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"Home advantage in East Asian professional football leagues including Japan, South Korea, and China, and the impact of the Covid-19 Pandemic on the games"

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ABSTRACT

This study examines the role of the Home Advantage on the outcome of the football games by utilizing a natural case emerging in the spike of COVID-19 pandemic, where the crowd has been suspended to attend the games. Thus, the crowd has been a driving factor influencing the outcomes of the games by imposing a pressure on the players as well as the referees. For this end, the games of the 3 Asian leagues, namely China, Japan and Korea for the season of 2018-2019 and 2019-2020 were evaluated in reference to the goals, yellow and red cards for home and away teams. Overall, no significant impact is detected as the no alterations are observed in the games with and without the spectators. However, the crowd size has implications for the match outcomes.

CONTENTS

INTRODUCTION

When a football club plays at home, it may bring an advantage – called home advantage (HA), increasing the probability of winning for the home team. HA in general is one of the most often discussed phenomena in professional team sports. Still, however, the mechanisms underlying HA are not fully understood yet. In this regard, the COVID-19 pandemic situation does offer a unique possibility to further explore HA in team sports and the relevance of crowd support.

The pandemic started from Wuhan (China), and then the virus spread to Korea and Japan in early 2020 (Tien-Chin & Jung, 2020). After initial lockdowns in China, more than 100 countries implemented strict or partial lockdowns till the end of March, 2020 (Dunford et al., 2020). All industries – also professional sports – were heavily affected by both the virus itself and the different lockdown measures employed. On 4th of March 2020, Serie A decided to hold games behind closed doors. Only five days later, Serie A was the first league to stop playing regular league games following a decision by the government. The English Premier League, the German Bundesliga, and the French Ligue 1 stopped playing regular league games on 13th of March 2020 (GOAL, 2020).

Even though the Chinese Super League, the Japanese J1 League, and the South Korean K1 League started regularly in February / March 2020, they were later also forced to postpone many games until they were allowed to start again playing games – though without fans in stadiums – between June and August 2020 (FootyStats, 2020). These incidents offer a unique possibility to explore the effect of crowd support on HA in these three East Asian football leagues.

As such, the overall objective of this thesis is to explore whether and how HA was affected in games played without spectators in the highest leagues of China, Japan, and South Korea. The study was conducted on the basis of the details of the matches of the highest leagues of these three countries during the times when the strict precautionary measures

are taken as a response to the global COVID 19 pandemic as well as the pre-pandemic period for the cross-comparison and it is available on the open sources on Internet. The data obtained permitted to undertake a quantitative research to determine the role of the possible HA on the match outcomes of these states.

1. Structure of Thesis

The thesis consists of ten main chapters. Following this introduction chapter, where the aim of the research is presented, a Literature Review, where we will delve into the previous studies in the field, will follow. It contains 3 sub-chapters, in the first of which background of the Home Advantage, with the definitions, conceptualizations and underlying mechanisms are given. In the second sub-chapter, the role of the home crowd on the HA is explored, especially its relation to the referee decision. In the last sub chapter, the latest studies utilizing the case emerging in the light of the COVID19 pandemic have been reviewed. In the light of the literature, the hypothesises are developed following the statement of the motivation for the current research in the Chapter 3 and conceptual framework in the Chapter 4. Later comes the Methodology parts, where, first comes the particulars of the sample and, second is the methods employed to answer the research questions. Estimations and results are the next chapter, where all results of the testing are displayed. In the discussion part, the results are compared against the other findings of the existing literature, and variations in the results are explained. Last but not the least, a brief conclusion with the further implications follows.

CHAPTER I

LITERATURE

1.1. Home Advantage

The well-known phenomenon of the HA in the football games indicates to the tendency of the team's winning the opponent in the home games compared to the away games with the same opponent (Stefani, 2008). Under the balanced home and away games, the success rate of the home teams is over 50% (Courneya & Carron, 1992). Home advantage is usually evaluated via the difference in scoring, fraction of the games won (Stefani, 2008), the difference in booking of teams by the referees, the kicks awarded (Picazo Tadeo et al., 2017).

Overall, HA might unfold via different mechanisms. For instance, familiarity with (home) facilities and equipment might be a factor pushing home team performances, which constitutes into the tactical factor (Stefani, 2008). As such, *un*familiarity with facilities and equipment might be a reason for weak performances of home teams when they have built a new venue (Pollard, 2002 as cited in Fischer & Haucap, 2021). Home teams might also benefit from local climatic conditions, particularly in international matches (Pollard, 2008). First and foremost, however, crowd support is seen as possible driver of HA (see, for instance, Courneya & Carron, 1992; Pollard, 2006a. as cited in Fischer & Haucap, 2021). In this regard, the home crowd yields psychological pressure by encouraging the home team and intimidating the away team. The presence of the spectators not equally affects the teams. Thus, the higher level of the home advantage is observed in countries where the spectators are more passionate (Stefani, 2008). The proximity of the crowd to the stadium also matters. For instance, the impact of the crowd on the players, especially if they are located in the first track, on home team might be negative rather than positive, as the players may be stressed and be prone to more rule violations (Buraimo et al., 2007).

On general, the home teams score more goals than the visiting teams. The difference between the goals of the home and away teams is positively correlated with the size of the crowd besides the referees and the ability of the team (Boyko et al., 2007).

1.2. Home Crowd and Referees

Moreover, the crowd may affect the game results via influence to the referees that run the games. The noise of spectators might impose anxiety to the referees leading to biased decision-making during the game (Seyed et al., 2011). This also is due to the social pressure, a phenomenon which is detected in diverse areas, such as voting, investment, work, or education, in people with various backgrounds; for example, low income, high income, Hispanics, whites etc. (Bursztyn & Jensen, 2016). In case of the football matches specifically, the pressure generates stress on the referees by affecting their emotions and mental states, who become more inclined to make inconsistent decisions, which are mainly favouring the home teams. Social pressure, here, might confuse both the referee's perception of the reward and also subconscious perceptive bias (Picazo-Tadeo et al., 2013). Such kind of home-team favouring decision making by the referees is a frequently occurred phenomenon during the football matches, which is called unconscious referee bias. Here, the crowd of the home team induces social pressure on the referees by provoking anxiety (Nigel et al., 2007). As a result of that noise, referees might also favour the home teams. The biased referee decision has been considered as a major empirical cause of the Home Advantage (Pollard, 2008).

In reference to the role of the crowd in the referee decision -making, Picaze-Tadeo et al. (2017) find that referees are more likely to book away the players of away teams in their research with the sample of the first division of Spanish Football league matches from 2002-2003 to 2009-2010 championships. Likewise, they are more inclined to take disciplinary

actions against the players of away teams once the foul is conducted during the free kicks (Picaze-Tadeo et al. 2017).

The home advantage via the referee decision making is further assessed with 1234 matches of 2000 -2001 to 2010-2010 seasons of the German Bundesliga. Here, asymmetry favouring the home team in the allocation of the injury time- the extra time added after the regular match time - exist. Thus, the injury time is longer in the games where the home team is losing, compared to the games where they are ahead of the away teams (Riedl et al., 2014). Garicano et al. (2005 as cited in Rickman and Witt 2008) reaches the same conclusion in the sample of the first two division of English League for the years of 1999-2000 and 2002-2003 as the referees were declaring extra times if the away teams were finishing the games as winners. Sutter and Kocher (2014) also concludes the same as their findings uncovers the fact that the referees assign longer injury time after the 2nd half of the game when the home teams are one goal behind in contrast to when they are one goal ahead. Given that the allocation of the extra time does not definitely guarantee the score, the authors have gone deeper by analysing the allocated penalties for the home team to identify the role of biased referee decision making on the match results. As a result, the referees have allocated more penalties favouring the home team, and refused more justified penalties to the away teams (Sutter & Kocher, 2014).

Larger the size of the crowd is or higher the density of the crowd is, the higher the effect of the crowd is (Schwartz & Barsky, 1977; Nevill et al., 1996). The effect of the noise of home crowd on the referee decision-making is further examined and confirmed in a research by Nevill et al. (2002). Thus, in a study where the referees were asked to watch the records of the previous games and assign fouls to the players, less cards were issued for the home teams that had the noise of more passionate spectators in the videos (Nevill et al., 2002). The role of the volume of the crowd noise is further assessed by Greer (1983), thus, in the stadiums, where the fans are more active i.e. booing more or swearing more, the home

teams become more successful. Here, the density of the crowd rather than overall size of thereof appears as a more influential element on referee decision. Additionally, the degree of the impact of the spectators on referee decision is higher than on the players' performance (Goumas, 2012).

Further proof for the influence of the spectators is found in an examination where the proximity of the crowd is tested. Thus, if the crowd making noise is located in the first tracks of the stadium, the referee bias favouring home team is high compared to the case where the crowd is placed farther than the stadium. This bias appears in the penalties awarded. However, surprisingly, in the games where the first tracks are crowded, the home teams have received more red and yellow cards (Buraimo et al., 2007).

This is linked to the fact that home crowd, which might push the performance of home athletes and teams, might also negatively affect performances of home teams and athletes, thus reducing HA (Harb-Wu & Krumer, 2019). As such, athletes not always perform well under support of fans (Allen & Jones, 2014). Further contradictions exist in the referees' decisions e.g. the strong crowd effect has failed to influence the referee's biased awarding of the free kicks to the home teams (Picaze-Tadeo et al., 2017).

1.3. Current Research on COVID19 effects

As mentioned before, the pandemic situation offers a unique possibility to further explore HA in team sports and to test the relevance of crowd support in this regard. Not surprisingly, several studies already exploited this natural shock for identifying the relevance of crowd support on HA in professional football. For instance, Leitner and Richlan found a link between the presence of audience and referee bias. Using a sample of games from the top 15 European leagues and comparing games with and without spectators, they revealed that crowd support has a significant negative effect on yellow cards awarded to the home team.

Likewise, home teams do not have any more a higher probability to win the game at home if no spectators are present (Leitner & Richlan, 2021).

Sors et al., (2021) investigated the situation within the sample of the 133 matches of UEFA Nations League by treating the Home Advantage and the Referee Decision as different variables, and discovers the reduction in both elements after the quarantine. Namely, the advantage of the home teams in match outcomes, points earned, goals scored, balls possessed, total shots, shots on goal, corner kicks, fouls called, yellow cards issued, red cards issued, penalties awarded, extra time added declined significantly from the open doors season of 2018-2019 to 2020-2021 season (Sors et al., 2021). In the examination of the 3 divisions of the German football league, HA observed in all 3 divisions by 12 %. During the ghost games, the HA vanishes completely in the Bundesliga only, whereas the lower divisions face with no alteration (Fischep &Haucap, 2020).

Correia-Oliveira and Andrade-Souza (2021) reached the same conclusion in the research of the extended sample of 2 divisions of German, Italian, Spanish and English leagues for 4 consecutive seasons inclusive of 2019/2020. Santana et al., (2021) investigated 305 matches of Bundesliga for the season of 2019/2020 before and after the social distancing (SD). Asper the results, the home teams have goaled more and conducted less fouls at the 2nd halves of the games before the social distancing, whilst after the social distancing, the goals of away teams rose in the 2nd halves. On general, HA was 50.32 ± 19.06% before the SD, whereas it slipped to 40.37 ± 26.08% after the SD (Sanatana et al., 2021).

One of the contradictory results has been obtained in the study of Sanches and Lavin (2020). 2 divisions of German, Austrian, Italian, English and Spanish football leagues were analysed, but no significance difference was uncovered in the results; for example, home games are usually won by the home teams during pre-pandemic and within-pandemic periods. Notwithstanding, in certain cases, the points vary. The variation, however, is not due to the fact that the away teams started to score more, but the number of the goals by

the home teams fell while the results of the games remained the same. Besides the crowd, the travel distance also failed to affect the results. Mainly identity, familiarity and learning factors are more influential elements (Sanches and Lavin, 2020).

Similar studies were conducted, for instance, by Bryson et al. (2020) and others.

HYPOTHESIS

In the light of the literature above, I develop the hypothesises below:

H0: Closed doors affects the HW share positively

H1: Closed doors affect negatively to goal difference

H2: Closed doors affect negatively to home yellow cards

H3: Closed doors affect negatively to home red cards

H4: Closed doors affect positively to away yellow cards

H5: Closed doors affect positively to away red cards

In regard to the variation in the crowd size, we further postulate that:

H6: Increase in crowd size doors affects the HW share positively

H7: Increase in crowd size affects negatively to goal difference

H8: Increase in crowd size affects negatively to home yellow cards

H9: Increase in crowd size affects negatively to home red cards

H10: Increase in crowd size affects positively to away yellow cards

CHAPTER II

MOTIVATION FOR THE RESEARCH

What is missing in the literature yet, however, is a study exploring these issues in East Asian countries. As such, the objective of this thesis is to explore whether and how HA was affected in games played without spectators in the Chinese Super League, the Japanese J1 League, and the South Korean K1 League. Thus, even before the pre social distancing period, in Asian countries the HA has been detected to be low than the rest of the world (Pollard, 2007), particularly compared to Europe that contain the sample for the most of the researches in the field. Furthermore, these countries have been particular and strict in the effective application of the restriction rules during the pandemic. Nevertheless, the up-to-date canvass of the HA and its being affected by the SD as in the case of the most European states is absent. This is where this paper will serve to address that gap. Furthermore, the research will extend the validation of the theory by replicating the testing on the different sample.

Another reason is in conjunction with the social pressure theory in the field of the behavioral economics, which the crowd in the football games can be utilized as a case to check. Thus, the social pressure as well as the concerns about the social image affects the behavior of the individuals and the decision making and this has been tested in various spheres, such as education, charity, financial investment, and behavior in workplace (Bursztyn & Jensen, 2016). In addition to being a contributive case to the economic literature, the findings also benefit the sport industry by determining the elements influencing the game results and the referee decision making. Here, the influences on the decisions of the officials have long been under the examination as neutral referees are required to maintain the competitiveness in the games for the interests of various club shareholders, fans, TV subscribers and the betters. The fact that it is a multibillion dollar industry and attracts millions of the viewers and interested people underlines the importance of the matter.

Furthermore, the research is extension to the study by Bryson et al. (2021), who cross-examined the closed and open matches of only the season of 2019/2020 in the leagues of 23 different European countries. Despite permission to the public attendance in that year, however, the crowd would not be high enough to complement the rates during the normal times. Thus, the pandemic was going on, and people could have been more cautious to attend the matches. Furthermore, restrictions have been present at different levels. In this research, nevertheless, the sample with the crowd extends to the preceding pre-pandemic year of normal days, thereby providing a chance for a more accurate result.

CHAPTER III

CONCEPTUAL FRAMEWORK

To determine the role of the Home Advantage as an underlying factor for an outcome of the played game, this paper adopts the framework utilized by the Bryson et al. (2021) in their paper "Causal effects of an absent crowd on performances and refereeing decisions during Covid-19" with the sample of 16 European countries in addition to Australia. Notwithstanding, a few amendments will be observed.

The term "Home Advantage" (HA) is broad concept. First quantitative description of HA in football was introduced by Morris, afterwards Pollard and Dowie improved and wrote more detailly (Pollard, 2008). In 1992 Courneya and Carron's model for advantage of home game was explained by game location and other 4 components (Allen & Jones, 2014). Game Location (GL) is either team plays at their own or away venue. Location of venue directly affects size of crowd that forms a psychological pressure during the game and tiredness from travel (Stefani, 2008). GL is connected not only directly, but also indirectly to home advantage. Since opponents travel from different cities or a certain distance to play, tiredness generates disadvantage for them. In many studies there are some contradictory outcomes, nevertheless when travel distance is omitted in local derbies HA decreases significantly (Pollard & Seckin, 2007 as cited in Pollard, 2008). For instance, disruption of familiar procedures, travel fatigue, and travel distance of away team are three components of discreet effects of travel (Smith et al., 2000), whereas the crowd effect is the most significant factor contributing to the home advantage (Pollard, 2008). Therefore, the crowd effect has been accepted as a main element here.

Overall, a bunch of research have proved that teams and athletes compete well at home comparing to away games (Allen & Jones, 2014). In this regard, HA appears to be particularly strong in football where 67.4% of games end with a home win (Jamieson, 2010. As cited in Leitner & Richlan, 2021).

Following Bryson et al. (2021), the outcome of a game could be measured with different variables, such as (a) home win vs not, (b) goal difference, (c) total goals, (d) home and (e) away yellow cards, (f) the difference between them. Moreover, it could be measured with (g) home red card, (h) away red cards, and (i) the difference between them. In this regard, the issuance of the yellow and red cards is the quantification for the "referee decision." In the literature, it is widely discussed and confirmed that the referees favor the home teams, usually due to the impact of the crowd (Pollard, 2008). Figure 1 below summarizes the relationship between predicting and responsive variables used in this study. The impact of crowd (having 0 or more spectators) and variance in the size of the crowd will be checked against the 9 variables listed above.
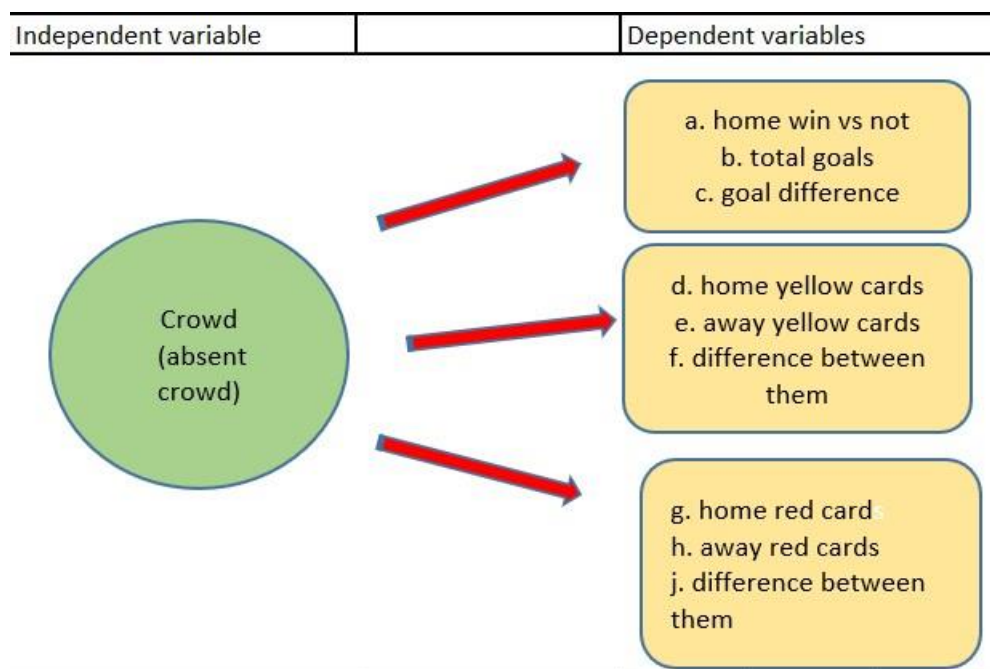

Figure 1. the closed doors and the crowd size are the explanatory variables tat are measured against the responsive variables for goals, yellow and red cards.

CHAPTER IV

METHODS

This chapter of the paper contains the methodology section, in which will detail the entire technique for operationalizing the research. The following corpus I will provide detailed information on the research design, data, and sample.

The paper relies on a quantitative data analysis, which is undertaken via STATA software. We mainly focus on the matrix average of the fixed effects - within effects. For that, we fit the regression model to the panel data.

4.1. The Sample and Data Collection

The data for the research is of a secondary source, meaning that the author has resorted to the existing data available. The data is descriptive as no variable was controlled and manipulated, rather the observations were collected without intervention.

The prior checking of the data for missing values and outliers was realized in the process of the data preparation. The data missed the outliers, but few missing values existed especially in regard to the records of the number of the spectators.

For the sake of the research, overall, the records of 1289 matches have been considered. 738 of these games were from the season 2019, and 551 games constituted into the season of 2020. 224 games had no spectator, at all. The data have been collected from various websites that have announced the results of the games. They include Transfermrket.com, Soccerway.com, Footballdatabase.com, data.j-league.or.jp, Fbref.com and Soccerstats.com.

Table 1. Sample descriptive statistics for proffesional football in the 2018/2019 and 2019/2020 season.

	2018/2019	2019/2020
Home Win %	44.17	38.29
Mean attendance	18211.38	3313.19
Number of ...		
Teams	46	46
Referees	75	49
Leagues	3	3
Countries	3	3
Matches behind closed doors	0	224
All matches	738	551

Notes: author calculations using data from various web-based resources accessed on 4/5/2022 for the both seasons of 2018/2019 and 2019/2020. Mean attendance calculations for the championship year of 2019/2020 include matches played behind closed doors, i.e., zero values.

The sample group is extracted out of the 3 main football leagues of the Asian countries, which are under the examination. Namely, they are K League 1, J1 League, and the Chinese Super League that are the highest tier of the professional football in South Korea, Japan and China, respectively. The Leagues are comparatively younger (see the Table 4 in an Appendix). In each season, the fixed number of the teams are participating in the championships. Two teams in the last 2 slots are being relegated to the lower divisions, while the top teams in the second divisions are being promoted to the season yearly. In Japan and Korea, the second team in the bottom of list participate in playoffs with the

winners of the second division. Each League has the dominant teams, for example Guangzhou and Beijing Guan in China, Jeonbuk and FC Seoul in Korea and Urawa Red Diamonds and FC Tokyo in Japan, that holds the more titles and attract more spectators, usually.

In Japan and Korea, the championship is composed of the single stage and the team with the highest score get the cup without the championship match. In China, each time plays against each other two times: one in home stadium and another one in the away stadium. The highest scoring ones get the championship titles, unless there is a tie, for which score or goal of the teams are considered to determine the winner.

324 matches from K League 1, 613 matches from the J1 League and 352 matches from the Chinese Super League are included into the data (Table 1). In 1289 games, one team played in home arena, whereas the other one attended the away game. As far as the time-period is concerned, in all 3 leagues, the games are divided pre-lockdown period and lockdown period, when the attendance of the public to the games was strictly prohibited. So, the lockdown period covers the 2020 championship year. However, it should be noted that during that year, not all the games occurred in the absence of the crowd. The year 2019 was selected for the open access period for comparison, and the reason behind choosing that year is the short gap period between the periods noted. Thus, if quarantine had not been applied due to the lockdown, the participation level of the spectators would have been similar. Furthermore, it was for the sake of keeping all other factors that could have impact constant.

For the examination all the matches in the first division of the Chinese, Japanese and Korean Football Leagues for the seasons of 2018-2019 and 2019-2020 are reviewed. Unlike the European Leagues, here the seasons continues along 1 year only.

The games are consecutive, but in a backward order from the final match of the championships toward the start. In Korea, 192 games were held in 2019, in Japan the

number of the matches for 2019 was 306 and in case of China, the number reached to 240. All these games were held open to the public and was observed with the dense participation. The number of the games in 2020 was 112, 307, and 132 for China, Japan and Korea, respectively. In the J1 League in 2020, the majority of the games in the first half of the season was subject to consecutive postponement. The matches embarked in early July with no spectators, initially. In that season, the number of the games with no spectators was summed up to 18. Starting from the late July, the stadiums were opened to the public participation. Notwithstanding, the attendance rate approximated to the quarter of the previous season. Thus, the average attendance in the Japan in 2019 was 13700, while this number fell to 3400 in 2020.

When it comes to the K1 League, all matches of the 2020 season were undertaken in the closed stadiums in the spike of the COVID 19 pandemics. However, in the early August the games were opened for the fans' participation until the mid-August. The remaining games were also continued behind the closed doors. 114 games out of the 192 games were held closed to public. The participation rate during the short window in August 2020 was noticeably low, having the average of 242.09 person per match in contrast to the 7970.86 pack per game in the preceding season. In case of China, the 2019 season has lasted from March to November, whereas the whole season of 2020 was squeezed between the July-November months, despite the fact that the initial planning was from February to November. 92 games out of 112 games in 2020 occurred with 0 fan attendance. Average attendance here in 2019 was 11566.58 and in 2020 was 228.97 per game.

Total of 18 teams competed in the J1 league in both season of 2019 and 2020. In 2020 Kashiwa R. and Yokohoma FC replaced the Jubilo I. and Matsumoto Y. from the previous season. In Korea, each year 12 teams competed. Busan IPark team was promoted to the 2020 season replacing by replacing the Gyeongnam FC. Total of 16 teams competes in both season in the Chinese Super League. Qingdao Huanghai and Shijiazhuang Ever Bright

were promoted to the 2020 season and Beijing Renhe relegated to the lower division. Tianjin Tianhai was not present from the previous season as it was subject to the dissolution.

In Japan the 306 games of 2019 were officiated by 24 judges whereas in 2020 only 21 referees run the total of 307 games. In China, however, the number of referees fell from 37 running 240 matches in 2019 to 16 officiating 112 games in 2020. In Korea, the 192 matches were officiated by 14 referees in in 2019, and 12 referees led 132 matches in 2020. Comparatively, the frequency of the games per referee in Chinese league was less. Furthermore, in 2019 a unique case has occurred in Chinese Super league. Thus, the referee team was composed of international judges rather than nationals only typical to the 2020 season in the same league besides the championships in both years in two other countries in sample.

In regard to the Table 1, on general, the 41.66%of the games in 2019 were won by the home teams, 34.13% of the games witnessed the victory of away teams and 24.20% of the games ended in draw.

Table 2. Differences in sample means, matches played behind closed doors vs with fans in 2018/19 and 2019/20 seasons.

	Mean difference (Behind closed doors - with crowd)
Home win share	0.05
Goal diff. (Home - Away)	0.14
Total goals	-0.012
Home yellows	-0.008
Away yellows	0.14
Yellows diff. (Home - Away)	-0.14
Total yellows (Home + Away)	0.13
Home reds	0.004
Away reds	0.019

Notes: For the goal difference, as well as the home win share, the ttest demonstrates a significance at 5% levels.

In 2020, in total, 38.29% of the games ended in the victory of the home teams, 37.74% of the games ended in the victory of the away teams when the 23.95% of the games ended in draw. The rate of the home team wins decreases compared to the previous year, yet away team victories and draws increased. Away team win share has been higher than in 2019, but lower than the games with crowd of the same season. In all games with "0" spectators in 2020, 37.50% of the games resulted in the victory of the home teams, 37.94% of the games observed the victory of the away teams and 24.55% of the games concluded with the draw. In the games of that same season where the crowd attendance was allowed yet

the size of the crowd was less than half of the last year, the home win share was 38.83%, away team win share was 37.61%, and the draw share was 23.54%.

When the crowd was absent, the home win share has decreased dramatically compared to the previous season, and slightly compared to the games open to public in the same season. The draw share of the games with crowd in 2020 and games in 2020 have been complimentary, and both have fallen behind the games with no spectators. This implies to the decreased home advantage.

In a season of 2018-2019, 1100 goals were scored by the home teams compared to the 783 in the following years. Away team goals fell from 738 in 2018/19 to 551 in 2019/20 making the total number of the goals hit decline from 2040 in 2018/19 to 1528 in 2019/20. Consequently, the mean goal difference was 0.21 in the pre COVID period slightly higher than post COVID period 0.06.   In brief, the positive outputs of the away teams have risen. Furthermore, the mean difference of the goals scored decreased, alongside the mean difference of the yellow card issued.

Total number of the yellow cards issued in 2018/19 season was 2161 and this amount declined to 1541 in the following year, as the yellow cards for both home and away teams had declined simultaneously. The mean of the yellow card difference shifted from -0.29 to -0.14.

This suggest that the home advantage had declined. In the case of the China, the variation of the goal difference was significantly larger than the cases of Japan and Korea. However, for the Yellow Cards issued, there was a sharp increase in case of China, and a very slight decrease in the case of Korea and Japan. In contrast, the mean difference of the yellow cards issued decreased strongly.

Table 2 depicts the simple mean differences in match results, comparing those played with and without a crowd in 2019/20. During the closed-door matches, the mean difference of the

home and away yellows, as well as the difference between them and the total number of the

cards issued declined (Table 2).

ESTIMATION AND RESULTS

The Ordinary Least Squared will be conducted in accordance to the method utilized by Bryson et al. (2021) by developing the following regression model to identify the impact of the variation in the crowd size and the case of having no spectator at all on the match outcomes, which is displayed via various variables:

$$y_{ijkm} = \beta 1 C_{lijkm} + \beta 2 A_{tijkm} + h_i + a_j + r_k + \varepsilon_{ij} , (1)$$

In the equation, y denotes to the outcome. For outcomes, all the dependent variables – home and away goals, difference between goals and total goals, home and away yellows, difference between them and total yellows, and home and away reds, difference between them and total reds- contributing to the outcomes will be calculated in a separate regression analysis. C is a dummy variable indicating the games' taken place in an open or closed stadium. The value 0 stands for the open arenas with fans, whereas the 1 indicates the closed stadiums. A_t defines the attendance by numbers.

Besides, fixed effect variables are in the use to reveal the general patterns pertinent to the teams or referees e.g. whether some referees are issuing more yellow cards, or some teams score more goals, or certain teams earn more yellow or red cards. h_i is a fixed effect variable standing for the home team factors, whereas a_j is employed do demonstrate the fixed effects for the away team factors. r_k, on the other hand, covers the fixed effected related to the referees.

In reference to the Table 3, which shows the outcomes of the estimations, less 1% variance is possible to be explained with below depending variables. As a result of the analysis, the fact of having the games behind the closed doors did not have any significant impact on any results of the games. On the other hand, variance in the size of the crowd is proven to have influence in the match results, mainly in the differences in the goals and yellow cards between the home and away teams, as well as goals of the away teams and the number of yellow cards issued for the home teams.

In regard to the Yellow Cards issued to the home teams, the Closed doors do not impose any significant role, but the variance in the size of the crowd is significantly negatively correlated with their number (p-value 0.005<0.05; column IV). This implies that the number of the yellow cards awarded to the home teams decreases in line to the increment in the size of the crowd. Furthermore, no significant correlation is detected between the "0" spectator attendance or the alteration in the size of the crowd and the number of the yellow cards awarded to the away teams. However, further impact is detected on the difference between the yellow cards issued to the home and away teams (p-value 0.002<0.05; column VI). As the crowd size increases, the difference between the yellow cards issued to the home and away teams decreases.

Moreover, the results, in terms of the goals are also being influenced by the alteration in the number of the spectators. The goals by the away teams (p-value 0.004<0.05) are negatively influenced by the variation in the crowd size. Concurrently, the difference between the goals of the home and away teams are being significantly affected (p-value 0.004<0.05; column II) and the correlation is positive. This implies that, as the size of the crowd mounts, the difference between the goals scored increases.

In light of information discovered above, significant influences of the crowd size are detected in the game outcomes. This is in line with the commonly accepted opinion on the social pressure originating out of the generally home-team supporting crowd that intimidates the referees and enforces them to the home team favouring decisions on disciplinary actions. In addition to that, the number of the goals scored by the away teams decreases as the number of the spectators increases in the stadiums. This further implies that the spectators in the stadiums impose impact to the performance of the players, particularly of the away teams by intimidating them.

Last but not the least, no impact by the closed door games and the changing crowd size is detected in respect to the red cards issued home teams, away teams, to the total number of the red cards and to the difference between the red cards for home and away teams.

Table 3. Estimated effects of playing football behind closed doors on match outcomes

	Home win share	Goal diff. (Home-Away)	Total goals	Home yellows	Away yellows	Yellows diff. (Home-Away)
	(I)	(II)	(III)	(IV)	(V)	(VI)
Closed doors ($\hat{\beta}_1$)	0.003	0.24	-0.033	-0.036	0.07	-0.12
	0.041	0.14	0.14	0.92	0.098	0.12
Attendance (100s) ($\hat{\beta}_2$)	0.015	0.001	-0.007	-0.001	0.0005	-0.001
	0.0001	0.0006	0.006	0.004	0.004	0.0005
Home team fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Away team fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Referee fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.006	0.006	0.0001	0.009	0.0001	0.01
N	1,286	1,286	1,286	1,286	1,284	1,286

Notes: In the second rows, below the coefficients, the robust standard errors are displayed.

Furthermore, Poisson model is employed where each home team and away team were weight equally. This also due to the fact that the outcome variables are count data and, additionally, the mean is relatively small. Unlike the previous one, the Poisson model does not contain the random error term i.e. non observable random term causing the differences

between the actual and theoretical value of the dependent variable. Here, it is not required to estimate the residual variance.

The result demonstrates the significant effect on the yellow cards issued to the home teams (p-value 0.008 <0.05). In this case, as well the significant effect appears only from the crowd size variance. In each extra unit of the crowd size, the likelihood of the home team's getting yellow card declines by 0.0009. Another relation is observed for the goals by the away teams (p-value 0.003 <0.05). In increase of each addition unit of the spectators, the goals hit by the away teams decreases by -0.001. No relation is observed in other outcomes.

The research also considered the outcomes in the games taking place on the weekends only, and identified significant negative effect of the crowd size on the home win share, home goals, difference between the goals, home yellow cards, and difference between the yellow cards. Closed doors did not impose any implications.

In addition, the closed doors and the crowd size did not impose any impact in the outcomes related to the home and away team red cards, difference between the red cards and the number of the total red cards awarded.

DISCUSSION

The variation in the results of the games is obvious when the games were compared across the 2018/2019, which occurred in standards of normal days, and 2019/2020 championships years, of which major portion was affected with the SOP of the COVID 19 pandemic, and when the games with crowd and without crowd of the season 2019/2020 cross compared. The positive results of the home teams have reduced whereas the positive results of the away teams have grown. Thus, home win share and draw share has declined concurrent with the surge in Away win share. The mean difference of the goals scored between the home and away teams has also fallen. Another matter regarding the games is that the overall performance has shrunken. The total number of the goals, hit both by home and away teams, have fallen down noticeably. As per Bryson et al., (2021), who reached the same conclusion, since the final score line of the matches was not different anymore, there is likelihood that the attitude of the players is changed. The results of the games in the matches with 0 and limited spectator participation are almost identical.

Furthermore, the referee behaviors have also been affected. This in regard to the total number of the diminish in the disciplinary actions, both in red and yellow cards awarded to both away and home teams. This situation might also have been originated out of the performance of the players. Nevertheless, the overall trend is downward in both teams, the difference between the yellow cards and red cards issued has narrowed down, implying improvement in the positions of the away teams.

In their paper, Bryson et al., (2021) had identified the significant effect between the closed door games and the away team yellow cards i.e., in the games with no spectator at all, fewer yellow cards were issued to the away teams, and, simultaneously, difference between the yellow cards had decreased. Additionally, the variance in the closed door games had imposed no effect to the match outcomes (Bryson et al., 2021). Unlike the former, however, I find that the closed door does not impose any effect to the match results, whilst the general

variance in the crowd size is proven to play a role in the gamer outcomes. Specifically, the number of the goals scored by the away teams, as well as yellow cards issued to the home teams and difference between the yellow cards are negatively affected by the spectator number. Difference between goals is subject to the positive correlation, however.

The reason might be originating out of the sample groups. Bryson et al., focus on the 23 European leagues, where the nationals of the same country would run the games, compared to the significantly fewer sample in this paper. Due to the cultural and social factors, the referees in each continent might have developed different responses to the social pressure of the crowd in the stadiums. Furthermore, the wide sample of Bryson et al. mainly accounts to the matches of 2020 season, the year when COVID19 arose and restrictions were applied to the games. So, they consider the games with and without spectators in that very year, unlike here, where the games in restricted formats were compared to the games of normal days of previous years. This fact might constitute into the source of the differences between the findings. Thus, if this paper had solely focused on the games of the 2020 and cross compared the games with spectator and no spectator, the results could have been different. Since the variance in the crowd size would not be that large, no impact could have been discovered as, Bryson et al., (2021) find no significant impact of the closed door and the variance of the crowd size on the match outcomes.

There was proportion reduction in the total number of the goals by both parties. Since, the score outcome is solely related to the player's performance, it implies to significant impact of the changing situation on the players. The spectator support and the noise of the crowd influence the players ability to score as away team faced with disadvantages in the games. This rather discards the role of the familiarity with the home stadium and facilities.

This is in line to the claims by Courneya & Carron (1992) and Pollard (2006) that the crowds are the main drivers of the home advantage as variation found in the goals and yellow cards, which are considered the best methods to measure the HA by (Stefani, 2008), with and

without the crowd. The findings further supports the explanation by Stefani (2008) that the crowd's noise creates psychological pressure encouraging the home team and intimidating the away teams, yet his further clarification that the home advantage of the crowd may vary depending on the level of passion of the spectators opens a room for further research.. Thus, the spectators of this region may demonstrate less emotional behavior in stadiums yielding no significant influence to the players, however empirical proofs are insufficient to confirm this and it is not measured in this paper.

Moreover, I confirm the social pressure of the crowd on the referees, given the significant negative correlation between the crowd size and home yellow cards implying that the extra unit of the crowd size increases the number of the yellow cards for the home team. This is in line with the literature on the biased referee decision out of the anxiety emerging from the crowd noise (Seyed et al., 2011; Nigel et al., 2007) and unconscious home team favoring (Pollard, 2008). The finding that the number of yellow cards for home teams decreases as the size of the crowd increases contradicts with the findings of Buraimo et al., (2007). Thus, when the first tracks of the stadiums are full with crowd and the noise of the crowd is high, home teams earn more yellow and red cards. Harb-Wu & Krumer (2019) identifies the negative effect of the home team crowd in the competitions of biathlon. The expectation of the fans induces chocking by jeopardizing the athlete's attentional focus. In that circumstance, they are far away from the mechanical mode. Athletes may get stressed with the noise of the crowd, and their adrenaline might increase. In that psychological tremor, their precision would decrease. Another explanation is stress out of the stadium. Thus, in home matches athletes meet the shareholders and sponsors, to whom they have financial obligations, it might stress them out. Further, reasoning was that in the home games athletes would spend more time with family and friends just before the matches, as a result being less prepared for the games or the more media attention might tire them up (Harb-Wu & Krumer, 2019). The results here does not support these postulations, however.

Correspondingly, the findings rejects the Territoriality model, which is suggested by Allen and Jones (2014). In line with the protective response of animalistic character of the human, when they compete at home stadium the opinion of the invasion of the perceived territory results in the protective response and more aggression out of increased testosterone. In the sample of the ice hockey players, the cortisol hormone, which is related to stress, also has been detected higher in the home games in comparison to the away games indicating more stress at home games (Allen & Jones 2014).

Morita & Araki (2022) recently reviewed the impact of the social pressure on the match outcomes in case of specifically Japan's 2020 season with difference in difference estimation of two-way fixed method and discovered significant effect on referees, of which magnitude is not high. The referees are more prone to call fouls for the away teams with crowds, but no effect on issuing the yellow cards. Fouls for home teams have reduced in the existence of crowd, too. I utilized a fixed effect estimation as well with the overlapping sample with this study, and discovered the negative impact of the crowd on the referee decision. Further difference between these two studies is that Morita and Araki treated the crowd attendance step by step first when there was no crowd, secondly when only the home team fans were allowed as an initial part of opening, and lastly when the fans of both teams were allowed. Here, however, no such approach toward crowd happened, moreover the previous year's crowd participant was also added into my sample. Given that the volume of the average participation in the season 2018/2019 was at least triple of the season 2019/2020, noticeably impact of crowd on home team yellow cards could have been due to the high proportion of the former season.

Morita & Araki found that because of the pressure of the crowd the referees are more prone to punish the away teams, but with little magnitude. The similar result is evident in the paper of the Picaze-Tadeo et al. (2017). The referees become more inclined to issue a disciplinary action against the away teams once a foul has happened and a ground has been set,

implying the little likelihood of punishment of away teams upon the social pressure. I confirm the existence of the complimentary bias by the referees, however instead of punishing the away teams, it is more on favoring and closing eyes to the home teams. Sutter and Kocher's (2014) conclusion on home team favouring decisions by the referees accounts to the fact that such decision appear once the home teams are behind the away teams, therefore higher social pressure has occupied the stadium. My research discards the consideration of scores during the game and their impact to the game final results. Also, these two studies were conducted far before the pandemic that did not experience the long-lasting shock affecting every aspect of life.

When it comes to the passion and noise of the crowd as an influential factor as highlighted by Stefani et al., (2008), Greer (1983) as well as Nevill et al. (2002), it is confirmed in this study, as the crowd size was significant. In the open games where the spectators size varied from couple of hundreds to over 20 thousand fans, obviously there would be difference in the noise level. So, the referee or player under the pressure of the noise have to demonstrate a different behaviour.In reference to the study of Goumas (2012), (1) density of the crowd, and (2) passion level of the crowd are more influential rather than the total size of the crowd. Even the biggest number of the crowds noted here might have lower density in the stadium resulting in the low pressure, and this is not tested. Additionally, the same study by Goumas finds that the crowd influences the referees more than it does to the players.

Several studies examining the crowd influence on the match outcomes by using the COVID19 natural shock finds that the likelihood of home teams' victory reduce and home teams' punishment increases once the crowd is absent (Leitner & Richlan, 2021; Sors et al., 2021).

Fischep &Haucap (2020) finds no variance in the match outcomes in the lower division of German football league with the exception of the first division. The situation in the 1st division stabilizes over time as the players get used to the new normal (Fischep &Haucap, 2020).

This might address the other findings that collide with of this paper, such as Santana et al. (2021), who also examine the case of Bundesliga. Here, the case in Bundesliga might be specific or the stabilization over the time as individuals gets used to the new normal might be omitted. Thus, study of Sanches and Lavin (2020) supports the findings of my paper who extended their samples to 4 more European leagues alongside Germany. The home win share remains the same despite overall decline in the goals scored by both teams as in the case of 3 Asian countries in this paper. They find these results by executing the following tests Pearson's Chi-square, t-Student, Pearson's correlation and the general univariate linear model.

CONCLUSION

The paper utilizes the natural shock emerging out of the COVID19 pandemic to measure the widely discussed topic of the crowd as an underlying element in HA advantage in the match outcomes. For this end, I utilize the methodology utilized by the Bryson et al. (2021) and apply it to the data set exerted out of the leagues of the 3 Asian countries. In conjunction with the literature, I postulate the negative impact of the absence of the crowd and positive impact of the crowd size on the match outcomes factoring home teams. Vice versa is claimed for the away teams.

In the methodology part, I used fixed effect Ordinary Least Squared to identify the impact of the predicted items on the match outcomes by treating the home team, away team and referees as fixed set of items.

I find that significant relations the variance in the crowd size with several home team favouring match outcomes. Significant relation has been discovered between the crowd size and the home team yellow cards and away team goals. This might be explained with the psychological models that the crowd in the stadium generates stress intimidating the away team players thereby affecting their performance and referees thereby affecting their decision.

The implications of the research emphasize the importance of the venues. Teams playing in away games are disadvantaged. In that regard, the players that are to play in away venues are recommended to be provided with psychological consulting services. At the same time, to ensure the accuracy and transparency of the decision making, adequate measures should be taken by the Football Federations organizing the matches and championships to amend the refereeing system, as any type of measures focused on the referees particularly would be unsuccessful. At the end of the, they are human and their emotional stability and durability might be prone to outside influences regardless the trainings. The optimal option would be identifying methods to induce the technological tools to the refereeing. Having this in mind,

also all championships should be designed in a way each times play with the same opponent at home and away venues 1 times during the same year.

Furthermore, future research might be undertaken to elaborate the details of the crowd size. For example, density of the crowd besides the quantity of the spectators, or their placement e.g., first track, or back track etc. can be further examined to identify how specifically the crowd affects the match results.

REFERENCES

1.   Allen, M.   S.,   & Jones, M.   V. (2014). The   home   advantage   in   athletic competitions. *Current   Directions   in   Psychological   Science*, 23(1), 48–53. https://doi.org/10.1177/0963721413513267

2. Balmer, N. J., Nevill, A. M., Lane, A. M., & Ward, P. (2007). Influence of crowd noise on soccer refereeing consistency in soccer. Journal of Sport Behavior, 30(2), 130.

3. Boyko, R., H., Boyko, A. & Boyko, M. (2007). Referee bias contributes to home advantage in English Premiership football, Journal of Sports Sciences, 25:11, 1185-1194, DOI: 10.1080/02640410601038576

4. Buraimo, B., Forrest, D. and Simmons, R. 2010. The 12th man?: Refereeing bias in English and German soccer. Journal of the Royal Statistical Society (A), 173: 431–449.

5. Burstztyn, L., and Jensen, R. (2017). Social image and economic behavior in the field: Identifying, understanding, and shaping social pressure. Annu. Rev. Econ., 9 (1), pp. 131-153

6. Correia-Oliveira, C., R. & Andrade-Souza, V., A. (2021). Home advantage in soccer after the break due to COVID-19 pandemic: does crowd support matter?, International Journal of Sport and Exercise Psychology, DOI: 10.1080/1612197X.2021.1934716

7. Courneya, K. S., & Carron, A. V. (1992). The home advantage in sport competitions: A literature   review. *Journal   of   Sport   and   Exercise   Psychology*, 14(1), 13–27. https://doi.org/10.1123/jsep.14.1.13

8. Dennis Riedl, D., Bernd Strauss, B., Andreas Heuer, A., & Oliver Rubner, O. (2015). Finale furioso: referee-biased injury times and their effects on home advantage in football, Journal of Sports Sciences, 33:4, 327-336, DOI: 10.1080/02640414.2014.944558

9. Fischer, K., and J. Haucap (2020). "Does Crowd Support Drive the Home Advantage in Professional Soccer? Evidence from German Ghost Games during the COVID-19 Pandemic". Technical report, DICE Discussion Paper.

10. Grover, N. (2021, March 31). *Football teams retain home advantage with no crowd, study finds.* The Guardian. Retrieved January 29, 2022, from https://www.theguardian.com/science/2021/mar/31/football-teams-retain-home-advantage-no-crowd-study

11. Harb-Wu, K., & Krumer, A. (2019). Choking under pressure in front of a supportive audience: Evidence from professional biathlon. Journal of Economic Behavior & Organization, 166, 246–262. https://doi.org/10.1016/j.jebo.2019.09.001

12. Leitner, M. C., & Richlan, F. (2021). No Fans–No Pressure: Referees in Professional Football During the COVID-19 Pandemic. *Frontiers in Sports and Active Living*, 3(2624–9367). https://doi.org/10.3389/fspor.2021.720488

13. Picazo-Tadeo, A. A, González-Gómez. F., & Guardiola. J. (2017). Does the crowd matter in refereeing decisions? Evidence from Spanish soccer, International Journal of Sport and Exercise Psychology, 15:5, 447-459, DOI: 10.1080/1612197X.2015.1126852

14. Pollard, P. (2006). Worldwide regional variations in home advantage in association football, Journal of Sports Sciences, 24:3, 231-240, DOI: 10.1080/02640410500141836

15. Pollard, R. (2008). Home Advantage in Football: A Current Review of an Unsolved Puzzle. The Open Sports Sciences Journal, 1, 12–13. https://opensportssciencesjournal.com/contents/volumes/V1/TOSSJ-1-12/TOSSJ-1-12.pdf

16. Sánchez, A., J. & Lavín, J., M. (2021). Home advantage in European soccer without crowd, Soccer & Society, 22:1-2, 152-165, DOI: 10.1080/14660970.2020.1830067

17. Santana, H. A. P., Bettega, O., B. & Dellagrana, B. (2021). An analysis of Bundesliga matches before and after social distancing by COVID-19, Science and Medicine in Football, 5:sup1, 17-21, DOI: 10.1080/24733938.2021.1903540

18. Smith, R., Ciacciarelli, A., Serzan, J., & Lambert, D. (2000). Travel and the Home Advantage in Professional Sports. *Sociology of Sport Journal*, 17(4), 364–385. https://doi.org/10.1123/ssj.17.4.364

19. Sors, F., Grassi, M., Agostini, T. & Murgia., M. (2022) The influence of spectators on home advantage and referee bias in national teams matches: insights from UEFA Nations League, International Journal of Sport and Exercise Psychology, DOI: 10.1080/1612197X.2022.2044367

20. Stefani, R. (2008). Measurement and interpretation of home advantage. In J. Albert & R. Koning (Eds.), Statistical thinking in sports, 203–216. Boca Raton, FL: Chapman & Hall/CRC, Taylor and Francis Group.

21. Witt, R., and Rickman, N. (2005). Favouritism and financial incentives: A natural experiment. School of Economics Discussion Papers 0105, School of Economics, University of Surrey.

APPENDIX

Table 4. The details of the top tier leagues in China, Japan and Korea

	Chinese Super League	J1 League	K League 1
Tier	1st	1st	1st
Est.	2004	1992	1983
Competing teams per season	18 (2022)	18	12
Relegation slot	2	2	2
Dominant Teams	Guangzhou (8 titles/2 runners up) Shandong Taishan (4 titles/ 2 runners up) Beijing Guoan (1title/ 4 runners up) Shanghai Port (1 title/ 3 runners up)	Kashima Ant. (8 titles/ 3 runners up) Yokohama F. (4 titles/ 4 runners up) Kawasaki Fr. (4 title/ 3 runners up) Jubilo Iwata (3 title/ 3 runners up)	Jeonbuk Hyundai (9 titles/ 2runners up) Seongnam (7 titles/ 3 runners up) FC Seoul (6 titles/ 5 runners up) Pohang Steelers (5 titles/ 4 runners up)
Average attendance	23314 (2019)	20751 (2019)	8065 (2019)
Overall attendance	5.595 mln (2019)	6.349 mln (2019)	1.596 mln (2019)
Most attended clubs	Guangzhou Beijing Guoan Jiangsu Chongqing	Urawa Red Diamonds FC Tokyo Gambo Osaka Nagoya	FC Seoul Jeonbuk Suwon Bluewings Daegu

Note: In China, the number of the participating clubs was 16 by 2022. For the attendance rates, the statistics of 2019 are presented as it was the last year of the normal times before the pandemy.