID period includes a small amount of data within a single league. That is also the reason why we will use individual teams across the whole of Europe as single units for our multilevel level analysis and will not analyse the individual teams within a single country. Given the sparse nature of the post-COVID data, one can expect significant variation within a single country.

1. **How many observations will be collected or what will determine the sample size?**

All European leagues that finish the 2019/20 season without an audience will be included in the analysis. Altogether, as stated above, we will include the individual games from 15 different leagues from 11 different countries.

1. **Other**

N/A.