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Differences in home advantage between sports

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Existing theories of home advantage attempt to explain home advantage wherever it exists; that is, they attempt to explain home advantage as a phenomenon. They do not attempt to explain the differences in home advantage between sports. There are only two studies in the literature that attempt to do so, and one of them is limited to contrasting baseball with other sports (Gómez, Pollard, & Luis-Pascal, 2011; Jones, 2015).

Fig. 1 presents home advantage from 2006-07 to 2015-16 by year for the five major professional sports for men in North America: soccer, basketball, baseball, American football, and ice hockey. The present paper asks the question "To what extent, if any, does the distance typically covered by an entire team in the course of a game associate with home advantage as depicted in Fig. 1?" Such an association does not, of course, necessarily explain home advantage. Nevertheless, if it exists, then the association itself requires explanation.

The five sports in Fig. 1 are represented by the élite leagues in each sport: soccer (English Premier League-EPL), basketball (National Basketball Association-NBA), baseball (Major League Baseball-MLB), American football (National Football League-NFL), and ice hockey (National Hockey League-NHL). The data are taken from the statistics pages of the league websites. Home advantage is taken as the percentage of home wins minus 50%. Ties are ignored; only decided games are considered. This way of calculating home advantage is the most commonly used. It is also unbiased. In basketball, baseball, football, and hockey all games are decided one way or the other in regular season play, but in soccer, ties are common, accounting for roughly a quarter of all games in the EPL. Any way of calculating home advantage that awards a positive value to ties inevitably reduces home advantage and would therefore constitute a bias against soccer vis-à-vis the other four sports.

The effect size of the difference between the proportions of all decided games won by the home team in soccer and baseball, 0.62 versus 0.54, is 0.16, as indicated by Cohen's h (Cohen, 1977, pp. 180–85). A value of h this size is accounted as "small" by Cohen's rule of thumb; and the difference between soccer and baseball is the largest of the ten differences. Therefore, all of the differences would be described as small by Cohen's rule, or smaller or smaller yet. Effect size, however, is not the most telling feature of Fig. 1 but, rather, the curves' robustness over time. Each curve consists of ten independent tests or demonstrations of home advantage. All the tests in a given curve indicate home advantage and almost all of the differences between two given curves are in the same direction. The sample sizes each year are large for baseball, basketball, and hockey and moderate for soccer and football. Most of the tests are statistically reliable, many at the 0.001 level; and the curves in Fig. 1 are abbreviated. All five go back as far as the Second World War and two of them, baseball and soccer, go back more than a century (Pollard & Pollard, 2005). Home advantages are small in effect size but very robust with respect to time, at least at élite levels of play. Even differences in home advantage do not change often and, when they do, change slowly, requiring at least a decade to take place.

1. Background

1.1. Individual sports

The literature on home advantage has always focused on team sports. The pioneer paper by Schwartz and Barsky (1977) presented data on American football, basketball, baseball, and ice hockey but not a word on any individual sport. Nevertheless, a few papers on individual sports did appear, but not quickly: high school cross country (McCutcheon, 1984), high school wrestling (McAndrew, 1992), and Alpine skiing (Bray & Carron, 1993). In all of these studies the advantage was small, 3–4%; all three were also isolated studies. In the rest of the 1990s and the first decade of the 21st century studies were published on tennis, golf, boxing, and the Olympics. Most of these studies were carried out in sizeable samples and some were statistically significant. In 2013 Jones carried out a systematic review of all publications on home advantage in individual sports to date. It concluded (p.397) that "Except for subjectively evaluated sports [such as diving, gymnastics, or figure skating], home advantage is not a major factor in individual sports,

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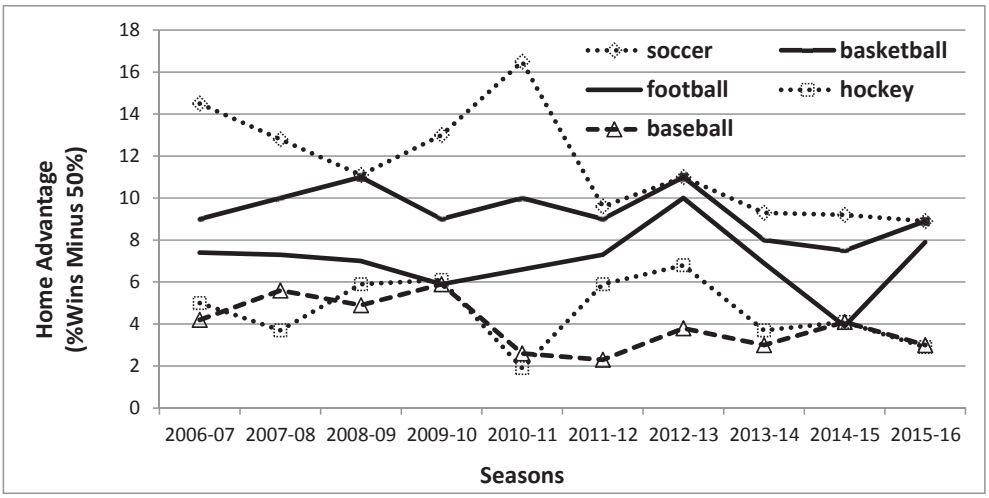

Fig. 1. Home advantage in regular-season, élite, professional sports for men: soccer, basketball, baseball, football, and hockey, 2006–07 to 2015–16.

much less does it play a role in individual sports comparable to its role in team sports."

This last point was drawn out further by Jones (2015). In the major team sports home advantage can be shown to hold not just at present or in a selected sequence of years but repeatedly back over time. As pointed out earlier, the advantage in baseball can be shown to be significant year by year for more than a century. It holds not just in the major leagues but in minor leagues and college baseball also. Home advantage has been demonstrated in soccer not just in the EPL but in every level of English soccer (Pollard & Pollard, 2005). Soccer is played all over the world, and Pollard and Gomez (2014) have shown that home advantage exists everywhere. The advantage in basketball exists in the college game as well as the NBA. It exists in women's basketball, as it does in women's soccer or women's hockey (Jones, 2015, p. 795). In short, home advantage is characteristic of major team sports, but only in team sports. No such showing has been made for any individual sport.

The most compelling evidence that the home effect is minor or nonexistent in individual sports is embedded, oddly enough, in team sports. Many team sports include passages that can be described as "individual efforts." Free throws in basketball are a good example. When a player attempts a free throw, he or she plays as an individual; teammates and opposing players are sidelined or otherwise idled. In samples from the NBA numbering 95,494 (home) and 90,875 (away) Jones (2013) reported a difference in conversion rates of 0.2%, 75.2% (home) to 75.0% (away), not significant at the 0.05 level (critical ratio = 0.71, $p > 0.4$), despite the enormous sample sizes and despite, too, the efforts of hometown fans behind the backboard to distract the away shooters.

Shootouts in NHL ice hockey are used to decide games in the regular season that end in ties after regulation time and one 5-min overtime period. A shootout consists of a sequence of contests each one pitting a shooter from one team against the goaltender from the other. Here again we have an individual effort embedded in what is otherwise a team sport; and again the result is no difference between conversion rates for the home and away shooters (Jones, 2013; McEwan, Martin Ginis, & Bray, 2012). In fact, both of the reports just cited found a small but nonsignificant difference in favor of the away shooters.

Penalty kicks in soccer are a third example. Dohmen (2008) collected all penalty kicks in the German Bundesliga from its foundation in 1963 until the end of the 2003/2004 season, a total of 3619 kicks. The result was the same as in hockey shootouts. Out of 2560 kicks the home kickers converted 1884 or 73.6%; out of 1059 kicks the away kickers converted 803 or 75.8%. The difference is not significant ($z = 1.39$; $p > 0.05$) and in the wrong direction; the away kickers did better than the home kickers, albeit not reliably better.

These observations could hardly be clearer. In all three cases the individual efforts are embedded in a team sport. The individual players are also teammates in the team sport. The court, rink, or pitch is the same. The same crowd, the same officials, the same games, all are the same; and all three sports show hefty home advantages as teams. Yet when the same players compete as individuals, the home effect goes away.

1.2. Away disadvantage

The teamwork theory (see below) contends that the home effect is better understood as an away disadvantage than as a home advantage. Of course, as far as the numerical result is concerned, home advantage and away disadvantage come to the same thing,

$$\frac{\text{Home Wins}}{\text{Home Wins} + \text{Away Wins}} - .5 = .5 - \frac{\text{Away Wins}}{\text{Home Wins} + \text{Away Wins}}.$$

The two formulations do differ, however, in suggested locus of action. Home advantage suggests that the cause or causes of the effect act primarily on the home team and away disadvantage that they act primarily on the away team. This difference in which team is primarily affected may be helpful in separating the two formulations. If a cause could be found which counters or nullifies the home (away) effect, then, perhaps because of where it acts or what it is, it might be possible to infer which formulation is the more correct. The teamwork theory contends that playing away puts a team on the defensive. The away players realize that they are not in familiar circumstances, that the crowd is against them and, they suspect, so are the officials. They feel on the defensive, even intimidated or threatened. If it could be shown that other causes known or suspected of putting a team on the defensive also affect the home (away) effect and do so conformably to theoretical expectations, it would constitute evidence in favor of the teamwork theory. Concussions and other injuries in football or fighting in ice hockey may be cases in point (Jones, 2016).