International Journal of Sport Finance, 2018, **13**, 82-102, © 2018 West Virginia University

Order Effect Under the "Away-Goals Rule:" Evidence from CONMEBOL Competitions

Carlos Varela-Quintana,[1] Julio del Corral,[2] Juan Prieto-Rodriguez,[1]

[1]*University of Oviedo*
[2]*University of Castilla-La Mancha*

Carlos Varela-Quintana, PhD, is adjunct professor of economics at the University of Oviedo. His research interests include sports economics, labor economics, tourism and marketing with focus on behavioral economics.
Julio del Corral, PhD, is associate professor of economics at the University of Castilla-La Mancha. His current research focuses on the economics of sports, specifically the topics of demand, competitive balance, productivity, discrimination, and betting.
Juan Prieto-Rodriguez, PhD, is a full professor of economics at the University of Oviedo. His fields of specialization are cultural economics, leisure economics, and labor economics.

Abstract

This paper tests for the existence of an order effect in competitive situations using the natural experiment of the introduction of the "away-goals rule" in CONMEBOL club competitions. This rule states that in a case of a two-legged fixture finishing level on goals, the team that scores more goals as a visitor will qualify for the next round. Fixed-effects logit analyses for the period 1988–2014 provide evidence that, after the application of the rule in 2005, teams that played the second leg as visitors had an increased probability of winning in regulation time. This phenomenon was especially significant when the "visitor in the second leg" was the stronger team of an evenly matched game, or conceded no goals in the first match. Several explanations related to behavioral biases, such as psychological pressure, time inconsistency, and loss aversion, are proposed.

Keywords: football, order effect, incentives, regulation

Introduction

Real life is full of examples of path dependence where the order really matters, such as a firm entering an industry first (Mueller, 1997), a candidate's performance in the early stages during primary elections (Knight & Schiff, 2010), or players moving first in a chess game (González-Díaz & Palacios-Huerta, 2016). Being first may start up feedback mechanisms that give pioneers an advantage over followers, but it also might become a serious disadvantage. In the industrial organization literature, first movers may benefit from the learning effect, the pre-emption of resources and the buyers' switching cost, while last movers may benefit freely from the experience of the pioneers, the lower uncertainty, and the incumbent inertia of the first movers (Lieberman & Montgomery, 1988).

In addition to the classical variables of the structure–conduct–performance paradigm, behaviour biases, such as psychological pressure and emotions, have also been proposed to explain the order effect in a sequential contest. In the absence of any bias, rational agents should have the same probability of winning regardless of the order in which they start a competition. Sport offers natural experiments to test this hypothesis. By analysing the Singles Championship at Wimbledon from 1992 to 1995, Magnus and Klaassen (1999a) found that players who served first in the first set had an advantage over their opponents. Similarly, Page (2009) used data from all the professional tennis matches played during 1991–2008 and found that players who won a close first-set tiebreak went on to win, on average, one game more in the second set. In soccer, Apesteguia and Palacios-Huerta (2010) analysed 269 penalty shoot-outs for the period 1970–2008 and reported an order effect whereby teams that began the sequence won 60.5% of the time. They associated this with psychological pressure on those taking penalties for the team that is behind in the score, especially in the decisive last rounds. Kolev, Pina, and Todeschini (2015) analysed the effect of a regulatory change in the U.S. National Hockey League that permitted home teams to decide who should start the penalty shoot-outs. They found that, despite the chances of scoring being much lower in hockey than in soccer, most home teams preferred to start first, and these teams did better (47.7% success) than those who decided to shoot second (only 43.7%).

Several studies have also provided evidence of second-mover advantages. One such advantage is judges' systematic bias that benefits those who perform last in a sequential evaluation. Bruine de Bruin (2005) found that contestants placed in the later positions of two contests (the Eurovision Song Contest and the World and European Figure Skating Championships) had significantly higher evaluations than those in the earlier positions. This happened regardless of whether they used an end-of-sequence or a step-by-step voting procedure. This strong effect was also reported by Page and Page (2010) in the *Idol* shows from eight countries. Additionally, the authors found a small advantage in the earliest positions of the series and a positive influence of the previous contestant's quality. By analyzing knockout contests from UEFA competitions over the period 1955–2006, Page and Page (2007) found that teams playing the second match at home were significantly more likely to win a two-leg match. They proposed as a possible explanation that the "home advantage[1] could be higher for matches that have higher stakes or are more important with respect to their immediate outcomes" (p. 1554).[2] Krumer (2013) elaborated a model that explained this phenomenon theoretically through the existence of a psychological advantage. Varela-Quintana, del Corral, and Prieto-Rodríguez (2015) found that this "second-leg home advantage" was especially relevant in close contests, and that the probability of recovery from a bad outcome in the first match was greater for those who played the second leg as hosts. In addition, Feri, Innocenti, and Pin (2013) found a last-mover advantage in a field experiment with 57 young basketball players, with two players facing each other shooting five consecutive free throws. They concluded that second movers perform better under psychological pressure and they detected differences regarding the ability to manage it.

However, psychological effects have been questioned in other empirical studies. Magnus and Klaassen (1999b) reported that winning the penultimate set did not provide an advantage in the final set at Wimbledon. Kocher, Lenz, and Sutter (2012) found no evidence for the first-mover advantage in a larger sample of 540 penalty

shoot-outs. In addition, Eugster, Gertheiss, and Kaiser (2011) attributed the second-leg home advantage to the strength differences between teams. Similarly, Mueller-Langer and Andreoli-Versbach (2011) found neither an order effect nor a leading effect when analysing UEFA competitions.

The aim of this study is to shed some light on the phenomenon by analysing the sequential effect of a sport regulation known as the "away-goals rule." Some football competitions use knockout rounds, whereby teams face each other twice: once as a visitor, and once as a host; the winner, according to goals scored, qualifies for the next round. If a game finishes level on goals, organizers have tested different rules to break the deadlock. One of these tiebreaker methods is the away-goals rule. Introduced in 1965 in the UEFA Cup Winners' Cup, the rule establishes that, when both teams have scored an equal number of goals after the two legs, the team that has scored more away goals will qualify for the next round. Therefore, the definition of a draw (and, therefore, of victory and defeat) has changed over time according to the regulatory modifications. For instance, a game with two matches ending 1–0 and 2–1 (making an aggregate score of 2–2) would have been defined as a draw prior to the introduction of the away-goals rule, but as a victory for the away team in the second leg under its implementation.

In this paper, we test whether the sequential application of the away-goals rule has an asymmetric effect on two-leg matches. Three results might be expected from the application of this regulation: (1) the rule gives an advantage to the away team in the first leg (first-mover advantage); (2) it benefits visitors in the second leg (second-mover advantage); or (3) it is neutral, so no variation in the outcomes would be observed.

To test this, we analyse the introduction of this rule in the South American Football Confederation (CONMEBOL) during the 2005 season. By comparing the results from the period during which the rule applied (1988, 2005–2014) with those from the period when it did not (1989–2004), we found that the rule favoured second-leg away teams.

The rest of the paper is organized as follows. The next section examines the development of tiebreaker rules for two-legged fixtures from CONMEBOL. The following section describes the database and the procedures used to test the hypotheses. Afterwards, we present the main results, discuss several explanations and outline our conclusions.

Characteristics of the CONMEBAL Tournaments

History of the CONMEBOL Club Competitions

CONMEBOL comprises 10 national associations (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, and Venezuela). Since its founding in 1916, CONMEBOL has organized several intracontinental club competitions. Created in 1960, the Copa Libertadores de América brings together the top-ranked teams in national championships. Held in 1970 and 1971, the Copa Ganadores de Copa was the first attempt to create a second tournament, placing the most recent winners of the South American domestic cup competitions face to face. Two decades later, in 1988, the Supercopa João Havelange brought together all the teams that had won the Copa Libertadores at least once. Meanwhile, the Copa CONMEBOL, created in 1992,

pitted the runners-up of the national championships that had not qualified for the Copa Libertadores. The Supercopa João Havelange and the Copa CONMEBOL were replaced in 1998 by two competitions of regional character: the Copa Merconorte and the Copa Mercosur. The Copa Mercosur was played by the clubs of the Southern Cone (Argentina, Brazil, Chile, Paraguay, and Uruguay), and the Copa Merconorte was contested by the teams from the northern area (Bolivia, Colombia, Ecuador, Peru, Venezuela and later, the United States, Mexico, and Costa Rica). Inspired by the Supercopa João Havelange, access to both competitions was limited to the most prestigious clubs in South America. For this purpose, qualifying criteria, such as the current and historical results and the size of the fan base in their respective countries, were used.

The Copa Merconorte and Copa Mercosur merged in 2002, leading to the Copa Sudamericana, which is currently the second most prestigious South American tournament. Although it initially inherited the spirit of gathering the most prestigious clubs, since 2010, it has become a championship for those clubs that cannot access the Copa Libertadores.

Finally, the Recopa Sudamericana, created in 1989, is currently played by the champions of the Copa Libertadores and Copa Sudamericana (and previously by the winners of the Supercopa João Havelange).

Criteria to Choose the Winner

During the period 1960–1987, the Copa Libertadores used the following rules to choose the winner of a contest: point difference, a third match, the addition of extra time, goal difference, coin tossing, and penalty shoot-outs. The first method awarded 2, 1, or 0 points for each victory, draw or defeat, respectively. When the two matches—of 90 minutes each—finished level on points, the second method was to play a third game of 90 minutes at a neutral venue. In the event of a continuing tie, the third method was to play 30 minutes of extra time just after finishing the third match. If the draw persisted, the next step was to take into account the goal difference over the two legs.[3] Finally, if the game still remained tied, a coin toss was used as the ultimate solution. In the 1970s, this last method was replaced by shoot-outs from the penalty spot. Although this scheme enabled the election of a winner, it had the undesired effect of extending the length of the game beyond regulation time. Nonetheless, it remained unchanged because of the little weight that the knockout format had in the tournament. Thus, from 1960 to 1987, the most used method to choose the winner in the Copa Libertadores was point difference (n = 30), followed by a third match (n = 10), goal difference (n = 8), extra time (n = 4), penalty shoot-outs (n = 2), and, finally, coin tosses (n = 1).

The increase in the weight of the knockout rounds in the late 1980s was accompanied by actions that reduced the use of non-regulation time. Thus, for the 1988 season, CONMEBOL decided to set the following order of procedures to determine the winner of a two-leg match: point difference, goal difference, the away-goals rule, and penalty shoot-outs.[4] Some considerations must be made regarding these criteria. First, extra time and third matches were substituted by the goal difference. Therefore, in practice, points lost all their relevance as a means of resolving the outcome of the game. Second, CONMEBOL introduced the away-goals rule, a tiebreaker method

that UEFA had used successfully since 1965. The FIFA (2015) defines the away-goals rule in the following terms: "Competition rules may provide that where teams play each other home and away, if the aggregate score is equal after the second match, any goals scored at the ground of the opposing team will count double" (p. 55).

CONMEBOL used the away-goals rule only in the 1988 competition. During 1989–2004, they decided to set point difference, goal difference and penalty shoot-outs as the criteria to determine the winner. These guidelines were applied to all rounds, with the exception of the final of the Copa Mercosur, where a third match was still used in 1998 and 2000. The absence of the away-goals rule resulted in a significantly high number of encounters that needed to go to penalty shoot-outs. Over these 16 years, 596 two-leg knockout rounds were disputed; among them, the most used method to choose the winner was point difference (n = 331), followed by penalty shoot-outs (n = 154), goal difference (n = 109) and third matches (n = 2).

CONMEBOL made its last major change in 2005, setting point difference, goal difference, the away-goals rule, and penalty shoot-outs as the order for winning matches (CONMEBOL, 2004).[5] This scheme was implemented in all rounds except for the final, where extra time is played before going to a penalty shoot-out and the away-goals rule does not apply. The reintroduction of the away-goals rule in the rest of the matches greatly reduced the number of penalty shoot-outs. Thus, from the 594 knockout rounds played during 2005–2014, most were resolved using point difference (n = 359), followed by goal difference (n = 113), the away-goals rule (n = 65), penalty shoot-outs (n = 55) and extra time (n = 2).

Non-random Pairing

The pairing of teams is not perfectly random in the South American tournaments. CONMEBOL, like other governing bodies in sports such as FIFA and UEFA, combines random draws and seeding systems to match teams. One way of seeding is to set up the brackets so that stronger teams face weaker teams. In CONMEBOL competitions, this unequal pairing begins in the early stages.[6] In addition to this, the Copa Sudamericana paired teams of the same country in the early stages of the championship.

Seeding may also be introduced through a bye that allows a team to proceed to the middle stage of a tournament without competing. This procedure is used by the Copa Libertadores, whereby the winner of the previous competition as well as the best teams in the domestic championships are placed in the group stage.

Competitors can also be "re-seeded" in such a way that the top-ranked teams play against the lowest-ranked teams. This method has been used by the Copa Libertadores in the round of 16, pitting the top finishers from the group stage against the runners-up.

Finally, and maybe more importantly for our paper, the best teams can be allocated a home game for the second leg, which significantly increases their probability of victory, according to the second-leg home advantage. This benefit is given to clubs in the early stages of the Copa Sudamericana using the rankings from the most recent domestic club competition. The Copa Libertadores gave this advantage to top-ranked teams from the group stage in the round of 16, and extended it to quarter-finals, semi-finals and finals from 2005 onwards. The changes in the seeding rules over the studied period may affect our results. Thus, it is necessary to control for quality differences between teams in our analysis.

Methods

Database

To analyse the effects of the away-goal rule, this article uses data from CONMEBOL club competitions between 1988 and 2014. Matches played under the round-robin format, and the finals played since 2005 (which allowed extra time), were eliminated from the database.[7] This gave us information on 1,179 two-leg matches (2,358 individual matches), with the Copa Libertadores providing 447 games, the Copa Sudamericana 446, the Copa CONMEBOL 120, the Supercopa João Havelange 124, the Copa Mercosur 26, the Copa Merconorte 13, and the Recopa Sudamericana 3.

We split the database into two samples in order to compare the period during which the away-goals rule was not applied (1989–2004) with the period during which it was applied (1988, 2005–2014). In the first period, the tiebreaker criterion before going to penalty shoot-outs was the goal-difference rule (hereinafter GDR),[8] whereas in the second one, it was the away-goals rule (hereinafter AGR). This provided a total of 585 knockout rounds played with the AGR and 594 without it.

The results of the knockout rounds were obtained from http://www.rsssf.com and http://wildstat.com. Meanwhile, information on the tiebreaker methods came from http://www.conmebol.com.

Analyses

Our unit of analysis is the two-leg match. To investigate the effect of the AGR, we present an initial exploratory analysis in which we compare the results from games that applied the rule (in 1988 and after 2005) with those from games that did not (1989–2004). We use hypothesis testing to evaluate the strength of the differences, considering statistically significant those with a p-value of less than 0.1. Unless stated otherwise, all tests are two-tailed.

In order to obtain more robust results, we controlled for team ability. To do so, we estimated several binary response models in which the dependent variable takes a value of one if the second-leg away team wins during the regulation 180 minutes, and zero if it loses. This means that we exclude the confrontations that ended in a tie.[9] The reason is that we are interested in the change of proportions between winners and losers beyond the obvious reduction in draws. Of course, we could consider the results of the penalty shoot-outs, where the percentage of victories for home and away teams does not significantly differ from 50% (see Kocher, Lenz, & Sutter, 2008). However, this would reduce the potential differences generated by the rule and their significance.

As explanatory variables, we use teams' abilities and a dummy variable that reflects whether the AGR was applied. We also included interactions between the AGR and the ability difference in order to analyse if the impact of the rule depends on the quality gap between teams. In addition to this, we considered dummies for the rounds that teams played (finals, semi-finals, quarter-finals, round of 16, second stage, first stage) and a continuous trend variable.

To measure team ability, we create a variable that takes into account the points[10] that the clubs earned in the CONMEBOL tournaments over the previous five years. The values are assigned according to the round they reached and, for simplicity, are the same for all CONMEBOL tournaments. It is possible that a team could play two

tournaments in a single season; in such cases, we only consider the points of the highest round achieved, not adding the points earned by a team in two different competitions during one season.

Once these values are assigned, we build two coefficients. The first one, the team coefficient, adds the points earned by a team during the preceding five seasons. The second one, the country coefficient, is the average of points earned by all teams belonging to the same country during the previous five seasons. Both coefficients are added to ascertain the ability of the team in the season *t*.

$$Ability_t = \sum_{i=t-5}^{t-1} [(Team\ coefficient) + (Country\ coefficient)]_i$$

The difference in ability in a knockout round is calculated by subtracting the ability between visitor and home team according to their location in the second leg.

To the extent that we are using team performance from the past five years to approximate its current ability, transfers and other changes in the quality of the lineups may affect our measure. Unfortunately, better alternatives, such as team budgets, transfer values, and betting odds are not available for the initial seasons of the study. Under these circumstances, we consider that using the five-year performance is an appropriate way to identify bigger-budget clubs, as only they can consistently remain in the top positions over a long period.

Table 1 shows the ability difference between away teams and home teams according to their position in the second leg, for the overall sample, for the seasons 1989–2014 (when the GDR is applied), and for 1988 and 2005–2014 (when the AGR is applied). In line with what we expected, the allocation of the teams is not random. The negative values reflect that visitors in the second leg are, on average, weaker than the hosts. The values are significantly different from zero at $p < 0.01$ using a one-sample *t*-test, as much for the entire period as for each sub-period.

Note that the weakness of second-leg away teams is higher under the AGR than under the GDR. A possible explanation is the change in the seeding of the Copa Libertadores in 2005, by which the stronger teams from the group stage were designated the second-leg home teams in all of the following rounds (not only the round of 16). However, because there is no significant difference between the two periods when applying a two-sample *t*-test ($p < 0.56$), we can be confident of our descriptive analysis.[11]

TABLE 1. Ability difference between second-leg away teams and second-leg home teams

Period	Mean[a]	S.D.	Min.	Max.	n
All seasons: 1988-2014	-1.782***	15.156	-51.333	53.800	1,179
GDR period: 1989-2004	-1.527***	15.724	-51.333	53.800	594
AGR period: 1988, 2005-2014	-2.041***	14.567	-42.533	43.375	585

Note: Ability difference = (Ability of the second-leg away team) – (Ability of the second-leg home team);* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
[a] Significant difference from 0 using a one-sample *t*-test.

Results

Differences With and Without the Away-goals Rule

In line with CONMEBOL's aim, we expect a significant decline in draws after the introduction of the AGR. Obviously, this reduction is caused by the fact that the regulation change considers previously ignored data (the away goals) to resolve draws. Table 2 shows this reduction according to the aggregate score. As can be seen, not all types of draws benefit equally from the AGR. The possibility of applying the rule was greater in draws with a larger number of goals than in those ending 0–0, reaching its maximum effect with the aggregates of 2–2 and 3–3.

TABLE 2. Distribution of draws when teams scored an equal number of goals

Aggregate score	GDR period (1989-2004)	AGR period (1988, 2005-2014)	Difference
0-0	1.35	1.03	-0.32
1-1	5.39	2.74	-2.65**
2-2	8.59	3.42	-5.17***
3-3	6.40	1.54	-4.86***
4-4	2.69	0.00	-2.69***
5-5	1.01	0.17	-0.84*
6-6	0.51	0.00	-0.51*
Total	25.93	8.89	-17.04***

Note: Values are interpreted as column percentages. The number of knockout rounds played with the GDR was 594, and with the AGR was 585. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

In addition to this, the new rule could also have promoted a variation in teams' behaviour in order to exploit it in their favour. That is to say, visitors would attempt to score more away goals, whereas hosts would be more defensive to prevent it. Two results are possible in this situation. On the one hand, the reduction in draws would improve the winning percentage of the hosts and visitors in the second leg equally; this would happen because, on average, the efforts of both teams should cancel each other out. On the other hand, it is possible that the AGR gives an advantage to either visitors or hosts, thus significantly improving their outcomes.

Table 3 shows the distribution of the aggregate results obtained in regulation time (180 minutes = two legs of 90 minutes each) in the 1,179 two-leg matches played during 1988–2014. The results are shown separately for the period during which only the GDR was applied (1989–2004) and for the period that also included the AGR (1988, 2005–2014). In a first approximation of the data, we can observe that second-leg home teams had a higher percentage of victories than the away teams. This regularity, known as second-leg home advantage, is in line with the findings of Page and Page (2007) and Varela-Quintana, del Corral, and Prieto-Rodríguez (2015) for UEFA tournaments.

TABLE 3. Results after playing the 180 minutes of regulation time in two-leg matches

	GDR period (1989-2004)	AGR period (1988, 2005-2014)	Difference
Draw	25.93	8.89	-17.04***
Second-leg away teams win	29.46	42.56	13.10***
Second-leg home teams win	44.61	48.55	3.93
Total	100.00	100.00	

Note: Values are interpreted as column percentages. The number of knockout rounds played with the GDR was 594, and with the AGR was 585. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

The new tiebreaker rule met regulators' expectations by significantly reducing draw situations after the 180 minutes of regulation time. Concretely, draws decreased by 17.04 percentage points (from 25.3 to 8.89), which is significant at $p < 0.01$ using a two-sample *t*-test. Moreover, analysing the winning percentage according to a team's location in the second leg, we see that the AGR did not improve the results of teams in the same way. The percentage of victories of second-leg away teams increased by 13.10 percentage points (from 29.46 to 42.58), which is significant at $p < 0.01$ using a two-sample t-test. By contrast, home teams in the second leg experienced an improvement of only 3.93 percentage points (from 44.61 to 48.55), which is not significant.

Figure 1 shows the evolution of the percentage of victories for the second-leg away teams after eliminating ties. We use a kernel-weighted local polynomial regression to obtain a graph of the smoothed values and the confidence bands for each period. It can be appreciated that the percentage of visitors in the second leg who qualified for the next round was higher after 2005, which suggests that the allocation of pitches is important under the AGR.

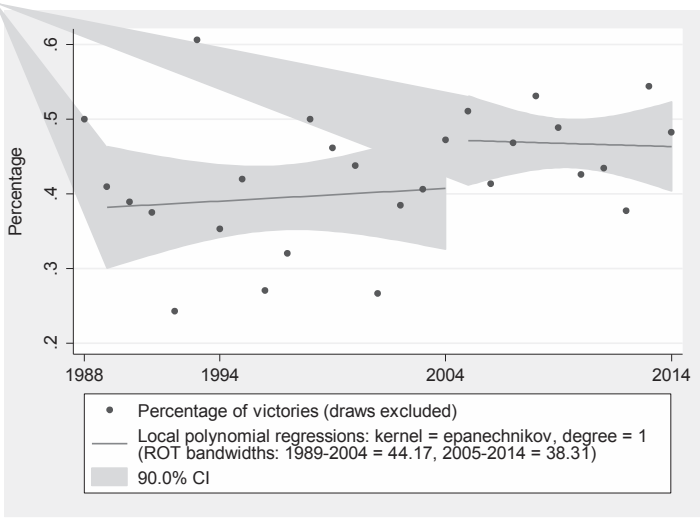

FIGURE 1. Percentage of victories for the visitors in the second leg

It is important to note that this result cannot be attributed to the allocation of better teams as visitors in the second leg after 2005. In fact, as we mentioned before, the seeding rules tended to run in the opposite direction—by increasing the number of stronger teams playing as hosts in the second leg.

Simulation Analysis

Until now, we have analyzed the observed average values (victories, defeats and draws) by applying to each period its corresponding rule. In order to detect any change in behaviour, we now explore what would have happened if the rule had been applied to the other period (*i.e.,* applying the AGR to the period 1989–2004 and applying the GDR to the period of 1988, 2005–2014). In Table 4, we compare the real and simulated results at the end of the regulation 180 minutes, under the AGR and the GDR.

TABLE 4. Results applying the away-goals rule and the goal difference to both periods

	Result of a two-leg match			
	Draw	**Second-leg away team wins**	**Second-leg home team wins**	**Total**
Applying the away-goals rule				
Period 1989-2004 (Simulated values)	10.27	39.06	50.67	100.0
Period 1988, 2005-14 (Real values)	8.89	42.56	48.55	100.0
Difference	-1.38	3.51	-2.13	
Applying only the goal difference				
Period 1989-2004 (Real values)	25.93	29.46	44.61	100.0
Period 1988, 2005-14 (Simulated values)	20.17	36.92	42.91	100.0
Difference	-5.75**	7.46***	-1.71	

Note: Values are interpreted as row percentages. The number of knockout rounds was 594 in the period 1989-2004, and 585 in the period 1988, 2005-14. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

The application of the AGR in both periods has similar results, revealing no significant differences between real and simulated values. In other words, the AGR was not quite successful in increasing situations with away-goal differences. This might have happened because the rule failed to encourage the offensive effort of visitors or because this effort was totally cancelled by the defensive determination of hosts.

More interesting results are observed when we analyse the real and simulated application of the GDR. The number of draws decreased by 5.75 percentage points (significant at $p < 0.05$), and the number of victories won by visitors in the second leg increased by 7.46 percentage points (significant at $p < 0.01$).

Contrary to what was expected, the implementation of the AGR did not generate successful actions in order to exploit it, but rather it promoted behaviours that allowed the match to be solved using the GDR. These behaviours favoured "away teams in the second leg."

Analysis of the Goals

By analysing the results of two-legged fixtures, we have seen that the introduction of the AGR contributed to an increase in the number of victories won by second-leg visitors using the GDR. In order to understand this paradox, we investigate the evolution of the goals scored.

Table 5 examines the goals—both aggregated and in each leg separately. We can see that the average number of goals fell from 5.232 to 4.932, a difference that is significant at the 5% level. Contrary to expectations, the new tiebreaker system does not seem to encourage teams to score goals and, therefore, enhance the attractiveness of the game. In fact, it seems to promote defensive strategies to avoid them.

TABLE 5. Goal average in two-leg matches in CONMEBOL club competitions (1988-2014)

	GDR period (1989-2004)	AGR period (1988, 2005-14)	Diff.
1st leg			
Home-team goals	1.502	1.465	-0.037
Away-team goals (a1)	0.953	0.867	-0.086
Goal difference (d1)	0.549	0.598	0.049
2nd leg			
Home-team goals	1.850	1.665	-0.185**
Away-team goals (a2)	0.928	0.935	0.007
Goal difference (d2)	0.923	0.730	-0.193*
Aggregate score			
Total goals scored	5.232	4.932	-0.301**
Away-goal difference for hosts in 2nd leg (aa)	0.025	-0.068	-0.094
Goal difference for hosts in 2nd leg (dd)	0.374	0.132	-0.242*

Note: The number of knockout rounds played with the GDR was 594 and with the AGR was 585; (aa) is calculated as (a1)-(a2); (dd) is calculated as (d2)-(d1); *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

In line with our previous findings, the analysis of the aggregate score shows that the goal difference in favour of "home teams in the second leg" decreased by 0.242, which is significantly different from zero at the 10% level. A decrease of 0.094 in the away-goal difference for the home teams in the second leg is also observed; however, this value is not significant.

A detailed analysis of what happens in each leg shows that goal reduction was only significant for the home teams in the second leg, with no significant differences in the first match. Thus, home-team goals fell by 0.185 (significant at $p < 0.05$), which contributed to increasing the goal difference to −0.193 (significant at $p < 0.10$).

A possible explanation (to be taken up again later) is that home teams are less wary of the AGR in the first leg. This would lead them to be more offensive than they should be in an attempt to exploit their "home advantage." By contrast, in the second leg, home teams are more wary of the AGR and become more defensive. Paradoxically,

this leads to them scoring fewer goals and, therefore, reduces the goal difference in their favour, resulting in them losing more games.

The Influence of the Away Goals from the First Leg

An important issue to investigate is whether conceding an away goal in the first leg may influence the results of the second leg. For this, we analyse individual matches. Table 6 shows the distribution of the away goals scored in the first leg and the percentage of associated away-team victories in the second match.

TABLE 6. Away-team victories in the 2nd leg according to away goals conceded in the 1st leg

Away goals conceded in the 1st leg by away teams in 2nd leg	Distribution of the away goals in 1st leg			Away-team victories		
	GDR	AGR	Diff.	GDR	in the 2nd leg	Diff.
0 goals	41.9	42.7	0.8	11.6	20.4	8.8***
1 goals	32.8	35.6	2.7	23.6	21.2	-2.4
≥2 goals	25.3	21.7	-3.5	16.0	22.0	6.0
Total	100.0	100.0		16.7	21.0	4.4*

Note: Values are interpreted as column percentages. The number of knockout rounds played with the GDR was 594 and with the AGR was 585. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

It can be observed that the first leg ended with zero away goals 42% of the time, one away goal 33% of the time, and two or more away goals approximately 25% of the time in the GDR period (1989–2014). The t-tests show that this distribution had no significant changes after introducing the AGR. By analysing the second leg, we observe that the away-team victories were 8.8 percentage points higher when there was no away goal scored in the first leg (which is significant at the 1% level). A possible interpretation of these figures is that the AGR harmed the offensive performance of the hosts in the second leg, because conceding a goal was perceived as a very risky scenario when they did not score an away goal in the first leg.

Who Benefits Most from the Rule?

In this section, we analyse if the AGR effect varies depending on the ability difference in the contest. For this, we estimate a logit model with a dependent variable that takes a value of one if the away team in the second leg wins the two-legged round, and zero if it loses. We use the ability difference as the only explanatory variable, which is obtained from the historical performance in CONMEBOL tournaments during the previous five seasons. We only consider the victories and defeats during the 180 minutes of regulation time, with draws excluded from the model. Thus, the sample provides 973 observations (GDR = 440, AGR = 533). The results of Model (1) are shown in Table 7. As we expected, the coefficient of the ability difference is positive and significant, indicating that the larger the difference in ability, the higher the probability of victory.

TABLE 7. Estimate of the probability of victory for the second-leg away teams

	(1) Logit	
	Coeff.	**ME**
Constant	-0.222***	
Ability difference	0.024***	(0.006)
Number of observations	973	
Log-likelihood	-651.18	
Pseudo-R2	0.023	

Note: Dependent variable: the "visitor in the 2nd leg" wins the two-leg match in regulation 180 minutes. Observations exclude draws. ME means the marginal effect measured at the mean value of the explanatory variable. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

We use this estimated probability to classify the second-leg visitors into four quartiles. The first and fourth quartiles include uneven pairings, while the second and third quartiles include the most evenly matched games. The first quartile comprises away teams in the second leg with a very low probability of beating their opponents. The second quartile has visitors with greater chances than the previous group, although they still remain low. The third quartile contains the visiting teams with a high probability of victory. The fourth quartile comprises the visitors with a very high probability of qualification for the next round. These groups are used in Table 8 to check if the second-leg away team has an upper hand when the AGR is applied. A positive and significant difference indicates the existence of this advantage.

TABLE 8. Victory of visitors in 2nd leg in 180 minutes according to their winning probability

	GDR period	**AGR period**	**Difference**	***n***
Overall	39.77	46.72	6.94**	973
According to the winning probability				
1st quartile (very low probability of victory)	33.96	29.20	-4.77	243
2nd quartile (low probability of victory)	36.52	43.75	7.23	243
3rd quartile (high probability of victory)	41.38	59.06	17.68***	243
4th quartile (very high probability of victory)	47.57	55.32	7.75	244

Note: Values are interpreted as column percentages. Draws have been excluded. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

It can be appreciated that the percentage of victories for the visitors in second leg is significantly greater under the AGR (46.72%) than under the GDR (39.77%). The difference is significant at the 5% level. Analysing the results using the quartiles, we can see that, as expected, the winning percentage of the visitors grows when the probability of winning the two-leg fixture increases. More interestingly, the winning-percentage difference before and after the implementation of the rule is 17.68% in the third quartile, which is significant at $p < 0.01$. This result means that the rule did not have widespread effects on all clashes, but tended to work in the evenly matched fixtures where the second-leg visitors had a probability of victory that was a little higher than their opponents.

A possible explanation is that playing away is not easy. Second-leg visitors must have at least a little better ability to be able to exploit the rule at the opposition's ground. However, when the probability of winning is very high (fourth quartile), the rule does not seem to be decisive, possibly because the difference in quality is so great that the game would have produced the same result in the absence of the rule. These results are in line with the findings of Varela-Quintana, del Corral, and Prieto-Rodríguez (2015), who found that the second-leg home advantage was especially relevant in evenly matched games.

Econometric Analysis

In order to check the robustness of our findings, we estimate five econometric specifications, the results of which are shown in Table 9. The models examine the probability of the visiting team in the second leg winning the knockout round within the regulation 180 minutes. In all models, draws were excluded from the analysis.

Model (2) is a pooled logit that uses the ability of both teams, the presence of the AGR in the contest, and five round dummies (semi-finals, quarter-finals, round of 16, second stage, first stage) as explanatory variables. Estimates show that, after controlling for ability, the effect of the AGR is positive and significant at the 5% level. More specifically, the marginal effect of the AGR is 0.077; that is to say, the probability of victory for the visitors in the second leg rose approximately eight percentage points with the new regulation.

In Model (3) and those that follow, we include a trend variable in order to test whether there is a possible preexisting evolution across time rather than an impact of the AGR. The trend variable correlates with our variable of interest, increasing its variance by a factor of 2.85 according to the VIF test. Nonetheless, estimates show that the AGR variable stays positive and significant at the 10% level, and the marginal effect remains barely unchanged (0.088). These results provide more evidence that the AGR is driving victories of the second-leg away teams.

If the location (home or away) of teams depends on unobserved characteristics, these individual-specific effects will be correlated with the explanatory variables. In this case, the pooled model estimators are usually inconsistent, and fixed-effects (FE) estimators should be used (Longhi & Nandi, 2015). Model (4) shows the results of an FE logit model controlling for the home teams in the second leg. The likelihood-ratio test of rho estimated from a random-effects (RE) logit, as well as a Hausman test obtained from comparing RE and FE models, suggest that the FE logit model is the best specification available. Although estimates show that the effect of the AGR is positive

TABLE 9. Effect of the AGR on the probability of victory for the visitors in the second leg

	(2) Logit	(3) Logit	(4) FE logit	(5) FE LPM	(6) Mundlak probit
Constant	-0.68**	-0.633**		1.016	1.019***
Own ability	0.031***	0.031***	0.031***	0.007***	0.019***
	(0.007)	(0.007)			(0.007)
Opponent's ability	-0.017***	-0.017***	0.017*	0.003*	0.010*
	(-0.004)	(-0.004)			(0.003)
Away-goals rule	0.329**	0.376*	0.841***	0.186***	0.511***
	(0.077)	(0.088)			(0.184)
Trend variable		-0.004	-0.001	-0.001	-0.002
		(-0.001)			(-0.001)
No. of observations	973	973	872	973	973
No. of groups			86	172	
No. of clusters					172
(Pseudo) R^2	0.032	0.032	0.063	0.066	0.081
Hausman test p-value			0.000	0.000	

Note: Dependent variable: the "visitor in the 2nd leg" wins the two-leg match in regulation 180 minutes. Observations exclude draws. Models (4) and (5) include "second-leg home teams" fixed effects and robust standard errors. Model (6) includes means for all regressors at the "second-leg home teams" level and standard errors clustered at the "second-leg home teams" level. All models include round dummies. The values in parentheses show the marginal effects, measured at the mean values of the continuous variables, and measured at the discrete change from 0 to 1 for the subpopulation identified by the categorical dummies. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

and significant at the 1% level, this model cannot provide marginal effects. To solve this issue, specifications (5) and (6) provide useful approximations.

Model (5) is a fixed-effects linear probability model (FE LPM) with robust standard errors at the level of the home teams in the second leg. Model (6) estimates a pooled probit using the Mundlak approach, which produces results that are fairly close to an FE model.[12] In both specifications, the impact of the AGR is quite similar (0.186 and 0.184, respectively) and significant at the 1% level. That is to say, the probability that visitors in the second leg qualify for the next round increases by about 18 percentage points under the AGR, which implies a higher advantage than was estimated in pooled logits.

In Table 10, we use the same specifications as those in Table 9 to check whether the AGR effect is different depending on quality disparities between teams. For this, we classify the contests into four quartiles according to the ability difference, and we interact the tiebreaker rule with them. The fourth quartile includes uneven fixtures with very high ability differences in favour of the away teams in the second leg. The third quartile is a group of evenly matched contests with small disparities in quality in favour of the away teams in the second leg. The second quartile contains evenly matched games with small ability differences in favour of the home teams in the second leg. The first quartile, omitted in the model, is a group of uneven games with very high ability differences in favour of the home teams in the second leg.

TABLE 10. Effect of the AGR according to the ability differences in the two-leg match

	(7) Logit	(8) Logit	(9) FE logit	(10) FE LPM	(11) Mundlak probit
Constant	-0.407*	7.020		-5.232	1.175***
Ability difference	0.018***	0.018***	0.011	0.002	0.006
	(0.004)	(0.004)			(0.002)
Away-goals rule	-0.144	-0.106	0.058	0.013	0.031
	(-0.034)	(-0.025)			(0.011)
AGR x 2nd quartile	0.392	0.393	0.384	0.085	0.238
	(0.094)	(0.094)			(0.088)
AGR x 3rd quartile	0.836***	0.840***	0.998***	0.234***	0.630***
	(0.205)	(0.206)			(0.235)
AGR x 4th quartile	0.442	0.446	0.382	0.091	0.245
	(0.109)	(0.11)			(0.091)
Trend variable		-0.004	0.013	0.003	0.007
		(-0.001)			(0.003)
No. of observations	973	973	872	973	973
No. of groups			86	172	
No. of clusters					172
(Pseudo) R^2	0.036	0.036	0.051	0.055	0.075
Hausman test p-value			0.000	0.000	

Note: Dependent variable: the "visitor in the 2nd leg" wins the two-leg match in regulation 180 minutes. Observations exclude draws. Models (9) and (10) include "second-leg home teams" fixed effects and robust standard errors. Model (11) includes means for all regressors at the "second-leg home teams" level and standard errors clustered at the "second-leg home teams" level. All models include round dummies. The values in parentheses show the marginal effects, measured at the mean values of the continuous variables, and measured at the discrete change from 0 to 1 for the subpopulation identified by the categorical dummies. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Once we include the AGR interacting with the ability difference, the impact of the AGR dummy variable vanishes in all models, being captured by the interaction between the rule and the teams of the third quartile. In Models (7) and (8), the marginal effect is close to 20% among teams from the third quartile; this result is statistically significant at the 1% level. The FE LPM and the Mundlak probit increase the impact to 23%. These results do not allow us to reject the hypothesis that the AGR specifically improved the outcomes for the visiting teams in the second leg that had a small ability difference in their favour.

Discussion

Under rational behaviour, the AGR effect should be neutral, as teams react to the rule in the same way in both legs: hosts would be more defensive to prevent conceding a goal whereas visitors would become more offensive. However, the outcomes obtained in this paper differ from the predictions of the standard choice model and seem to be linked to several behavioural biases mentioned in the literature.

One argument refers to performance failures related to psychological pressure, such as "choking," "panicking," and "yips" (Clark, Tofler, & Lardon, 2005), whereby players fail the execution of a well-learned skill when they are subjected to high pressure. Order effect literature has highlighted that being behind in the score is one such situation that may generate stress, anxiety and emotional states that lead players to fail simple tasks such as taking penalty kicks. Our findings might be related to this explanation, as not scoring an away goal in the first leg seems to have a detrimental effect on performance of home teams in the second leg. Although second-leg home teams that scored in the first leg (57.3% of the total) might also exert pressure in the opposite direction, this scenario does not seem to have taken place.

A second possible argument is that teams assign different costs and rewards to the away goals because of a time-inconsistent behaviour. Time inconsistency appears when agents overweigh the present, making choices in the short-term that would not be made in the long run using the same reasoning. Under this bias, hosts (visitors) in the first leg were less wary of the risk (benefit) of conceding (scoring) an away goal, so they did not change their behaviour. By contrast, in the second leg, home (away) teams were more wary of the importance of conceding (scoring) an away goal, and they became more defensive (offensive). It can be inferred that time inconsistency might not generate any observable change in outcomes because, in the first leg, both teams give little heed to the rule, and in the second leg, they cancel out each other's efforts. Descriptive analysis supports the argument in the first leg but not in the second one, where a reduction of performance of home teams is observed. An ad-hoc explanation is that becoming more defensive harms the hosts in the second leg because they do not exploit their home advantage appropriately.[14]

Our third explanation is related to loss aversion, which interacts with the two previous arguments. Loss aversion refers to the notion that "losses loom larger than corresponding gains" (Tversky & Kahneman, 1991, p. 1039). The desire to avoid a loss leads people to be risk-averse as well as risk-loving. To the extent that loss aversion emerges in the second leg because of time inconsistency, we might explain the AGR effect. On the one hand, second-leg home teams take fewer risks (sacrificing part of their home advantage) in order to avoid conceding an away goal. On the other hand, the second-leg away teams are willing to take more risks if they have conceded an away goal in the first leg. In addition to this, loss aversion in the second leg due to time inconsistency may generate psychological pressure,[15] so these three factors interacting with each other are also a plausible scenario that should be considered. All these explanations are far from being comprehensive and complete, and they need further investigation.

Unfortunately, except for the Prouhet–Thue–Morse sequence proposed by Palacios-Huerta (2012) for tiebreaks in tennis, few sport policy recommendations can be made in order to prevent the injustice of the sequential order. In this work, however, we have a case where the solution would be easy to implement as it only involves the removing of the rule. Despite this, its permanence could be desirable as it might help to counterbalance the second-leg home advantage.

Conclusions

In this paper, we investigate the existence of an away-goals-rule effect on two-leg matches from CONMEBOL club competitions. For this purpose, we compare the

outcomes from seasons that applied the rule (1988, 2005–2014) with those from seasons that did not (1989-2004).

Our results indicate that, under the away-goals rule, second-leg away teams improved their percentage of victories. This occurred especially in evenly matched games where the visitors in the second leg were better than their rivals, and in two-legged fixtures with the first leg ending with no away goals.

We also compared the goals scored in both periods. The results show that the rule did not stimulate a larger number of goals in the tournaments. In fact, its effect was to reduce the goals scored by home teams in the second leg, possibly because of a greater defensive effort.

Endnotes

[1] In many sports, statistics show that teams/players playing at home are more likely to win. This phenomenon, known as home advantage, has been attributed to several factors. Empirical evidence shows a positive effect of familiarity with the stadium on home teams (Pollard, 2002) and a negative effect of travel fatigue (jet lag) on away teams (Steenland & Deddens, 1997). Regarding psychological factors, Waters and Lovell (2002) found greater confidence among home teams, and Pollard (2006) attributes the variation of home advantage between domestic leagues to different senses of territoriality. Finally, the crowd is considered the main source of home advantage through their pressure on referees, players, and coaches. Nevill, Balmer, and Williams (2002) found that referees are influenced by crowd noise, while Garicano, Palacios-Huerta, and Prendergast (2005) reported that close matches were shortened by referees when the home team was ahead, and lengthened when the home team was behind. Koyama and Reade (2009) focused on how the crowd reduce shirking attitudes of home teams and how televised football has contributed to lessening the home advantage because it allows viewers to monitor the effort of away teams.

[2] Although it is not mentioned in their work, this phenomenon can be considered a case of time inconsistency, whereby the costs are immediate (the effort of both players and fans supporting their teams) and the reward is delayed until the future.

[3] This scheme was not effective until 1965, the year when extra time was first played. Before this, the 1960 season applied, in this order: point differences, goal differences, third matches, and coin tosses. In 1961, the organization applied coin tosses instead of third matches; and during 1962–64, the order was changed, whereby the goal difference was now applied just after the third match.

[4] Because in the round of 16 and the quarter-final there was an odd number of pairings, the Copa Libertadores also applied the best loser as a criterion to qualify for the next round.

[5] The regulation of the Copa Libertadores (but not the Copa Sudamericana) also mentions the number of goals as a tiebreaker criterion. For simplicity, we omit it because in a two-leg knockout round, this solution is equivalent to the goal difference.

[6] To categorize teams, the Copa Libertadores has used the performance of the associations in the previous edition, and the Copa Sudamericana has taken the rankings of the teams in the most recent domestic club competition.

[7] A total of 2,592 clashes were disputed during 1988–2014, but only those played over two matches, or legs, were taken into account in the analysis. One-leg matches (n = 11) and group matches (n = 1,368) were not considered. In addition, we removed final rounds that applied different tiebreaker schemes, such as a third match (n = 2) or extra time (n = 32).

[8] We consider jointly the point difference and the goal difference in the GDR. Note that the point difference is a redundant criterion when the goal difference is applied just after.

[9] Concretely, we removed 154 ties from the GDR period, and 52 ties from the AGR period, thus providing a total of 973 observations (GDR = 440, AGR = 533) for our binary response models.

[10] The winner takes 8 points, the runner-up 7, reaching the semi-final 6, quarter-final 5, round of 16 takes 4, round of 32 takes 3, second round 2, first round 1, and if not played, 0.

[11] The Shapiro–Wilk W test does not refute the normal distribution of the goal difference in the overall sample or in each period; and the Kolmogorov–Smirnov test refutes the hypothesis that the variable follows a different distribution in both periods. This prevents a possible risk of misspecification in our latent variable model that might cause inconsistent estimators.

[12] The Mundlak probit involves adding within-individual means of the regressors to the pooled probit. This correction allows dealing with the unobserved individual effects that are correlated with the observed explanatory variables (see Jones, Rice, Bago d'Uva, & Balia, 2007; Wooldridge, 2010).

[13] "For instance, a majority of adults report that they would rather have $50 immediately than $100 in 2 years, but almost no one prefers $50 in 4 years over $100 in 6 years" (Ainslie, 1991, p. 334).

[14] Several works in the literature have noted that offensive actions (rather than defensive) are a characteristic feature of the home advantage. Tucker, Mellalieu, James, and Taylor (2005) used a computerized video analysis system to study the behaviour of a professional team during 30 matches played during the 2004–05 English Premier League season, and they found that playing at home reported a higher and successful number of technical indicators, especially in the attacking third of the pitch. Lago-Peñas and Lago- Ballesteros (2011) found in the 2008–09 season of the Spanish League that home teams had significantly higher figures for attack indicators (such as shots, attacking moves, box moves, crosses, off-sides, assists, passes, dribbles and ball possession), with differences according to the team quality. Moreover, Staufenbiel, Lobinger, and Strauss (2015) found that home coaches had higher expectations of winning, more challenging goals, more offensive decisions, and more courageous playing tactics in an experimental, online management game where they were randomly located.

[15] For instance, in penalty shoot-outs, "a greater pressure on the kicker may be explained in terms of some form of probabilistic loss aversion, that is if losses are perceived disproportionally larger than gains" (Apesteguia & Palacios- Huerta, 2010, p. 2562).

References

Ainslie, G. (1991). Derivation of "rational" economic behavior from hyperbolic discount curves. *The American Economic Review, 81*(2), 334–340.

Apesteguia, J., & Palacios-Huerta, I. (2010). Psychological pressure in competitive environments: Evidence from a randomized natural experiment. *The American Economic Review, 100*(5), 2548–2564.

Bruine de Bruin, W. (2005). Save the last dance for me: Unwanted serial position effects on jury evaluations. *Acta Psychologica, 118,* 245–260.

Clark, T. P., Tofler, I. R., & Lardon, M. T. (2005). The sport psychiatrist and golf. *Clinics in Sports Medicine, 24*(4), 959–971.

CONMEBOL. (2004). *Copa Toyota Libertadores Reglamento.* Luque, Paraguay: Confederación Sudamericana de Fútbol.

Eugster, M. J., Gertheiss, J., & Kaiser, S. (2011). Having the second leg at home – advantage in the UEFA Champions League knockout phase? *Journal of Quantitative Analysis in Sports, 7*(1), 1–11.

Feri, F., Innocenti, A., & Pin, P. (2013). Is there psychological pressure in competitive environments? *Journal of Economic Psychology, 39,* 249–256.

FIFA. (2015). *Laws of the Game 2015/2016.* Zurich: FIFA.

Garicano, L., Palacios-Huerta, I., & Prendergast, C. (2005). Favoritism under social pressure. *The Review of Economics and Statistics, 87*(2), 208–216.

González-Díaz, J., & Palacios-Huerta, I. (2016). Cognitive performance in competitive environments: Evidence from a natural experiment. *Journal of Public Economics, 139,* 40–52.
Jones, A. M., Rice, N., Bago d'Uva, T. M., & Balia, S. (2007). *Applied Health Economics.* London & New York: Routledge.
Knight, B., & Schiff, N. (2010). Momentum and social learning in presidential primaries. *Journal of Political Economy, 118*(6), 1110–1150.
Kocher, M. G., Lenz, M. V., & Sutter, M. (2008). The case of penalty shootouts in football. In P. Andersson, P. Ayton & C. Schmidt (Eds.), *Myths and facts about football: The economics and psychology of the world's greatest sport.* Newcastle: Cambridge Scholars Publishing.
Kocher, M. G., Lenz, M. V., & Sutter, M. (2012). Psychological pressure in competitive environments: New evidence from randomized natural experiments. *Management Science, 58*(8), 1585–1591.
Kolev, G. I., Pina, G., & Todeschini, F. (2015). Decision making and underperformance in competitive environments: Evidence from the national hockey league. *Kyklos, 68*(1), 65–80.
Koyama, M., & Reade, J. J. (2009). Playing like the home team: An economic investigation into home advantage in football. *International Journal of Sport Finance, 4*(1), 16–41.
Krumer, A. (2013). Best-of-two contests with psychological effects. *Theory and Decision, 75*(1), 85–100.
Lago-Peñas, C., & Lago-Ballesteros, J. (2011). Game location and team quality effects on performance profiles in professional soccer. *Journal of Sports Science and Medicine, 10*(3), 465–471.
Lieberman, M. B., & Montgomery, D. B. (1988). First-mover advantages. *Strategic Management Journal, 9*(S1), 41–58.
Longhi, S., & Nandi, A. (2015). *A practical guide to using panel data.* Los Angeles: Sage Publishing.
Magnus, J. R., & Klaassen, F. J. (1999a). On the advantage of serving first in a tennis set: Four years at Wimbledon. *Journal of the Royal Statistical Society: Series D (The Statistician), 48*(2), 247–256.
Magnus, J. R., & Klaassen, F. J. (1999b). The final set in a tennis match: Four years at Wimbledon. *Journal of Applied Statistics, 26*(4), 461–468.
Mueller, D. C. (1997). First-mover advantages and path dependence. *International Journal of Industrial Organization, 15*(6), 827–850.
Mueller-Langer, F., & Andreoli-Versbach, P. (2011). *The absence of 'order effects' in dynamic tournaments: Evidence from a real-life randomized experiment* (Max Planck Institute for Intellectual Property and Competition Law Research Paper No. 11-08).
Nevill, A. M., Balmer, N. J., & Williams, A. M. (2002). The influence of crowd noise and experience upon refereeing decisions in football. *Psychology of Sport and Exercise, 3*(4), 261–272.
Page, L. (2009). *The momentum effect in competitions: Field evidence from tennis matches* (Working paper).
Page, L., & Page, K. (2007). The second leg home advantage: Evidence from European football cup competitions. *Journal of Sports Sciences, 25*(14), 1547–1556.
Page, L., & Page, K. (2010). Last shall be first: A field study of biases in sequential performance evaluation on the Idol series. *Journal of Economic Behavior & Organization, 73*(2), 186–198.
Palacios-Huerta, I. (2012). Tournaments, fairness and the Prouhet–Thue–Morse sequence. *Economic Inquiry, 50*(3), 848–849.
Pollard, R. (2002). Evidence of a reduced home advantage when a team moves to a new stadium. *Journal of Sports Sciences, 20*(12), 969–973.
Pollard, R. (2006). Worldwide regional variations in home advantage in association football. *Journal of Sports Sciences, 24*(3), 231–240.
Staufenbiel, K., Lobinger, B., & Strauss, B. (2015). Home advantage in soccer — A matter of expectations, goal setting and tactical decisions of coaches? *Journal of Sports Sciences, 33*(18), 1932–1941.
Steenland, K., & Deddens, J. A. (1997). Effect of travel and rest on performance of professional basketball players. *Sleep, 20*(5), 366–369.

Tucker, W., Mellalieu, S. D., James, N., & Taylor, J. B. (2005). Game location effects in professional soccer: A case study. *International Journal of Performance Analysis in Sport, 5*(2), 23–35.

Tversky, A., & Kahneman, D. (1991). Loss aversion in riskless choice: A reference-dependent model. *The Quarterly Journal of Economics, 106*(4), 1039–1061.

Varela-Quintana, C., del Corral, J., & Prieto-Rodriguez, J. (2015). Where to play first (away or home) in a best-of-two tournament? An analysis from UEFA competitions. In P. Rodríguez, S. Késenne & R. Koning (Eds.), *The economics of competitive sports.* Cheltenham, UK: Edward Elgar Publishing.

Waters, A., & Lovell, G. (2002). An examination of the homefield advantage in a professional English soccer team from a psychological standpoint. *Football Studies, 5*(1), 46–59.

Wooldridge J. M. (2010). *Econometric Analysis of Cross Section and Panel Data.* Cambridge, MA: MIT Press.

Authors' Note

The authors would like to thank Carlos Gomez-Gonzalez, Thadeu Gasparetto, participants of the X Gijón Conference on Sports Economics, the First Meeting of the PhD Students in Economics and Business of the University of the Basque Country UPV/EHU, the 6th ESEA Conference on Sports Economics in Antwerp, the editor Arne Feddersen, and two anonymous referees for their valuable comments.