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Incentives matter sometimes: On the differences between league and Cup football matches

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Abstract

Economic agents react to incentives, and this holds true for professional football teams as well. Double round-robin and single-match elimination represent two opposite competition regimes, with incentives varying distinctly between them. At the level of individual matches, a single defeat needs not be fatal under a double round-robin regime, unlike in a single-match elimination system. Utilizing data from Dutch professional football spanning from the 2004/05 season to the 2022/23 season, we compare single-match elimination Cup matches with double round-robin league matches, focusing on stadium attendance, match results, and home advantage. Stadium attendance tends to be lower in Cup matches, although the gap narrows in later stages of the Cup tournament, and it eventually disappears. The home advantage is similar in Cup matches and league matches, but when Cup matches extend beyond regular time, the home advantage diminishes. In later stages of the Cup tournament, both during extra time and penalty shootouts, home advantage appears to be virtually absent.

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1. Introduction

Incentives play a crucial role in shaping the behavior of economic agents. For understanding how incentives affect this behavior, analyzing sports data is very helpful (Bar-Eli et al., 2020). Professional sports matches often involve high stakes, influencing the allocation of effort within and between matches. Sports data are clear on the outcome of effort in terms of winning or losing and information on this is available on a regular basis. Professional football teams do not form an exception to this principle. In professional football, the double round-robin and single-match elimination formats represent two distinct competition regimes. They each have their own set of incentives. Under a single-match elimination system, a sole defeat is fatal, since 'lucky losers' are a rare exception. This sharply contrasts with the double round-robin system. These differences in incentives are likely to affect the behavior of match attendants, but also of individual players and, thus, team performance.

In our paper, we analyze the disparities between these two opposing competition regimes. Specifically, we compare single-match elimination in the Dutch Cup (known as the KNVB-beker; KNVB stands for Koninklijke Nederlandse Voetbalbond, in English: Royal Dutch Football Association) to double round-robin Dutch league matches (Eredivisie and Eerste Divisie, the first and second tiers of Dutch professional football, respectively). In the Dutch Cup, a random draw determines the opponents and the home advantage. Moreover, the nature of every match is 'prevail or fail'. Our analysis spans 19 seasons of Dutch professional football, from 2004/05 to 2022/23, examining data from every Cup match played (club X, at home, versus club Y), alongside information on both the equivalent league match (X, at home, versus Y) and the mirror match (Y, at home versus, X), all played within the same season. Our dataset enables us to explore potential differences in stadium attendance, match results, and home advantage between league and Cup matches. The structure of our paper is as follows. In section 2, we present an overview of the literature on attendance, match results and home advantage. Section 3 discusses different competition regimes and the related incentives. Section 4 provides a brief historical overview of the Dutch Cup and of our dataset, along with relevant descriptive statistics. Section 5 presents an empirical analysis of differences in stadium attendance between Cup matches and league matches. Section 6 focuses on differences in home advantage between Cup matches and league matches. Section 7 concludes.

2. Literature review

Only a few studies have analyzed differences between Cup matches and league matches. Dixon and Coles (1997) present an analysis of English league and Cup football matches played in the early 1990s, but they do not consider potential differences between the two types of matches. Instead, they use Cup matches, because, in these matches, often teams from different leagues play against each other. Szymanski (2001) uses this feature of the Cup tournament, because it implies that, on average, Cup matches are much more unbalanced than divisional matches. The focus of his analysis is on the relationship between competitive balance and stadium attendance. He compares attendance in English FA Cup matches with equivalent league fixtures played in the same season, finding a relative drop in stadium attendance for FA Cup

matches. Up to the mid-1980s the attendance at FA Cup matches was substantially higher. However, in the last decade of the twentieth century, attendance was about the same. Szymanski (2001) attributes this to the FA Cup becoming a more unbalanced tournament. The remainder of this literature review consists of two separate parts. Firstly, we review the literature with respect to stadium attendance. Secondly, we discuss some major contributions concerning competition formats and incentives and the effects on results and home advantage.

2.1 Stadium attendance

Studies concerning stadium attendance in professional football offer various explanations for the size of the crowd. Some form of competitive intensity is an important factor in many contributions. For example, Scelles *et al.* (2013) examine the explanatory factors for stadium attendance at matches in Ligue 1, the highest tier of French male football, in the period 2008-2011. Their focus is on the influence of both pre-match competitive balance – measured as the point-difference between the two teams - and pre-match competitive intensity, measured as the point-difference for the hosts compared to rankings with sporting consequences, such as qualification for an UEFA tournament. They find that the effect of competitive balance is insignificant. However, competitive intensity turns out to exert a positive influence. Thus, potential attendants appear to value being in contention higher than single-match uncertainty. This is in line with Pawlowski and Nalbantis (2015), who study the highest tiers of Austrian and Swiss male professional football in the 2008/09-2012/13 seasons. One of their main findings is that, if a club is still in contention for the league title, this will foster attendance.

Bond and Addesa (2020) also study the effect of competitive intensity on stadium attendance for three seasons, 2012/13 to 2014/15, in the Serie A, the highest tier of Italian male professional football. They also find that competitive intensity exerts a significant positive influence on stadium attendance. This concerns all sporting prizes, with the qualification for the UEFA Europa League (UEL) as a notable exception. The attendance is also higher when the ranking of the home team exceeds the expectations of the fans prior to the season, which points at reference-dependent preferences. Again, being in contention affects attendance positively, while better-than-expected results may attract additional spectators.

Valenti *et al.* (2020) analyze the explanatory factors of stadium attendance in the UEFA Women's Champion League at 554 matches in the seasons 2009/10 to 2017/18. They distinguish between five factors that foster attendance: competitive intensity and the stage of the competition play a vital role, apart from the uncertainty of the match outcome, the reputation of the away team and the weather conditions. For example, a large goal difference in the first leg significantly negatively affects attendance in the second leg. Evidently, when one of the teams is no longer really in contention to proceed to the next round, attendance tends to be lower.

Hautbois et al. (2022) examine the effects of the intensity of the competition on stadium attendance in Ligue 1 in the period 2009–2019, by making use of a practitioner-friendly visualization approach. The effects of the intensity of the competition, related to the

distinguished sporting targets, on attendance appears to be positive. Guironnet (2023) analyses the English Premier League (EPL) and the French Ligue 1 in the seasons 2016/17 and 2017/18. For Ligue 1, he finds a positive relation between competitive balance and stadium attendance. This especially holds for teams capturing tickets for UEFA competitions. Once more, being in contention for a sports target turns out to stimulate attendance.

The quality of opponents, sometimes enhanced by the presence of fans' idols, also appears in some studies. For example, Addesa and Bond (2021) investigate the main explanatory factors of stadium attendance in the Serie A, in the seasons 2012/13 to 2018/19. Amongst others, they find a preference of the Italian fans for better opponents. Guironnet (2023) also finds that, in the EPL, the relation between the appearance of top players and stadium attendance is positive. Moreover, in the EPL, matches between the traditional six top-clubs (London-based Arsenal, Chelsea, and Tottenham Hotspur, as well as Liverpool, Manchester City and Manchester United) are featured by a higher stadium attendance.

Wills *et al.* (2023) investigate the explanatory factors of stadium attendance demand in the male UEFA Champions League (UCL). They examine 1,234 matches from the 2009/10 season to the 2018/19 season, covering 32 football associations. They do not find a significant positive association between either outcome uncertainty or competitive intensity with higher attendances. However, team quality appears to be universally important. The appearance of top players only seems to be important for potential attendants outside the UEFA's top-five leagues (England, France, Germany, Italy, and Spain).

Match uncertainty is another factor that appears in some contributions. For example, Reilly (2023) finds strong evidence for a variant of the uncertainty of outcome hypothesis (UOH) at match-level. He studies second-leg matches from the European Champion Clubs' Cup, the now defunct predecessor of the UCL. This competition ran from the 1955/56 season to the 1991/92 season. In contrast, Pawlowski *et al.* (2018) investigate two matchdays in the German 1. Bundesliga, the highest tier of German male football, viz. the tenth round and the twenty-seventh round in the 2014/15 season. They find that the preferences of the fans for match uncertainty fall short of loss aversion.

Besters *et al.* (2019) study stadium attendance in the highest tier of Dutch male professional football from the 2000/01 season to the 2015/16 season. They also find that, for individual football matches, attendance is related to reference-dependent preferences with loss aversion dominating the preference for uncertain outcomes. This is in line with Szymanski (2003), who already points at the weak empirical support for outcome uncertainty stimulating demand for sports matches. Admittedly, towards the end of the season, outcome uncertainty regarding the final ranking becomes important.

Notably, Van Ours (2021) studies long-term developments (1956–2019) in stadium attendance in professional football in the Netherlands, finding that socio-economic developments have a strong influence. These results are in accordance with the findings of Reade and Van Ours (2023) for English professional football.

Some contributions also put forward physical conditions. For example, Schreyer and Däuper (2018) analyze the decisions of spectators with respect to attendance at 704 football matches in the German 1. Bundesliga between August 2014 and January 2017. No-show appears to hinge on poor weather conditions, such as rain and frost, and kick-off times, albeit only in midweek matches, in addition to the predictability of the match outcome and geographic rivalry. Competitive intensity seems to be unimportant.

Goller and Krumer (2020) examine 10,142 matches in the highest tiers of male professional football in England, France, Germany, and Spain, from the 2007/08 season to the 2016/17 season. They find lower attendances on the four days that are featured by a relatively low number of fixtures (Monday, Tuesday, Wednesday, and Thursday), as compared to the other three days, which are characterized by a relatively high number of fixtures (Friday, Saturday, and Sunday). Additionally, on infrequent matchdays, the home advantage for 'non-favorites' is significantly less.

Krumer (2020b) examines all matches in the group stage of the UEL from the 2009/10 season to the 2015/16 season. He finds that the stadium attendance is lower and home advantage is reduced, for teams positioned lower in the UEFA club ranking, for matches that start at 21.05 CET as compared to 19.00 CET. He attributes the lower stadium attendance for late matches to higher opportunity costs for potential stadium attenders who have obligations either at school or at work early next morning. Reduced home advantage follows from lower stadium attendance.

In conclusion, it seems plausible that competition intensity affects stadium attendance. This is likely to be an important factor in later stages of both the league and, especially, the Cup. The quality of the opponent and the presence of fans' favorites also enhances attendance. Finally, the matchday and the kick-off time affect attendance. This is probably to the disadvantage of the Dutch Cup. As we will describe in more detail later, most Cup-matches are played in the (late) evenings of weekdays, determined by the schedule of a commercial (live) broadcaster.

2.2 Home advantage, incentives, and results

Pollard and Pollard (2005) provide an overview of home advantage in professional football. They indicate that, in the English FA Cup, home advantage is lower than in the English league competitions.

Analyzing 2,013 German 1. Bundesliga matches, Krumer and Lechner (2017) conclude that home advantage depends on whether a match is played in the weekends or midweeks. In midweek matches, home advantage is virtually absent. They attribute this to lower attendances, which, in turn, lower the motivation of the players.

Van Ours (2019) investigates home advantage in the top league of Dutch professional football. He finds that teams who play on an artificial pitch benefit from a higher home advantage. Peeters and Van Ours (2021) study the evolution of home advantage in English football in recent decades. They find that home advantage shows a secular decline over time,

in addition to large fluctuations over time. Home advantage correlates positively with stadium attendance and the use of artificial pitches.

Csató (2021) discusses the interaction between the Dutch Eredivisie and Dutch Cup directly, viz. the case of the match of Heerenveen versus Feyenoord in the final round of the 2011/12 season. In summary, Heerenveen had to avoid a draw, not a loss, at any cost, to be certain of a direct ticket for the UEL. This example shows that peculiar incentives may trigger peculiar behavior.

Scelles and Andreff (2019) study 2,584 international matches in the 2011-2013 period. Home advantage and being favorite appear to exert a significant positive effect on the performance of national teams. However, the estimated coefficients diverge, referring to different effort-levels, hinging on incentives. The highest coefficient applies, if only the favorite has something to play for. Next, the second highest coefficient is applicable, if both teams are still in contention. Subsequently, the third highest and the fourth highest apply, depending on the models used, if only the underdog is still in contention and if no team has something to play for anymore, respectively. Finally, the lowest coefficient applies to international friendlies.

Scelles (2021) focuses on intra-match competitive balance and intensity in both the qualification and the final tournament of both UEFA Euro 2012 (16 participants) and UEFA Euro 2016 (24 participants). Both competitive balance and competitive intensity have substantially risen in UEFA Euro 2016 as compared to UEFA Euro 2012. Besides, the intensity of the final tournament of UEFA Euro 2016 was higher. Furthermore, the foundation of the UEFA Nations League (UNL) in 2018 has led to more matches with sporting stakes. Thus, these changes have raised both competitive intensity and competitive balance in national team matches under the patronage of UEFA.

Scelles *et al.* (2024) investigate 1,058 international matches played in two distinguished periods: 503 games from the period 2014-2016, prior to the start of the UNL, and 555 games from the period 2018-2021, since the establishment the UNL. The replacement of many international friendlies by the UNL raised competitive intensity. However, competitive balance worsened, due to altered incentives in the Euro qualification matches for the strongest as well as the weakest teams.

One should note that most of these studies concern inter-country matches or international club matches. Firstly, inter-country home advantage may be different from intra-country home advantage. Secondly, the double round-robin qualification leagues and the single round-robin group stages in the final tournaments are much smaller than regular leagues. Just like the group stages, the knock-out parts of the final tournaments are played within a very short span of time. This makes comparison to domestic leagues and Cups a rather difficult one.

3. Competition and incentives

3.1 Different competition regimes

Teams compete in football matches under various competition formats. The most common structure is the double round-robin system, prevalent in most domestic leagues worldwide. Under this system, each team competes against all others twice, once at home and once away. Notable exceptions to this format include the A-League Men in Australia and New Zealand, the Belgian Pro League, 1. Bundesliga in Austria, the Major League Soccer in the USA, and the Scottish Premiership. In double round-robin leagues, the final ranking is determined by the number of points accumulated, with three points awarded for a win, one for a draw, and none for a loss. In cases where two teams finish with the same number of points, tiebreakers such as goal difference, goals scored, and head-to-head results are used to determine the final standings.

In contrast, many domestic Cup competitions operate under a single-match elimination system. In these tournaments, teams compete in a series of one-off matches, with the victor of each match advancing to the next round. In the event of a draw at the end of regular time, extra time is typically played, followed by a penalty shootout, if necessary, to determine the winner. Nearly every professional team, particularly in Europe, participates in some form of Cup competition, alongside their league commitments. In England and Scotland, for instance, two prominent Cup tournaments take place annually. All members of the Football Association (FA), across various levels of the football pyramid, participate in the FA Cup. On the other hand, only clubs from the full professional leagues partake in the League Cup. Home advantage and opposing teams are determined through a draw conducted soon after the preceding round. It is worth noting that the final, a showdown between the last two remaining teams, typically occurs at a neutral venue. For instance, in England, the final is often held at Wembley Stadium, while in the Netherlands, it takes place in the Feyenoord Stadium, also known as 'De Kuip'.

3.2 Diverging incentives: match-level

In a single-match elimination system, a random draw determines both the opponents and the home advantage. Notably, even the strongest team can face elimination due to a poor performance on the day. For instance, in the 1995/96 season, Ajax clinched victories in the European Super Cup, the Intercontinental Cup, and the Eredivisie. Additionally, they were runners-up in the UCL, narrowly losing the final against Italian champions Juventus in Rome after a penalty shootout. However, Cambuur, a sub-top team from the second tier, stunned Ajax in the round-of-sixteen of the Dutch Cup with a clear 2-0 victory.

In contrast, Ajax secured victory in the inaugural double round-robin Eredivisie in the 1956/57 season, despite losing seven out of thirty-four matches. In conclusion, the significance of a single defeat in the Cup tournament sharply contrasts with the possibility of enduring numerous defeats without jeopardizing a team's chances of clinching victory in the league.

3.3 Diverging incentives: competition-level

The reward structure for professional football teams typically exhibits characteristics akin to a winners-take-all system. To illustrate, one can summarize the Dutch professional football season 2022/23 by prioritizing Feyenoord (from Rotterdam) as league champions and PSV (from Eindhoven) as Cup-winners. Feyenoord emerged victorious in a double round-robin competition comprising thirty-four matches, while PSV triumphed in a single-match elimination tournament spanning six rounds, in addition to two qualifying rounds for amateur teams.

The Cup tournament prominently features winner-take-all characteristics. Firstly, the Cup-winners secure a tangible trophy. Secondly, they earn qualification for the UEL. Winning the league also guarantees silverware, along with qualification (including qualifying rounds) for the UCL, underscoring the presence of the winner-take-all element.

Several sub-top teams, numbering four or five, also qualify for UEFA tournaments, while four lower-ranked teams secure spots in the play-offs for UEFA tournaments. These teams, along with others positioned above the relegation zone, retain their places in the first tier of Dutch professional football. This arrangement yields favorable financial implications through increased attendance, media rights, merchandise sales, and sponsorship deals. Conversely, the three poorest-performing clubs face relegation, with the best among them forced to participate in promotion/relegation play-offs, risking demotion, while the other two automatically descend to the second tier, incurring substantial financial losses. This dynamic mirrors aspects of the conventional labor market, where some workers transition to better positions within or outside organizations, while others receive pay raises or additional training. Meanwhile, some workers maintain their current positions, while unfortunate individuals face demotion or termination.

4. Cup and league matches in professional football in the Netherlands

4.1 The history of the Dutch Cup

The Dutch Cup commenced in the 1898/99 season. Consequently, the Dutch Cup is younger than the English FA Cup, which originated in the 1871/72 season. Nevertheless, it predates the Spanish Cup (Copa del Rey, 1902), the French Cup (Coupe de France, 1917/18), the Italian Cup (Coppa Italia, 1921/22), and the German Cup (DFB Pokal, 1935/36).

It took considerable time for the Dutch Cup to establish a firm foothold in Dutch football. During the non-professional era, until November 1954, many amateur players preferred football-free weekends, while other teams prioritized friendly matches, sometimes abroad, over Cup participation. Consequently, clubs did not take the Cup tournament very seriously. In 1950, the KNVB discontinued the Dutch Cup, after PSV emerged as winners, keeping the trophy in their cabinet for the next seven years.

In the 1956/57 season, Dutch professional football finally adopted a pyramid structure. Simultaneously, the KNVB reintroduced the Cup tournament. However, this revival was short-lived, lasting only three seasons, until the KNVB again abandoned the Cup tournament after the 1958/59 season, due to lack of club interest. Nonetheless, by 1960, the KNVB had to

reverse this decision, as the UEFA Cup Winners Cup commenced in the 1960/61 season without Dutch participation. In the same season, the Dutch Cup resumed, garnering increased interest from clubs, as Cup victory now also meant qualification for an UEFA tournament.

Over the years, the KNVB experimented with various formats, including single round-robin group stages, two-legged quarterfinals, semifinals, and finals, with home and away matches. The participation of amateur teams has fluctuated, with current regulations ensuring their involvement at least in the preliminary round, often as a reward for winning regional amateur Cup competitions. Since the 1988/89 season, the Dutch Cup final has been held at the Feyenoord stadium ('De Kuip'). Since the 2003/04 season, the Dutch Cup has adopted a simpler format with only single-legged knockout matches and amateur participation. Outdated rules from the past, such as the away team progressing in case of a draw, have been discarded. A draw at the end of regular time now leads to two periods of 15 minutes of extra time, followed by a penalty shootout, if necessary.

4.2 Data description

In our analysis, we only include matches between professional football clubs. We collected information about matches in nineteen seasons, from 2004/05 up to and including 2022/23. For every Cup match played (club X, at home, versus club Y), we also obtained data – results and attendances – about the equivalent league match (X, at home, versus Y) and about the mirror match (Y, at home, versus X). Furthermore, we collected information about the day of the week that matches were played and about the starting times of the matches. Finally, we collected bookmaker betting odds information to calculate expected win probabilities and expected points for each match.[1]

Table 1 provides summary statistics for each of the groups in our sample: Cup matches, league matches, and mirror matches. We exclude the Cup finals in this overview. The average number of stadium attendants in non-final Cup matches is 11,400, while in league matches it is 16,100 and in mirror matches 15,200. We consider three match outcomes: (ex-post) win probability, number of points and goal difference. Thereby, we present the results from the perspective of the home team in the Cup match. The results in the league matches are somewhat better than the results in the equivalent Cup matches. For example, in the Cup matches, the win probability of the home team is 44 percent, against 47 percent in the equivalent league matches. The results in the mirror league matches are substantially worse than in the equivalent league matches. We also present expected win probability and expected points, both based on bookmaker data (see Appendix A1). Clearly, the expected win probabilities are in line with the actual win probabilities. The same holds for the expected points.

[1] Sources: flashscore.nl, worldfootball.net, various Wikipedia pages and ESPN.nl. For 21 Cup matches there is missing information on attendances in the seasons 2004/05-2006/07. Bookmaker odds are from betexplorer.com. The conversion from odds to expected win probabilities and expected points is straightforward (cf. Stadtmann, 2006, see also Appendix A1 for an example).

Table 1 Summary statistics various indicators: from the perspective of the home-team in the Cup matches

	Type of match			Home advantage	
	Cup	League	Mirror	Cup	League
	(1)	(2)	(3)	(4)	(5)
Attendance (1,000)	11.4	16.1	15.2		
Win probability	0.44	0.47	0.33	0.06	0.07
Points	1.57	1.68	1.22	0.18	0.23
Goal difference	0.32	0.55	–0.26	0.29	0.41
Expected win probability	0.47	0.47	0.33	0.07	0.07
Expected points	1.63	1.64	1.19	0.22	0.22
Observations	317	317	317		

Note: Excluding Cup finals. Expected results based on bookmaker odds

Our data allow us to establish the home advantage in regular matches by combining information from the league matches and the mirror matches. We assume that the following relationship between match outcome *R*, home advantage *H* and the difference in quality (strength) ΔQ between home team *i* and away team *j* in season *t* holds:

$$R^h_{ijt} = H_{it} + \Delta Q_{ijt}. \quad (1)$$

So, the result of team *i* against team *j* is equal to sum of the home advantage of team *i* in season *t* and the difference in quality between the two teams in season *t*. Similarly, the result of home team *j* against away team *i* is equal to the sum of the home advantage of team *j* and the difference in quality:

$$R^h_{jit} = H_{jt} + \Delta Q_{jit}. \quad (2)$$

If we assume that home advantage is not team-specific ($H_{it} = H_{jt} = H_t$) and the difference in quality is symmetric ($\Delta Q_{ijt} = -\Delta Q_{jit}$), the result in the second match from the perspective of away team *i* is:

$$R^a_{ijt} = -H_t + \Delta Q_{ijt}. \quad (3)$$

Therefore:

$$R^h_{ijt} - R^a_{ijt} = 2H_{it}. \quad (4)$$

Using the sample averages of the variables in equation (4), we find for the average home advantage:

$$\bar{H} = (\bar{R}^h - \bar{R}^a)/2. \quad (5)$$

So, average home advantage is simply the average difference of the average results.

Using equation (5), column (4) of Table 1 shows that, for matches equivalent to non-final Cup matches, the average home advantage is six percentage points (0.06) in terms of win

probability, 0.18 in terms of points and 0.29 in terms of goal difference.[2] Column (5) of Table 1 shows average home advantages in league matches. They are all somewhat higher than home advantages in Cup matches: 0.07 in win probability, 0.23 in points and 0.41 in goal difference. In reality, the home advantages in Cup matches are smaller than those in league matches. However, home advantages in terms of expected win probability and expected points are identical for Cup matches and league matches.

Table 2 Matches by day of the week and hour of the day

a. By day of the week

	Type of match			
	Cup	League	Mirror	Total
Monday	2	4	14	20
Tuesday	116	6	4	126
Wednesday	144	14	8	166
Thursday	54	5	3	62
Friday	0	76	83	159
Saturday	1	83	82	166
Sunday	0	129	123	252
Total	317	317	317	951

b. By hour of the day

	Type of match			
	Cup	League	Mirror	Total
12:15-12:30	0	27	20	47
14:30	1	78	94	173
16:30-16:45	2	29	12	43
18:00	4	1	0	5
18:30-18:45	44	28	24	96
19:00	6	3	1	10
19:30-19:45	20	31	38	89
20:00	102	87	90	279
20:15-20:30	3	6	8	17
20:45-21:00	135	27	30	193
Total	317	317	317	951

Table 2 gives an overview of the number of matches by day of the week and hour of the day. Excluding Cup finals and related matches there are 317 observations, each of Cup matches, league matches and opponent matches.[3] The majority of the Cup matches (99 percent) is played on Tuesday, Wednesday and Thursday, while on these days only a minority of the league matches and mirror matches is played (six percent). There have only been 11 Cup matches and 11 league matches that were played on the same day. In other words, there is virtually no common support to separate between Cup matches and other matches in terms of the effect of the day of the week on attendance. Panel *b* of Table 2 shows the number of matches by

[2] For Cup finals, we cannot specify results in terms of the home team, because they were always played in the same stadium.

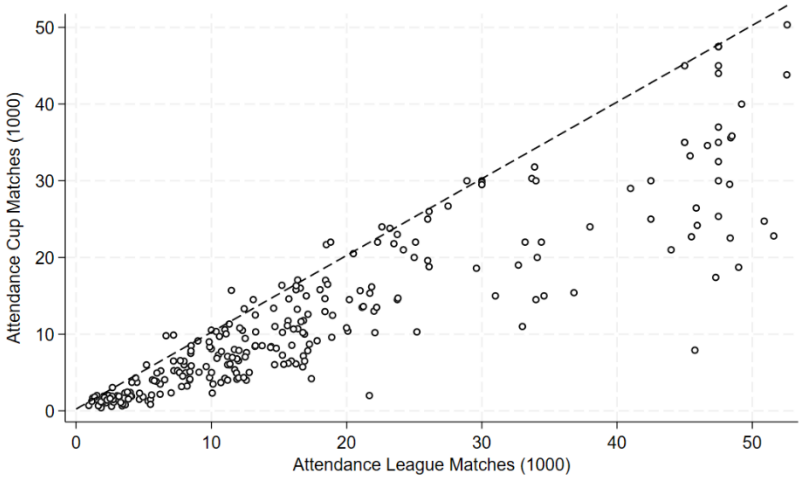
[3] In non-final Cup-matches a draw determines who plays at home. However, since 1989, the Cup final has always been played in in De Kuip, the home ground of Feyenoord, in Rotterdam. The 2010 Cup final between Ajax and Feyenoord was a two-legged one: the first match was played in the Johan Cruyff Arena, the home ground of Ajax, the second match was played in De Kuip.

hour of the day. Here there is more overlap but still the differences are large, and related to the day of the week the matches are played. Of the Cup matches, 98 percent is played after 18:00, while only 57 percent of the league matches is played after 18:00.

5. Stadium Attendance

Figure 1 shows the relationship between average stadium attendance in Cup matches and the related league matches, i.e., between the same teams.[4] Most observations are below the diagonal, indicating that the attendance at league matches is higher than the attendance at related Cup matches. There are various possible explanations for this. Marginal costs for attending a Cup match are higher than for regular matches. Indeed, supporters with seasonal tickets form the large majority of stadium attendants. For them, the marginal monetary costs of attending a regular match are zero, while, for a Cup match, they need to buy a ticket. It is also possible that the difference in stadium attendance results from the fact that pre-final Cup matches are almost all played on a weekday.

Figure 1 Stadium Attendance in Cup matches and equivalent league matches; 2004/05-2022/23

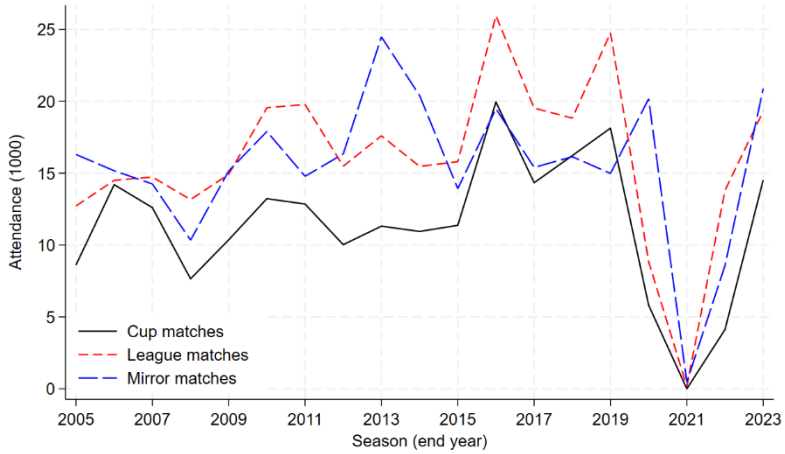


Note: Excluding Cup finals, season 2020/21 and matches with zero attendance

Figure 2 presents the developments in stadium attendance for the three types of matches we distinguish. There is a slight increase in stadium attendance over time. However, it is not clear whether this has to do with more interest in stadium attendance, or because of the matches in our sample. The increase comes to a hold after the 2018/19 season. Clearly, Covid-restrictions caused a big drop in stadium attendance after that season. In every season, Cup matches are less attractive than league matches in terms of stadium attendance. The mirror matches vary considerably over time, which may have to do with the particular pairs of teams competing.

[4] We exclude the season 2020/21, because of Covid-related attendance restrictions, and matches with zero attendance in 2021/22 (also Covid-related). During the 2020/21 season, most matches were played behind closed doors, while other matches faced severe attendance restrictions (see Van Ours (2024), for details).

Figure 2 Stadium attendance in Cup matches and equivalent league matches (1,000)



Note: Excluding Cup finals.

We start with an analysis of the difference in stadium attendance between Cup matches and league matches. We exclude from the analysis matches that were played behind closed doors and league matches for which comparable Cup matches had missing information about attendances. Then, we have information about 267 Cup matches and 267 league matches. The distributions of these matches over days of the week and hours of the day are given in Table 3. Panel *a* shows that Cup matches are – with the exception of one match – always played on Tuesdays, Wednesdays and Thursdays.[5] Average attendance is highest on Thursdays and by far the lowest on Tuesdays. Note, that this does not have to be a day-of-the-week effect but could be related to the particular pairs of home teams and away teams playing on Tuesdays. Furthermore, panel *a* shows that most of the league matches are played on Fridays, Saturdays and Sundays whereby on average stadium crowds are highest on Sundays and by far the lowest on Fridays. This too, may have to do with the particular pairs of teams that played on Fridays. The only day of the week with some overlap is Wednesday when, on average, for Cup matches there were about 15 thousand attendants, while for league matches (based on 13 matches only), there were about 20 thousand attendants.

Panel *b* shows that almost all Cup matches are played from 18:00 onwards, which makes sense because these are midweek matches. Only few league matches start after 20:00. Cup matches, on average, have a higher attendance if they start after 20:00; league matches have the highest attendance if they start before 17:00. Since virtually all Cup matches are played midweeks it is not possible to estimate the day-of-the-week effect on attendance. The hour of the day a match starts may matter (Krumer (2020b)) and this is something we investigate.

[5] Heerenveen–PSV (1–3), in the round-of-sixteen of the 2009/10 Dutch Cup, was played on Saturday, 16 January 2010.

Table 3 Number of matches and attendance by day of the week and hour of the day

a. By day of the week

	Type of match			Attendance (1,000)	
Day of the week	Cup	League	Total	Cup	League
Monday	0	3	3	–	–
Tuesday	95	5	100	6.2	–
Wednesday	122	13	135	14.9	20.2
Thursday	49	2	51	18.9	–
Friday	0	57	57	–	6.8
Saturday	1	75	76	–	18.4
Sunday	0	112	112	–	23.4
Total	267	267	534	12.6	17.8

b. By hour of the day

	Type of match			Attendance (1,000)	
Hour of the day	Cup	League	Total	Cup	League
12:15-16:45	1	115	116	–	23.0
18:00-20:00	142	126	268	7.8	12.0
20:15-21:00	124	26	150	17.9	23.2
Total	267	267	534	12.6	17.8

We use the following equation in which the logarithm of stadium attendance *A* is regressed on a dummy variable *C*, if the match is a Cup match, and *W* is the home win probability calculated using data on bookmaker odds:

$$log(A_{ijt}) = \alpha_{ijt} + \beta\, C_{ijt} + \gamma_1\, W_{ijt} + \gamma_2\, W^2_{ijt} + \gamma_3\, L_{ijt} + \varepsilon_{ijt}, \quad (6)$$

where α_{ijt} represent a vector of group fixed effects (267 groups). The parameter β is the parameter of main interest, representing the effect of playing a Cup match rather than a league match. The parameter γ_1 indicates to what extent a match with a higher home win probability attracts more or fewer attendants; the parameter γ_2 measures whether there is a non-linearity in this effect. Since the kick-off time may influence attendance, we estimated equation (6) with an additional dummy variable *L* with a value of one (1) if the match was a late match (after 20:00) and a value of zero (0) otherwise. Finally, ε_{ijt} is the error term.

Table 4 shows the relevant parameter estimates of equation (6) for Cup matches and related league matches. The first column shows that the home win probability has a positive effect on stadium attendance, while Cup matches, on average, have 38.74 percent ($e^{-0.49}$-*1*) fewer stadium attendants than equivalent league matches. Late matches attract significantly more attendants. The second column of Table 3 shows that the squared win probability has no significant effect, suggesting that the effect of win probability is linear.

There is no reason to think that home advantage or stadium attendance would be affected by the stage of the competition. Perhaps towards the end of the competition some matches may be more interesting if there is more at stake: a championship, qualification for a UEFA tournament or possible relegation. This is different for Cup matches which become more

interesting at later stages when there is more at stake and – because of the knock-out set-up – the average difference in strength between two opponents tends to be smaller.

Table 4 Parameter estimates (log) stadium attendance: Cup and league matches

	(1)		(2)		(3)		(4)		(5)	
Win probability	0.95	(0.37)**	1.94	(1.39)	1.10	(0.34)***	2.24	(1.37)		
Win prob-squared			-1.02	(1.28)			-1.17	(1.24)		
Cup	-0.49	(0.03)***	-0.49	(0.03)***	-0.59	(0.05)***	-0.60	(0.05)***	-0.60	(0.05)***
Round of 32					0.07	(0.07)	0.07	(0.07)	0.07	(0.07)
Round of 16					0.19	(0.06)***	0.20	(0.06)***	0.19	(0.06)***
Quarter-final					0.09	(0.08)	0.09	(0.08)	0.10	(0.08)
Semi-Final					0.52	(0.06)***	0.52	(0.06)***	0.51	(0.06)***
Late match	0.10	(0.04)**	0.10	(0.04)**	0.05	(0.04)	0.04	(0.05)	0.04	(0.04)
R-squared within	0.56		0.56		0.62		0.62		0.61	

*Note: Based on 534 matches (267 Cup and 267 league). Late match is a match that started after 20:00. No Cup finals. No matches with zero attendance (due to Covid-restrictions). All estimates contain group fixed effects (267); in parentheses standard errors clustered by group; ***, **, *: significant at a 1%, 5%, 10% level.*

The third column shows the attendance effects by the stage of the Cup tournament. In the first rounds of the Cup tournaments the average ticket prices are lower. Furthermore, for quite a few clubs, the seasonal-ticket holders can visit the first home match in the Cup tournament for free. In the round-of-sixty-four (the reference group), attendance is about 45 percent lower. The difference in stadium attendance between Cup and league matches diminishes as the Cup tournament progresses, such that in the semi-final the difference has virtually disappeared. Clearly, in the semi-finals, teams are highly in contention for Cup victory, which fosters attendance. With the introduction of Cup stage as an explanatory variable the effect of matches starting late disappears. This is because the share of late matches increases as the Cup tournament progresses. In the round-of-thirty-two, 35 percent of the Cup matches starts after 20:00; in the semi-finals this is 71 percent. So, what is measured as the effects of a late match in the first two columns of Table 4, is actually the effect of more matches starting after 20:00 in the final stages of the Cup tournament when attendance is increasing. Column (4) shows that again squared win probability has no significant effect. Column (5) shows that the parameter estimates of Cup and Cup stage are not much affected if the effect of win probability is ignored. This is most likely caused by the huge number of fixed effects we include in the analysis, i.e., a lot of the variation in attendance is picked up by investigating within-group differences.

6. Match results and home advantage

Whereas league matches can end in a home win, away win or a draw, Cup matches are different. Either the home team or the away team wins, after regular time, after extra time, or after a penalty shootout. Table 5 shows the results for Cup matches after regular time, after extra time and after penalty shootouts. Panel *a* of Table 3 gives an overview of the way in

which Cup matches (except Cup finals) are decided. Of the 317 matches in our sample (excluding Cup finals), 75 matches end with a draw in normal time. Out of these, at the end of extra time, 33 matches are still a draw. Of the 33 penalty shootouts, the home teams won 20 and the away team won 13.

Table 5 How Cup matches are decided; perspective of the home-team

	Number of matches				Percentages			
a. Matches (no Cup final)	**Win**	**Draw**	**Loss**	**Total**	**Win**	**Draw**	**Loss**	**Total**
Regular time	141	75	101	317	44	24	32	100
Extra time	23	33	19	75	31	44	25	100
Penalty shootout	20		13	33	61		39	100
Total	184		133	317	58		42	100
b. Semifinals & quarterfinals								
Regular time	38	14	27	79	48	18	34	100
Extra time	4	6	4	14	28	44	28	100
Penalty shootout	3		3	6	50		50	100
Total	45		34	79	57		43	100
c. Cup final								
Regular time	9	4	4	17	52	24	24	100
Extra time	1	3	0	4	25	75	0	100
Penalty shootout	1		2	3	33		67	100
Total	11		6	17	65		35	100

Note: in panel a, Cup finals are excluded. Panel c: for details of the Cup finals, see the appendix. In the Cup finals the perspective of the home-team is artificial as all Cup finals are played in De Kuip.

In extra time the home advantage is substantially smaller than in regular time. In contrast, in a penalty shootout the home advantage increases, with 61 percent of the home teams winning. Thus, a penalty shootout does not seem to be a lottery. This is in line with Krumer (2020a), who finds that higher ranked teams are more likely to win a penalty shootout. The home team is more likely to win a Cup match. Overall, the home win probability is 58 percent. Panel *b* of Table 5 shows how Cup matches are decided in the quarter-finals and semi-finals. In regular time, there is a clear home advantage, with home teams winning 48 percent of the matches and away teams winning 34 percent of the matches. However, in extra time and penalty shootouts the home advantage completely disappears. Finally, panel *c* provides information about the Cup finals. Of the seventeen Cup finals, four ended in a draw in regular time and three in a draw after extra time resulting in penalty shootouts (Table A1 in the appendix provides more details).

Table 6 Wins, draws and losses in Cup matches and league matches; from the perspective of the home team

	Regular Cup matches				
League	**Loss**	**Draw**	**Win**	**Total**	**Total (%)**
Loss	38	14	31	83	26
Draw	25	24	36	85	27
Win	38	37	74	149	47
Total	101	75	141	317	
Total (%)	32	24	44		100

Note: Excluding Cup finals.

Even though we paired Cup matches and league matches, the results of league matches are often not in line with those from Cup matches. As shown in Table 6, out of the 83 league matches that ended in a loss of the home team, only 38 ended in a loss in the Cup match. Similarly, out of the 149 league matches that ended in a win of the home team, only 74 ended in a win of the home team when it was a Cup match.

We investigate whether home advantage is different for Cup matches and league matches, using equation (5) that shows that average home advantage is equal to half the difference in the results of home matches and away matches: $(\overline{H} = (\bar{R}^h - \bar{R}^a)/2)$. Home advantage in league matches is equal to half the difference in means between league matches and mirror matches. For the home advantage in Cup matches, we also used the outcome in mirror league matches. The results of the calculations are shown in Table 7.[6]

[6] Note that the home advantages in panels a to c in the first column correspond to those reported in Table 1.

Table 7 Calculated home advantages in League matches and comparable Cup matches; win probability, points obtained, goal difference and loss probability (regular time and end of match)

	From 64	From 32	From 16	From 8	From 4
a. Win probability					
League	0.07 (0.02)***	0.08 (0.02)***	0.07 (0.03)***	0.06 (0.04)	0.05 (0.06)
Cup	0.06 (0.02)***	0.06 (0.02)***	0.05 (0.03)	0.05 (0.04)	0.00 (0.06)
Δ	-0.01 (0.02)	-0.02 (0.02)	-0.03 (0.03)	-0.01 (0.04)	-0.05 (0.06)
b. Points					
League	0.23 (0.05)***	0.25 (0.06)***	0.26 (0.08)***	0.18 (0.10)**	0.23 (0.18)
Cup	0.18 (0.05)***	0.16 (0.06)***	0.13 (0.08)*	0.11 (0.11)	0.06 (0.18)
Δ	-0.05 (0.05)	-0.09 (0.06)	-0.13 (0.08)**	-0.08 (0.11)	-0.16 (0.17)
c. Goal difference					
League	0.41 (0.08)***	0.44 (0.09)***	0.49 (0.12)***	0.51 (0.18)***	0.85 (0.31)***
Cup	0.29 (0.08)***	0.26 (0.10)***	0.27 (0.12)***	0.27 (0.18)*	0.32 (0.30)*
Δ	-0.12 (0.08)*	-0.17 (0.09)**	-0.22 (0.12)**	-0.25 (0.17)*	-0.53 (0.30)**
d. Loss probability (regular time)					
League	-0.09 (0.02)***	-0.09 (0.02)***	-0.11 (0.03)***	-0.07 (0.04)**	-0.13 (0.06)**
Cup	-0.06 (0.02)***	-0.05 (0.02)**	-0.04 (0.03)	-0.01 (0.04)	-0.06 (0.06)
Δ	0.03 (0.02)*	0.05 (0.02)**	0.07 (0.03)***	0.06 (0.04)**	0.06 (0.06)
Loss probability (end of match)					
League	-0.09 (0.02)***	-0.09 (0.02)***	-0.11 (0.03)***	-0.07 (0.04)**	-0.13 (0.06)**
Cup	-0.01 (0.02)	-0.00 (0.02)	0.02 (0.03)	0.04 (0.04)	0.00 (0.06)
Δ	0.08 (0.02)***	0.09 (0.02)***	0.13 (0.03)***	0.11 (0.04)***	0.13 (0.06)**
N	634	448	284	158	62

*Note: Excluding Cup finals; all estimates contain group fixed effects (317 groups); Δ is the difference in home advantage between Cup matches and league matches. The estimates of the league matches in panels d and e are identical; in parentheses standard errors; ***, **, *: significant at a 1%, 5%, 10% level.*

Panel *a* of this table shows that the home advantage in terms of win probability is smaller in Cup matches than in league matches, yet the difference is not significant. The same holds true for home advantage in terms of points obtained (panel *b*). The differences are sometimes substantial but still not significantly different from zero. The goal difference is substantially smaller in Cup matches and, in some cases, significantly different from zero. For example, as shown in panel *c*, on average, across quarter-final and semi-final matches, in comparable league matches the home advantage is 0.51 goals which is 0.27 goals in the related Cup matches, a difference significant at a 10%-level. In combination, the results in panels *a* to *c* of Table 7 suggest that there may a difference between Cup matches and league matches in terms of home advantage in the probability to lose.

Panel *d* of Table 7 shows the calculations for home advantage in loss probabilities during regular time showing that this is indeed the case. In the Cup matches from the round-of-thirty-two onward, except for the semi-finals, the probability to lose at home is significantly smaller than in comparable league matches. Finally, panel *e* of Table 7 shows that, if we take extra time and penalty shoot-outs into account as well, there is no longer a significant home advantage in Cup matches, while there is still a significant home advantage in the related league matches.

7. Conclusions

The same match between the same two football teams played in the same season but one for the Cup and the other for the league competition can yield different results for a variety of reasons. Luck may play a crucial role, such as a ball hitting the post in one match but finding the net in another. Additionally, the disparity in what is at stake can contribute to different outcomes. League matches typically come in pairs, with each team playing against every other team twice, once away and once at home. While winning a league match holds significance, away teams often settle for a draw. However, in a Cup match, there must be a winner at the end of the match, whether in regular time, extra time, or through a penalty shootout. Thus, aiming for a draw is not feasible. Moreover, in a pair of league matches, both teams benefit from a home advantage in one of the two matches, whereas in a Cup match, only one team enjoys the home advantage, determined by a random draw, usually conducted soon after the previous round.

When matches are decided by a combination of skill and luck, there should be no systematic difference between Cup matches and league matches. However, effort may also play a role. It is possible that the effort exerted by an away team in a Cup match surpasses that in a league match. If so, this implies that the home advantage in league matches is greater than that in Cup matches. This discrepancy may intensify when more is at stake in Cup matches, indicating that the home advantage diminishes as the Cup tournament progresses toward the final.

We explored this notion using data from professional football in the Netherlands, analyzing differences between Cup matches and regular league matches focusing on stadium attendance and home advantage. Our analysis covered data from Dutch professional football seasons spanning from 2004/05 to 2022/23.

Our primary finding indicates minimal differences between Cup matches and corresponding league matches in terms of match outcomes, although Cup matches still exhibit a clear home advantage. Moreover, we observed that home advantage diminishes when Cup matches extend beyond regular time, particularly in later stages of the tournament, where home advantage is absent during extra time and penalty shootouts. Nevertheless, as Cup matches are single events, the home team holds a significant advantage, suggesting inherent unfairness in the structure of the Dutch Cup competition, albeit determined by a draw. While stadium attendance is lower in Cup matches, this discrepancy lessens as the tournament progresses, likely due to the midweek effect.

Our main finding is that incentives matter for both attendance and team performance. In the early stages of the Cup tournament there is not much of a difference between Cup matches and league matches. Home advantage is very similar while attendance is lower for Cup matches. We have the impression that this related more to the day of the week (midweek) in combination with the time of the day (evening, sometimes late in the evening) than with potential attendance being less interested in visiting Cup matches. It is simply the marginal costs of visiting Cup matches late in the evening which are higher than the marginal costs of visiting a regular league match. However, at later stages of the Cup tournament this changes. When there is more at stake as winning a prize is nearing, marginal benefits for potential

stadium visitors and marginal benefits for teams increase. This leads to an increase in attendance and a decline in home advantage which in some cases completely disappears.

In our study we exploit information about goal scoring, points and wins in Cup matches and league matches to understand potential differences between the two types of matches. Focusing on Cup matches as a topic of interest in itself is a distinguishing feature of our analysis. In previous studies, Cup matches have often been used as control group when the set-up of league matches changed (for example, going from two points for a win to three points for a win). We are interested in Cup matches for their own sake. To get as close as possible to understanding differences between Cup and league matches we opted for a direct comparison of match outcomes and stadium attendances between the same pair of teams within the same season. On the one hand, this allows us to get close to a ceteris paribus analysis. On the other hand, we miss part of the changing incentives for league matches as the competition get closer to the end, i.e., when match outcomes matter – or not – for example for qualification for an UEFA tournament. We leave this issue as a potential topic for future research. We have the impression that although Dutch professional football has its own peculiarities, our main findings are likely to be valid for other leagues as well. After all, the differences in incentives between Cup matches and league matches are very similar across countries. We also have the impression that our conclusions are not limited to men's football. It may be true that women react differently to incentives but it is not likely that these differences will lead to fundamentally different conclusions. Also this is a potential topic for future research.

What do we learn from our main findings in terms of economic mechanisms? Firstly, we ascertain that stakes influence stadium attendance, with attendances rising as the Cup tournament advances. Secondly, stakes impact football teams, as the closer a Cup match is to the final, the less home teams benefit from their usual home advantage in league matches. Thirdly, within Cup matches, home advantage dissipates during extra time and penalty shootouts, suggesting a limit to the influence of crowd support on match outcomes. If home crowd support fails to secure victory during regular match time, it wanes over the course of the match. Overall, our main takeaway is that incentives significantly influence both audience and players, i.e. match attendance and match outcomes.

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Appendix A: Additional info

A1: Conversion from bookmaker odds to probabilities

We illustrate the conversion from bookmaker odds to probabilities using as a match example the league match between Ajax and Feyenoord on March 19, 2023. The odds were 1.80 euros for a bet of one (1) euro for an Ajax win, compared to 3.81 euros for a draw and 4.16 euros for a Feyenoord win. The bookmaker's margin is calculated as follows: (1/1.80) + (1/3.81) + (1/4.16) = 1.0584. In other words, the expected return for the bookmaker was 5.84 percent. The chance of a victory for Ajax follows from correcting the odds for this margin: (1/1.80)/1.0584 = 0.5249 or 52.49 percent. In a similar way, it can be deduced that the chance of a draw was 24.80 percent and the chance of a victory for Feyenoord was 22.71 percent. The expected number of points for Ajax was therefore equal to 1.82, compared to 0.93 for Feyenoord.

A2: Available data and Cup finals per season

Table A1: Overview of available sets of matches and Cup finals by season

Season	N	Cup final		Regular time	Extra time	Winner after penalty shootouts
2004/05	19	PSV	Willem II	4-0		
2005/06	15	Ajax	PSV	2-1		
2006/07	21	Ajax	AZ	1-1	1-1	Ajax
2007/08	22	Feyenoord	Roda JC	2-0		
2008/09	21	Heerenveen	FC Twente	1-1	2-2	Heerenveen
2009/10	17	Ajax	Feyenoord	2-0		
		Feyenoord	Ajax	1-4	two-legged Cup final	
2010/11	17	FC Twente	Ajax	2-2	3-2	
2011/12	19	PSV	Heracles Almelo	3-0		
2012/13	16	AZ	PSV	2-1		
2013/14	16	PEC Zwolle	Ajax	5-1		
2014/15	16	FC Groningen	PEC Zwolle	2-0		
2015/16	16	Feyenoord	FC Utrecht	2-1		
2016/17	17	Vitesse	AZ	2-0		
2017/18	18	Feyenoord	AZ	3-0		
2018/19	14	Ajax	Willem II	4-0		
2019/20	6	Feyenoord	FC Utrecht	cancelled, due to COVID-19		
2020/21	16	Ajax	Vitesse	2-1		
2021/22	17	PSV	Ajax	2-1		
2022/23	14	PSV	Ajax	1-1	1-1	PSV
Total	317					

Note: N = total number of groups (trio of matches) in the sample (excluding Cup finals). In the 2020/21 season, the Cup final was played without stadium attendants, due to COVID-19.