

# INVESTIGATING HOME ADVANTAGE IN THE ENGLISH PREMIER LEAGUE

## INTRODUCTION

The English Premier League (EPL) is comprised of **20** teams, all of which play each other twice in a season, one game at home (in their own stadium with majority home fans) and one game away, totaling **38** games per team and **380** individual matches per season. However, not all these games are equally balanced.

When a team has a higher chance of winning a home match, they are said to have the 'home advantage'. Home advantage in sport has received considerable attention in both economics and psychology literature, concluding that playing at home is advantageous for teams as it is a familiar environment for players, requires shorter travel and often contains a much smaller group of opposing supporters.

Over the span of thousands of games, it is shown in this report that on average, teams in the EPL playing at their home stadium win **62.0%** of games, with some very successful teams like Manchester City winning up to **89.3%** of their home matches. Factors of home advantage investigated in this report include crowd size, home-fan percentage and refereeing decisions.

## CROWD SIZE

Higher volume of fans will produce more noise and therefore be more off-putting to the opposition, while also motivating their own team to play better.

A factor to consider within crowd attendance is the ratio of home fans to away fans. In an article about away fan ticket allocation by Robbie Butler [1], it is stated that away fans in the EPL get access to **3,000** tickets, or **10%** of stadium tickets if the stadium capacity is greater than **30,000**.

Average home-win percentage against average home attendance

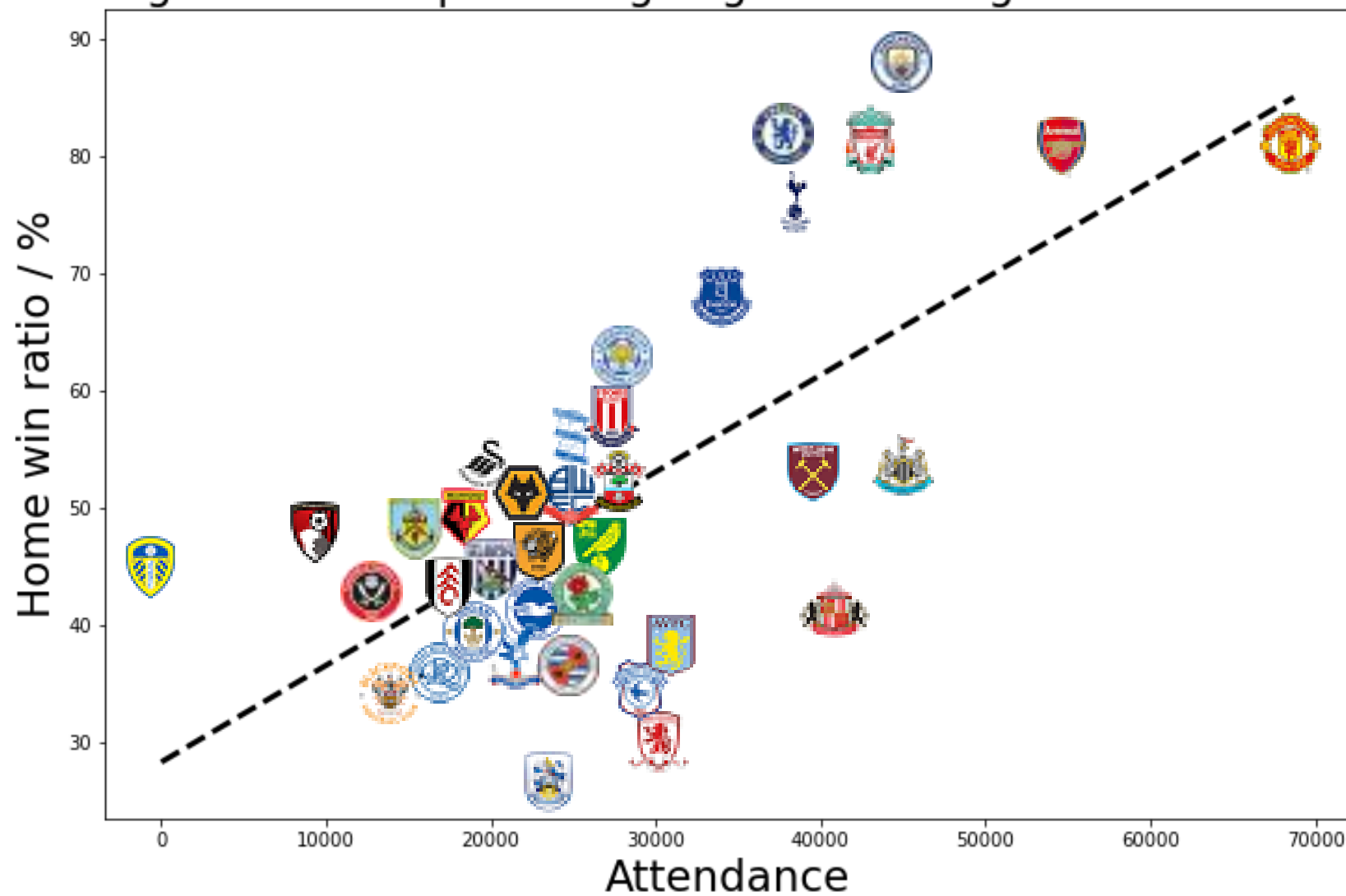


Figure 1: Each EPL team is represented by their own badge. Their placement shows each team's home-win ratio compared to their average attendance, where typically **80-90%** of fans are home fans, and all teams has at least **65%** home fans for all matches. The black dotted line represents the line of best fit for this data, showing a linear relation between home-win ratio and crowd attendance.

## DOES HOME ADVANTAGE EXIST?

As seen in Figure 1, there is a linear relation to the ratio of home games won to the attendance of the stadium, this is likely due to an outweighing of home fans influencing the game. As attendance drops below **30,000**, the percentage of away fans increases [1], meaning the home and away teams reach more equal chances of winning the match. In these circumstances, significant home advantage is not present. In the matches with a higher attendance, the away fan percentage stays at **10%**, meaning the large number of home fans inflict social pressure on refereeing decisions. As observed in Figure 3, when home teams are drawing or losing, large amounts of time are added by the referee to give them as much time as possible to score either an equalizer or a winning goal. It can also be seen that significantly less time is awarded when home teams are winning by one or two goals, giving away teams less chance at gaining points from a draw.

Figure 2 shows blue and red data, representing high fan attendance and low fan attendance (due to coronavirus restrictions in 2019/20) respectively. By comparing the two, it is evident that home advantage decreased with the loss of the supporters, where the teams' average home-win percentage dropped from **57.8%** to **48.2%** (Figure 2). Teams won **0.17** less points and scored **0.14** less goals per game. Carrying out a T-test for significant difference, assuming equal variance, showed a statistical difference between the win percentage before and during covid with **95%** confidence, confirming that there is a statistical decrease in home advantage in the absence of large crowds. Evidently, with large crowds present, they influence refereeing decisions, and hence the match results, proving that home advantage in the EPL does, in fact, exist.

## REFEREEING BIAS

Previously, Nevill et al. [2] have found that crowd noise affects refereeing decisions, with home teams awarded significantly more free kicks than away teams. According to Garicano et al. [3], referees frequently favour home teams by reducing added time in close games when the home team is ahead and lengthening close games when the home team is behind in order to appease the stadium crowds. In fact, neutral refereeing decisions are more likely to occur in stadiums where fans are seated further from the field of play, for instance because of the presence of a running track. To summarise, distant spectators are unable to have the same impact on referees.

Average home-win percentage with and without supporters present

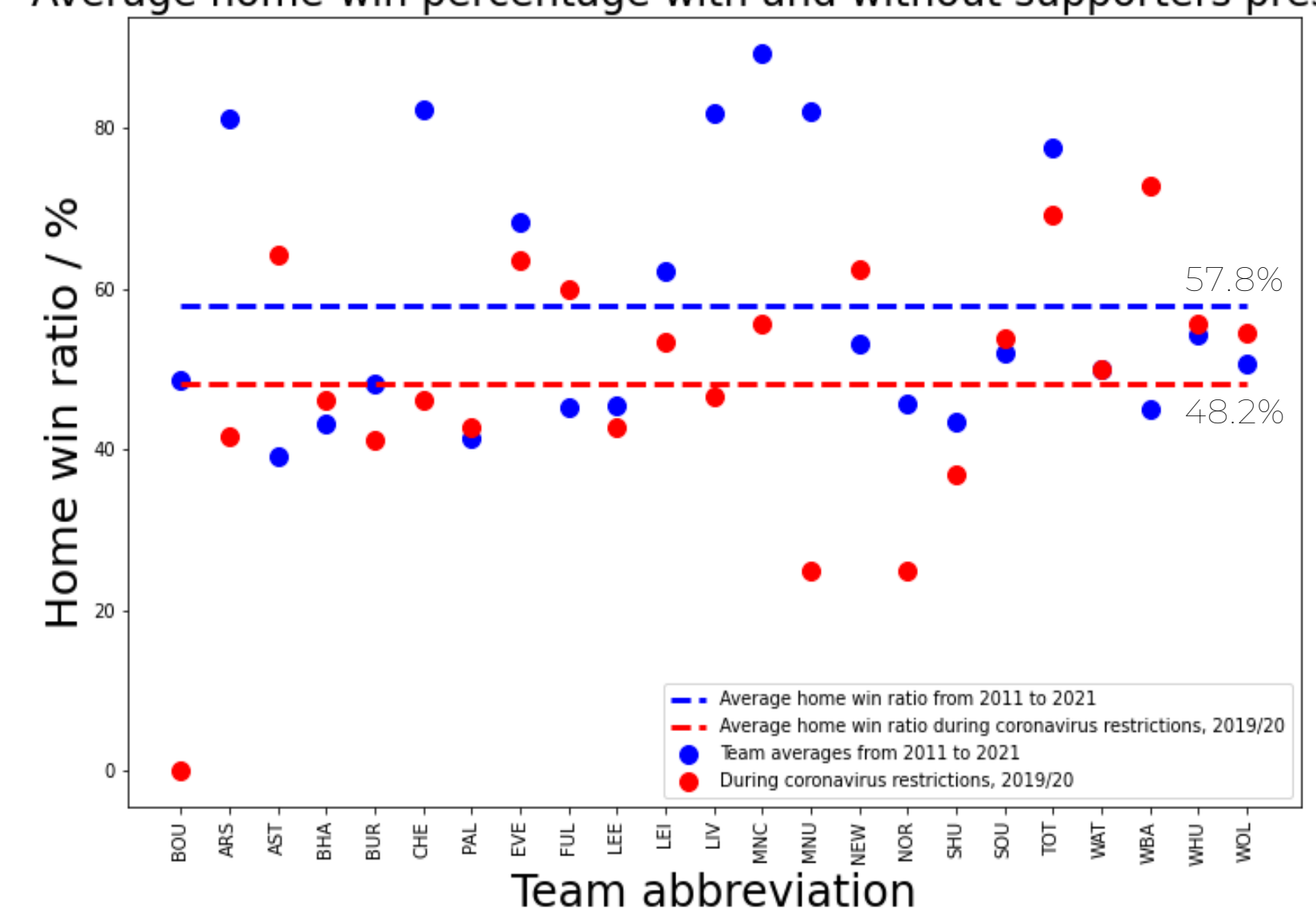


Figure 2: Blue shows the average home-win percentage from 2011 to 2021 with supporters present. Red shows the average home-win ratio for the 2019/20 season during coronavirus restrictions, where no fans were present. The dots represent the individual values for each team and the dotted lines represent the group average.

Extra time awarded by score difference

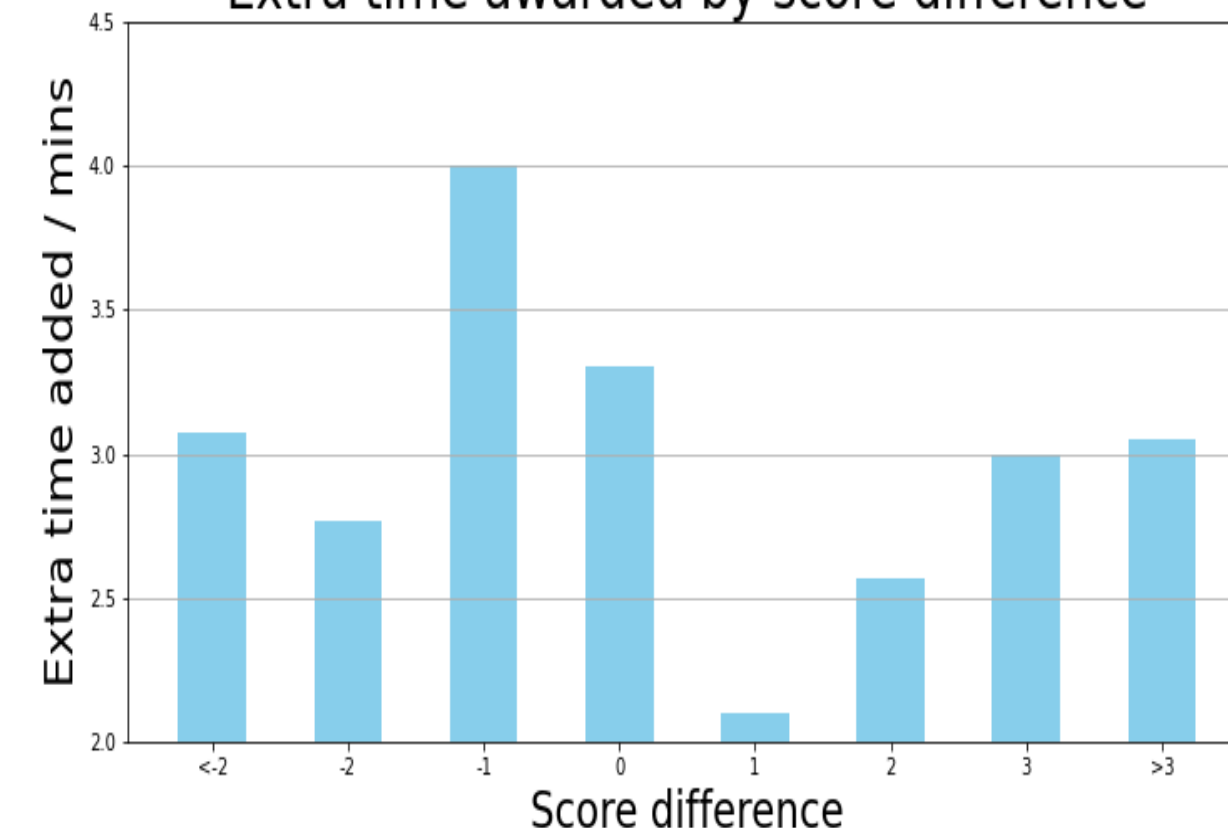





Figure 3: Number of minutes awarded by referees compared to the score margin relative to the home team, where (Score difference) = (Home goals) - (Away goals). Only **8.5%** of the matches ended with score differences above **3** or below **-2**.

## REFERENCES:

- [1] Robbie Butler. 'Away Fan Ticket Allocation In The Premier League'. The Economics of Sport. August 21, 2019.
- [2] Nevill, A. M., Balmer, N. J., & Williams, A. M. 'The influence of crowd noise and experience upon refereeing decisions in football'. (2002).
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- [4] John Watson Rooney. 'How Web Scrape Multiple Pages with ONE Function with Python'. October 18, 2020. Accessed November 2022.
- [5] Jesús Mata, Adapted by Oliver French. 'The struggles of being an away fan in LaLiga Santander'. Marca Spain Newspaper March 10, 2019

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