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To cite this article: Lionel Page & Katie Page (2007) The second leg home advantage: Evidence from European football cup competitions, Journal of Sports Sciences, 25:14, 1547-1556, DOI: [10.1080/02640410701275219](https://doi.org/10.1080/02640410701275219)

To link to this article: <https://doi.org/10.1080/02640410701275219>



Published online: 04 Oct 2007.



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The second leg home advantage: Evidence from European football cup competitions

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(Accepted 12 February 2007)

Abstract

The home advantage is a widely acknowledged sporting phenomenon, especially in association football. Here, we examine the second leg home advantage, an effect that is discussed in the public domain but which has received very little scientific attention. The second leg home advantage effect occurs when on average teams are more likely to win a two-stage knock-out competition when they play at home in the second leg. That is, both teams have a home advantage but this advantage is significantly greater for the team that plays at home second. Examining data from three different European Cup football competitions spanning 51 years, we show that the second leg home advantage is a real phenomenon. The second leg home team has more than a 50% probability to qualify for the next round in the competition even after controlling for extra time and team ability as possible alternative explanations. The second leg home advantage appears, however, to have decreased significantly over the past decade. Possible reasons for its existence and subsequent decline are presented.

Keywords: *Football, soccer, European cups, knock-out competitions, two-leg matches, UEFA*

Introduction

The home advantage in sport is an effect that has been widely studied and is well documented (Courneya & Carron, 1992; Nevill & Holder, 1999; Pollard, 1986, 2002, 2006a; Pollard & Pollard, 2005). It exists in a variety of different team sports, including football (Barnett & Hilditch, 1993; Clarke & Norman, 1995), baseball (Thorn & Palmer 1985), hockey (McGuire, Courneya, Widmeyer, & Carron, 1992), and basketball (Greer, 1983; Snyder & Purdy, 1985; Varca, 1980). Courneya and Carron (1992) defined home advantage as “the consistent finding that home teams in sports competitions win over 50% of the games played under a balanced home and away schedule” (p. 13). Realizing that this definition fails to take into account the away records of individual teams and is based solely on home win percentages, Bray (1999) clarified the concept and defined home advantage as occurring when the home winning percentage minus the away winning percentage is greater than 5%. Whatever the definition though, it is clear that this effect is robust and consistent. The home advantage effect has been most

widely studied in football, especially in the English Premier League (Barnett & Hilditch, 1993; Clarke & Norman, 1995; Nevill & Holder, 1999; Nevill, Newell, & Gale, 1996; Pollard, 2006b) but also in the World Cup (Brown, Van Raalte, Brewer, Winter, & Cornelius, 2002).

There have been four reviews of the home advantage effect in sport: those of Courneya and Carron (1992), Nevill and Holder (1999), Carron and colleagues (Carron, Loughhead, & Bray, 2005), and Pollard (2006a). As well as providing an overview of prior research, three of these reviews suggest frameworks or models to help conceptualize the inter-relationships between the empirical findings and to focus future research. The home advantage has been the subject of many empirical studies, but the causes of this effect are still unclear.

Among the most discussed causes of home advantage are the effects of the crowd, the familiarity with the pitch, and travel-related factors. Given the changes in crowd support between home and away matches, the crowd is one of the main factors thought to cause a home advantage (Agnew & Carron, 1994; Nevill, Balmer, & Williams, 1999).

In particular, researchers have tried to determine whether the home advantage is a function of crowd size (Dowie, 1982), crowd density (Agnew & Carron, 1994; Pollard, 1986), and/or crowd noise (Nevill, Balmer, & Williams, 2002). The results from this body of research are mixed (Nevill & Holder, 1999; Pollard, 2006a), and suggest that the influence of the crowd is dependent upon the type of sport and other mediating factors like officials.

Familiarity with the home facility may also be a cause of the home advantage (Moore & Brylinsky, 1995). It has, for example, been shown that teams playing on an artificial pitch benefit from a greater home advantage (Barnett & Hilditch, 1993). Other researchers have looked at the effect of teams moving to new facilities. Again, these findings are inconclusive with some evidence to indicate a decrease in home advantage after a move (Pollard, 2002) and other evidence to suggest there are no effects of moving to a new facility (Loughead, Carron, Bray, & Kim, 2003). In general, however, the findings tend to indicate only small effects for the contribution of familiarity to the home advantage effect.

A third factor often used to explain the home advantage is travel. Travel between the two grounds may contribute to a home advantage because of the fatigue that players experience. Travel factors that have been explored include the distance between the two facilities (Clarke & Norman, 1995), the number of time-zones crossed (Pace & Carron, 1992), and the impact of jet-lag (Recht, Lew, & Schwartz, 2003). The conclusions from the different studies on this issue tend, however, to indicate a weak or only negligible effect of travel duration and distance (Carron *et al.*, 2005; Nevill & Holder, 1999; Pace & Carron, 1992; Pollard, 2006a).

Other factors that have been proposed as explanatory variables of the home advantage include referee bias and territoriality. Empirical studies tend to find a bias of referees in favour of the home team (more free kicks, fewer yellow and red cards and penalties) rather than a bias against the away team (Nevill *et al.*, 2002). Moreover, it has been suggested that this effect could be due to the influence of the home crowd (Nevill *et al.*, 1996, 1999, 2002). However, there is also debate about the importance of this factor in explaining the home advantage because two studies (cricket: Jones, Bray, & Bolton, 2001; NHL hockey: Dennis, Carron, & Loughead, 2002) have found no effect of referee bias. Generally speaking, however, it would appear that if referee bias does have an effect on the home advantage, it is greater in sports in which there is a high degree of subjective evaluation (Balmer, Nevill, & Williams, 2001) and that the causes of the bias are probably mediated by other factors such as the crowd.

It has also been suggested that having to defend the home ground evokes territoriality and this has been proposed as an explanation of the home advantage (Neave & Wolfson, 2003; Pollard, 2006b). For example, Neave and Wolfson (2003) reported higher concentrations of testosterone in players before a home match than before an away match. In addition, differences have been found among European countries with respect to the strength of the home advantage, with the Balkan states having the highest home advantage statistics (at more than 70%) with much lower advantages in Northern Europe (~55%) (Pollard, 2006b). Pollard (2006b) hypothesized that this could be due to differences in territoriality between the different regions in Europe.

Some researchers have proposed other predominantly psychological factors as contributing to the home advantage (Terry, Wahond, & Carron, 1998; Waters & Lovell, 2002). For example, Waters and Lovell (2002) identified both individual player confidence and positivity as important factors in explaining the home advantage. Specifically, players reported being more confident when playing at home and being more positive about the likely outcome. No differences in mood states were found between home and away matches but there were significant differences in the perceptions of the team's confidence, such that confidence is greater before home matches. There is also some evidence for the mood states explanation by Hassmen and Bloomstrand (1995). Carron and colleagues (2005), however, believe that these factors are under-explored in the home advantage literature.

The home advantage has also been examined from the perspective of coaches (Gayton, Broida, & Elgee, 2001), athletes (Bray & Widmeyer, 2000), and supporters (Wolfson, Wakelin, & Lewis, 2005). In general, this body of research tends to cite more factors than the quantitative research and is more focused on different aspects of the home advantage. For example, Smith (2005) found that fans, and to a lesser extent the media, (1) focus almost exclusively on winning as the evidence for a home advantage, (2) see crowd noise as the main factor for the home advantage, and (3) treat the phenomenon as much more transient than is suggested by academic studies.

It is clear that the home advantage effect exists and is the result of the combination and interaction of several factors (crowd, travel, referee decision making, mood, and confidence). However, an area that has received much less attention (the authors know of no academic study) but which is discussed by players, commentators, and coaches (see quotations in Table I) is the perceived extra advantage a team gains by playing at home in the second leg of

Table I. Quotations from football players, officials, and coaches alluding to the second leg home advantage.

<p>“If we could play at home in the second leg, it would be a big plus for us. I once played for Palace when we beat Charlton in the second leg of a play-off semi-final and the atmosphere was unforgettable. We have done it the other way round before, but I know the value of playing the second match at home. (Dougie Freedman, Crystal Palace striker)</p> <p>The second leg at home is normally a slight advantage. (Arsene Wenger, coach of Arsenal)</p> <p>Maybe we have a slight advantage because we are playing the return match at home. (Carlo Ancelotti, coach of AC Milan)</p> <p>I think it will be a big advantage for us to play the second leg at home in Holland. Sometimes people make mistakes and it is better to make your mistakes in the first leg away from home because there is still time to put things right in the second match. (Patrick Kluivert, player of The Netherlands)</p>

two-stage knock-out competitions (hereafter, the second leg home advantage). The second leg home advantage effect occurs when, on average, teams are more likely to win a two-stage knock-out competition when they play at home in the second leg. That is, both teams have a home advantage but this advantage is significantly greater for the team that plays at home second.

The second leg home advantage is a concept that is relevant in all two-stage knock-out competitions, in particular the European cup competitions and the World Cup qualification rounds. The other main competitions that involve knock-out rounds in a two-stage home and away format include continental club competitions like the CONMEBOL Copa Libertadores and Copa Sudamericana, the CAF Champions League, the CONCACAF Champions Cup, and the AFC Champions League; and some national competitions, like the Carling Cup in England, the Copa del Rei in Spain, and the MLS play-off in the United States.

Members of the media, coaches, players, and fans all talk of this second leg home advantage effect, but very little is known about whether it really exists and, if it does, what are its likely causes. Therefore, a scientific study would be merited simply to establish whether such an effect exists. However, information about the second leg home advantage could also be important for other reasons. If it exists, such an effect should be included in forecasting models like those of Dixon and Coles (1997), Dixon and Robinson (1998), and Forrest and Simmons (2000) when applied to European cup matches. The existence and magnitude of such an effect are also of interest to bookmakers and gamblers. In addition, coaches and managers could use information about the effect in their match preparations.

Using data from three major European cup competitions, we examine the existence of a second leg home advantage effect over the period 1955–2006. The changes in the effect over time are also investigated. While many possible explanations have been proposed for the existence of a home advantage, to our knowledge no researchers have proposed possible explanations for a systematic difference in the home advantage between two legs and, more

specifically, for the existence of a greater home advantage in the second leg, resulting in a second leg home advantage.

No previous research has addressed the existence of a second leg home advantage, and thus no specific hypotheses are presented in this paper. Rather, we propose a research question, which is to determine whether the second leg home advantage exists. Specifically, in a knock-out round with teams of equal ability, does the team that plays at home in the second leg have a greater probability to win the round?

Methods

Database

The database consisted of 6182 knock-out rounds, each consisting of two legs (12,364 individual matches). These data were from three different European competitions, the Champions League (the Champions Cup until 1998), the UEFA Cup (previously the Inter-Cities Fairs Cup), and the Cup Winners Cup. For analysis, only knock-out round matches are taken into account; group matches and one-leg finals are not considered. The data from the Champions League are from the start of the competition in 1955 to 2006 and contains data from 1555 matches. The UEFA Cup data represent 2907 matches between 1971 and 2006, and the Inter-Cities Fairs Cup data represent 491 matches between 1955 and 1971. Finally, the data from the Cup Winners Cup represent 1229 matches from 1960 to 1999 (the last year of this competition). For parsimony, the data from the Inter-Cities Fairs Cup and the UEFA Cup are considered together as one competition for all data analysis. For simplicity, each season is hereafter designated by the year in which the season finished (i.e. the season 1955–1956 is represented by the year 1956).

Data collection and procedures

Data were taken from the following websites: (1) <http://www.uefa.com> (all match scores), (2) <http://www.xs4all.nl/~kassiesa/bert/uefa/data>, and

(3) <http://www.rsssf.com/ec/ecomp.html>. UEFA ranking coefficients were taken from the second of these websites and provide an index of team ability at the time of the competition. Information regarding extra time for the relevant matches was taken from the third website).

The team playing at home second is defined as the second leg home team and the other team as the first leg home team. A binary variable *vic* was created to represent the overall result of the second leg home team over the two legs (0 for a defeat, 1 for a victory). For most matches ($n=5327$, 86%), this result is determined by the total number of goals scored by each team over the two legs, with the team scoring the highest number of goals being defined as the winning team. When the teams are equal on goals at the end of the second leg, several solutions have been used to determine the winner. Before 1971, a third play-off match was most often used ($n=86$), or the result was determined by the toss of a coin ($n=20$). On several occasions, the result has been determined by the toss of a coin at the end of a play-off ($n=8$, included in the previous numbers). These solutions have been progressively abandoned. Three new measures were subsequently introduced to eliminate the need for these methods.

First, the away goals rule was introduced to reduce the number of cases in which teams are tied at the end of the two legs. The FIFA regulations (FIFA, 2006) describe the away goals rule as follows: “If both teams score the same number of goals in both matches, the goals scored away will be counted as double”. This rule implies that in those ties where both teams are equal on goals after the two legs, the team that has scored the greatest number of goals away from home will be declared the winner. The away goals rule was first used in 1966 in the Cup Winners Cup, in 1967 in the Inter-Cities Fairs, and in 1968 in the Champions Cup.

The second measure to be introduced was the addition of an “extra time” period, which consists of two 15-min halves. This time is added to the end of the normal duration of the match when the teams are still tied at the end of full time. This rule first appeared in 1965 in all competitions. Third, to separate teams when extra time was not effective, a penalty shoot-out was introduced at the end of the extra time in 1971 in all competitions. The most effective of these solutions to determine a winner has been the away goals rule ($n=423$), followed by extra time ($n=186$), and finally penalty shoot-outs ($n=148$).

For analysis of the second leg home team, the observations with play-off matches and/or coin tosses were eliminated. First, a play-off match means that the round no longer can be defined as a two-leg knock-out round. Second, coin tosses make the

result of the knock-out round purely random, and hence they do not present any interest regarding the second leg home advantage. Therefore, the final database consists of 6084 observations of two-leg knock-out rounds.

Analyses

Assuming the draw is random, if there is no second leg home advantage, on average both teams should have similar ability, and the probability for each team to win the knock-out round should be 50%. In contrast, the second leg home advantage implies that the probability of victory for the second leg home team is greater than 50%.

In some cases the UEFA seeding system allocates the “better” teams as the second leg home team. Therefore, the draw is not completely random and a higher percentage of victories for the second leg home team over the two legs could be a result of differences in teams’ ability. To accurately assess the real effect of the second leg home advantage it is thus necessary to control for the differences in teams’ ability. Since 1979, at the end of each year, UEFA calculates coefficients $coef_{it}$ for each team i that represent the team’s success during the competition in the current year t . The sum of the last 5 years of coefficients gives an index of team i ability:

$$ability_{it} = \sum_{k=1}^5 coef_{it-k}$$

This index is then used by UEFA in its seeding and drawing procedures.

The method used to calculate the coefficients has changed twice. Before 1999, a correction for the number of matches played per team was made by dividing the sum of the coefficients by the number of matches. Since 1999, the coefficients are not divided by the number of matches played. Hence, the current coefficients are much higher than previously. From 1999 to 2003, the coefficients were calculated with the addition of 50% of the corresponding country coefficient, and since 2004 this figure changed to 30%.

The seeding and drawing procedures of the cups are complex and have changed several times over the years. Before 1990, the UEFA index was only used to determine the number of berths in the UEFA Cup. They are now used by UEFA in its seeding and drawing procedures. Using this index of team ability it is possible to check if the seeding and drawing procedures tend to designate the better teams as the second leg home team.

Table II presents the descriptive statistics for the index *ability* for each time period. While the UEFA coefficients did not exist before 1979, the index

Table II. Descriptive statistics for the UEFA coefficients.

Period	Variable	Mean ^a	s	Min.	Max.	n
1956–1979	<i>ability</i>	2.170	1.709	0.5	9.856	3504
	$\Delta ability$	0.157*	2.994	−8.609	8.609	2064
1980–1989	<i>ability</i>	2.302	1.775	0.5	9.054	2602
	$\Delta ability$	0.227*	3.249	−7.915	8.665	1361
1990–1999	<i>ability</i>	2.263	1.824	0.333	9.124	2044
	$\Delta ability$	0.221**	3.122	−8.608	8.18	1351
2000–2004	<i>ability</i>	25.106	22.506	0	147.233	1112
	$\Delta ability$	2.723*	34.538	−106.035	132.937	948
2005–2006	<i>ability</i>	23.660	24.978	0	146.35	580
	$\Delta ability$	2.850 ⁺	28.902	−121.469	115.174	360

^aSignificant difference from 0 calculated with a one-sample mean test. ⁺ $P < 0.10$, * $P < 0.05$, ** $P < 0.01$.

Note: Differences in the magnitude for $\Delta ability$ are a result of the different calculation methods used for the UEFA coefficients in the different time periods.

shown for this period is calculated with the same rules that were used from 1979 to 1999. For each period, the table includes the descriptive statistics of the index and the average difference in coefficients between the second leg home team and the first leg home team, $\Delta ability = ability_{SLHT} - ability_{FLHT}$, divided by the number of knock-out rounds in the corresponding period. If there is no bias in the seeding system, the difference score should not be significantly different from zero. As shown in Table II, this difference score is positive and significant for each period, indicating a bias in the seeding system that tends to allocate the better teams as the second leg home team.

Thus, to accurately assess the second leg home advantage, it is necessary to control for differences in team ability. Because the main variable of interest in this study is the victories over two legs, the probability of winning for the second leg home team while controlling for differences in team ability must be estimated. A logistic regression model is used for this purpose. Calling p the probability of an overall victory for the second leg home team, the following logistic regression model can be estimated:

$$\log\left(\frac{p}{1-p}\right) = \alpha + \beta \Delta ability \quad (1)$$

For two teams with identical ability, the estimated probability \hat{p}_0 is a function of the estimated constant $\hat{\alpha}$ in model (1): $\hat{p}_0 = (e^{\hat{\alpha}}/1 + e^{\hat{\alpha}})$. A test of the hypothesis $\hat{p}_0 = .50$ is evaluated from the z statistic of the constant in the logit model, where $H_0: \alpha = 0$. Unless stated otherwise, all the tests are two-tailed.

Regarding the UEFA index, because of the changes that occurred in 1999 and 2004, the coefficient β in the logistic regression model will have different values over the three time periods.

To address this problem, three dummy variables were created: $I_{(61-99)}$, $I_{(00-04)}$, $I_{(05-06)}$, where

$$I_{(t_1-t_2)} = \begin{cases} 1 & : t_1 \leq year \leq t_2 \\ 0 & : otherwise \end{cases}$$

To account for the changes in the UEFA index, the logistic regression model estimated is as follows:

$$\log\left(\frac{p}{1-p}\right) = \alpha + \beta_1 I_{(61-99)} \Delta ability + \beta_2 I_{(00-04)} \Delta ability + \beta_3 I_{(05-06)} \Delta ability \quad (2)$$

Model (2) is a version of (1) allowing the coefficients of $\Delta ability$ to change between sub-periods. As the main aim of this paper is to study the second leg home advantage, and therefore the probability to win for the second leg home team, we do not report tables with all of the output from the regression models, but instead, and more importantly, we report the adjusted value of the variables of interest with its degree of significance relative to the null hypothesis. Last, it should be noted that all analyses, unless otherwise specified, are conducted on the data pooled over the three competitions.

Results

General overview

In line with the results from the main national football competitions, there is a significant home advantage effect in all three European football competitions. Figure 1 shows this effect and decomposes it between the first and second legs. These figures are similar to those reported previously for the English Premier League (Clarke & Norman, 1995; Nevill *et al.*, 1996) and those of other football

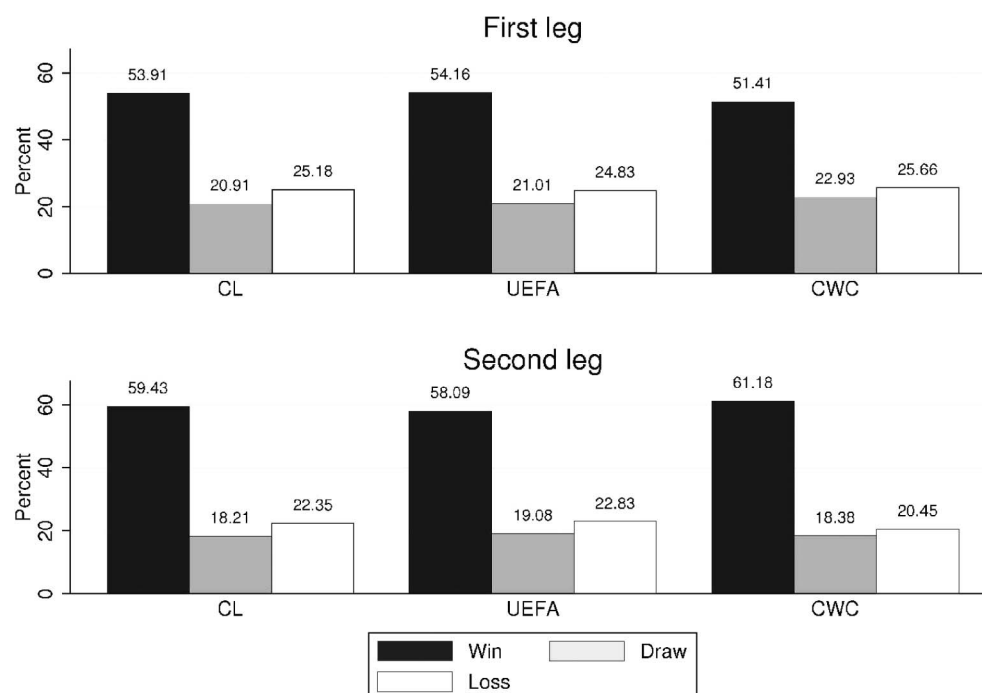


Figure 1. Home advantage by competition and legs.

competitions (Nevill & Holder, 1999; Pollard, 2006b). The difference in the percentages of home wins and home losses is a logical extension of Bray's (1999) measure of home advantage for teams (home wins minus away wins) to measure the home advantage *in a competition*. Using this measure, the home advantage in the current study is approximately 33 percentage points, averaged over the two legs and the three competitions. It is greater in the second leg (36.8%) than in the first leg (28.5%).

Table III shows the percentages of global victories over the two legs for the second leg home team both overall and by competition. On average, the probability of winning at the end of two legs for the second leg home team is 54.98%, which is significantly different from 50% at $P < 0.001$ using a one-sample two-tailed proportion test.

After controlling for differences in team ability, the estimated probability for an overall victory, using the logit model of equation (2), is only slightly lower (54.33%) and still significantly different from 50%. This result indicates that there is a second leg home advantage and that the higher percentage of victories for the second leg home team is not just due to the bias in the UEFA seeding system.

What happens after full-time?

A possible explanation of the second leg home advantage is that the second leg home team wins significantly more often because they benefit more from the home advantage effect. That is, in the case

Table III. Second leg home advantage statistics by competition and overall.

	Percentage of global wins for the second leg home team ^a	Corrected for ability ^b	<i>n</i>
Champions League	54.44***	53.49***	1521
UEFA Cup	53.95***	53.29***	1208
Cup Winners Cup	58.53***	58.65***	3355
Overall	54.98***	54.33***	6084

^aSignificant difference from 50 calculated with a mean test.

^bSignificant difference from 50 calculated with the *z* statistic of the constant.

*** $P < 0.001$.

of equality after two full matches, the second leg home team has the additional advantage of extra time being played on their home ground. This is what Nevill and Holder (1999) call a "rule factor". When looking only at the matches that involved extra time (without penalties, $n = 186$), there is a significant advantage for the second leg home team. The probability of the second leg home team winning, adjusted for differences in team ability, is 66.42%. This proportion is significantly different from 50% at $P < 0.001$. In the case of equality at the end of extra time ($n = 148$), there also seems to be an advantage to take penalties on the home ground with home teams winning 57.33% ($P < 0.10$) of the time. Therefore, at least some of the second leg home advantage effect can be explained by the advantage of extra time and penalties at home.

However, the second leg home advantage cannot entirely be explained by these two extra-time scenarios. There is a clear advantage for the second leg home team in extra time, but the number of matches are too few (only 3% without a penalty shoot-out and 5.5% including penalties) to account completely for the second leg home advantage effect. The matches with extra time and penalties were removed from the data set and the analysis re-run. Table IV shows the adjusted probabilities for the sample restricted to full-time matches ($n = 5750$). There is still a 53.77% chance of the second leg home team winning. Therefore, the second leg home advantage exists even in matches where there is no extra time or penalties.

Time trends

The data used for this research span 51 years of European competitions, thus allowing the study of

Table IV. Probability of a victory for the second leg home team depending on the outcome of the second leg match.

	Adj. probability	<i>n</i>
<i>Full-time matches</i>		
Champions League	53.15*	1452
UEFA Cup	52.55**	3155
Cup Winners Cup	58.36***	1143
Overall	53.77***	5750
<i>Matches with extra time</i>		
Overall	66.42***	186
<i>Matches with penalties</i>		
Overall	57.33 ⁺	148

⁺ $P < 0.10$, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

the second leg home advantage over time. The adjusted probabilities for the second leg home team to win were calculated for each year of the competition by estimating model (1) for each year. Figure 2 shows the changes in the magnitude of the second leg home advantage over time for full-time matches only. A second leg home advantage seems to be present in all the periods with a decreasing trend over time.

To test the statistical significance of changes in the second leg home advantage over time, one dummy per decade was introduced into the logistic regression model (2). In this way, we performed the logistic equivalent of an analysis of covariance to estimate an adjusted winning probability for the second leg home team per decade, while controlling for differences in ability with UEFA coefficients as covariates. Table V presents the estimated probabilities of a second leg home team victory per decade.

The second leg home advantage decreases over time and is no longer significant at 5% for a two-tailed test in the last decade. The winning probability for the second leg home team in this last decade is, however, still positive and marginally significant for a one-tailed test at $P < 0.10$. There are no significant differences between the coefficients per decade. However, when the variable *year* is introduced in the logistic regression instead of the decade dummy variables, its coefficient is negative and significant ($P < 0.05$), indicating a significant downward trend of the second leg home advantage over time. The corresponding adjusted probability of global victory for the second leg home team decreases approximately 5.4 percentage points from 1956 (57%) to 2006 (51.6%).

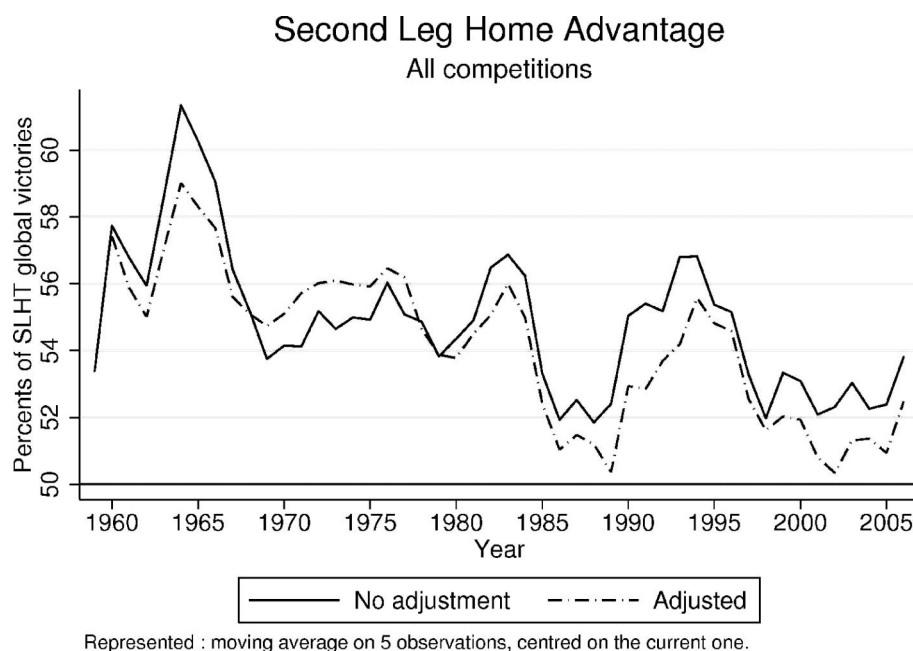


Figure 2. Probability of an overall victory for the second leg home team.

Table V. Adjusted winning probabilities of the second leg home team per decade.

Period	Adj. probability	L: CI (95%)	H: CI (95%)	n
1956–1965 ^a	56.14***	51.25	60.91	444
1966–1975	55.38**	52.18	58.54	1078
1976–1985	55.14*	52.07	58.17	1161
1986–1995	53.07 ⁺	49.98	56.13	1169
1996–2006	51.79	49.85	54.22	1898
Overall	53.77	52.38	55.15	5750

^aThe difference in ability is set to zero by default for the years 1956–1960 where no ability index is available. The absence of adjustment for this period is, however, not the reason for the high value of the probability, as the non-adjusted percentage of victory for this period is actually only 51.87% on 106 matches.

⁺ $P < 0.10$, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Discussion

This study assessed the existence of the second leg home advantage in two-leg knock-out encounters. The statistical analysis of 51 years of European cup football competitions showed that second leg home teams do have a significant advantage in knock-out rounds. This advantage has decreased significantly over time.

Many possible explanations for the home advantage effect have been proposed. However, the second leg home advantage introduces new questions because it is associated with a difference in two home advantages, the one of the first leg home team and the one of the second leg home team. It is, *a priori*, unclear how the current explanations for the home advantage effect can account for this asymmetry in home advantage.

One possible explanation for the asymmetry in home advantage could relate to the differential stakes involved in the two matches. Specifically, home advantage could be higher for matches that have higher stakes or are more important with respect to their immediate outcomes. The second leg match has a higher stake because it is more decisive. While the stake of the first match is to gain an advantage over one's opponents, the stake of the second match is the qualification. As a consequence of this difference in stakes or perceived importance, several factors already discussed in relation to the home advantage could be influential.

One factor that has been linked to the home advantage effect and studied relatively widely is that of referee bias and its interaction with crowd factors (Nevill & Holder, 1999). It is therefore possible that referee bias might be greater in the second leg match. Specifically, the crowd could perhaps have more influence on the officials in matches of greater importance. For example, it is possible that in matches where there are higher stakes, the crowd is

more hostile and aggressive. This could have an impact on the decision making of the referees to further favour the home team. Research should be conducted to examine this possibility.

Another explanation suggested for the home advantage involves the tactics of the players and the managers. Specifically, Pollard (2006a) noted that teams playing away from home often adopt a more defensive and cautious approach that may contribute to the home advantage effect. It is possible that there is an interaction between the types of tactics employed by teams in the second leg as a result of the first leg match. Future research could investigate the tactics of managers, both in terms of their proposed game plan and their behavioural play on the field.

Several psychological factors may have implications in this asymmetry in perceived stakes/importance. For example, the motivation or anxiety levels of the players could be significantly greater in the second leg, which may result in increased effort and better performance. Waters and Lovell (2002) identified both individual player confidence and positivity as important factors in explaining the home advantage, but whether these dimensions are different over two legs has not been studied. There is currently very little research on these topics but in future researchers could assess in more detail the psychological states of the players before home and away two-leg matches to gauge if there are any significant differences in these respects.

It is well established that the home advantage effect has decreased significantly over time (Nevill & Holder, 1999; Pollard, 2006a, 2006b). In this study, we found that the second leg home advantage has also decreased significantly over time and is now just marginally significant. As the second leg home advantage results from a difference between the home advantages of two teams, factors that explain the decline in the home advantage may be relevant for an explanation of the decline in the second leg home advantage. For example, Smith (2003) has suggested that increased professionalism and the development of a market culture in the game could contribute to the decline in home advantage.

Explanations for the home advantage are far from comprehensive and complete, especially in relation to the interactions between important factors. Therefore, explanations for an asymmetry in home advantage are also difficult to specify given the current state of understanding. Nevertheless, it is an interesting and important phenomenon that certainly warrants further investigation.

In conclusion, in this article we have demonstrated that there is a second leg home advantage in three European cup football competitions. This effect means that the second leg home team has a

significantly higher probability to win a two-stage knock-out tie. This second leg home advantage can still be seen after controlling for the ability of the teams (necessary because sometimes the draw disproportionately allocates the better team to the second home match). A small part of the second leg home advantage can be explained by extra time and penalties being played on the home ground of the second leg home team. However, these two factors alone cannot explain the second leg home advantage. The second leg home advantage has decreased significantly over time and is not as marked as it was at the beginning of the European cup competitions. More research is needed to further our understanding of the cause of the second leg home advantage effect and the factors that have contributed to its decline.

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