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Impact of Home Field Advantage: Analyzed Across Three Professional Sports

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Impact of Home Field Advantage: Analyzed Across Three Professional Sports

Abstract

We examined the impact of home-field advantage in the NFL, NBA, and MLB. We defined home-field advantage as winning more than 50% of the home games. Additionally, we took into consideration how season length could act as a moderator and influence the impact of home-field advantage. We collected data from the 2015 NBA and MLB seasons and the 2015 and 2016 NFL seasons to determine statistical significance. In total, we got data from 4,141 games to analyze. We found that there is statistical significance that the home team has a better chance of winning than the away team across the NFL, NBA, and MLB. We also found that season length has a significant impact on home team winning percentage.

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Comments

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Running Head: IMPACT OF HOME-FIELD ADVANTAGE

Impact of Home Field Advantage: Analyzed Across Three Professional Sports

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IMPACT OF HOME-FIELD ADVANTAGE

Abstract

We examined the impact of home-field advantage in the NFL, NBA, and MLB. We defined home-field advantage as winning more than 50% of the home games. Additionally, we took into consideration how season length could act as a moderator and influence the impact of home-field advantage. We collected data from the 2015 NBA and MLB seasons and the 2015 and 2016 NFL seasons to determine statistical significance. In total, we got data from 4,141 games to analyze. We found that there is statistical significance that the home team has a better chance of winning than the away team across the NFL, NBA, and MLB. We also found that season length has a significant impact on home team winning percentage.

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Impact of Home Field Advantage: Analyzed Across Three Professional Sports

Throughout our athletic careers, we have always heard about how much home-field advantage matters in professional sports. For example, football, both at the collegiate and professional level, commonly refers to the fans of a home team as their “12th man”. Each league only allows eleven players per team on the field at once. Therefore, referring to a team’s 12th man implies that the fans of the home team may have a helpful role. As athletes and also as fans of professional sports, we believe understanding the statistical significance of variables that explain home-field advantage are worth studying because of the common conception of a home-field advantage. One variable that will be key in understanding the significance of home-field advantage is the home team’s winning percentage across three major professional American sports: the National Football League (NFL), Major League Baseball (MLB), and the National Basketball Association (NBA). This study will review how the home-field advantage will impact a team’s home winning percentage. It will also look at some of the factors that define and have an impact on home-field advantage. In addition, we will take into account how season length across football, baseball, and basketball acts as a moderator between home-field teams and winning percentage.

Potential Moderators

Pollard studied familiarity of context in sports. Specifically, he was able to quantify the advantage of familiarity with the local playing facility. Pollard's research investigates 37 teams in the MLB, the NHL, and the NBA from 1987 to 2001. His study is noteworthy because it accounts for the change in home advantage when a team changes stadiums, but remains in the same city. By studying professional sports organizations that stayed in the same city he was able to keep some consistency regarding crowd support, noise, and density. He suggested that crowd

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attendance may actually increase because of the new stadium. Pollard found that home advantage in the first season at the new stadium after moving was significantly less than the home field advantage in the final season in the old stadium. This was concluded across all three sports. From that finding he can estimate that 24% of the advantage of playing at home is lost when a team relocates to a new facility even though it is in the same city. This study provides us with more knowledge about home-field advantage and factors associated with that advantage.

In another study that gives reason to a home team's advantage, Nichols studies the phenomenon of travel fatigue, focusing on the NFL. This study focuses on NFL games from 1981 to 2004, because of a phenomenon that happened in 2008. In 2008, NFL west coast teams traveling east were unable to beat their opponents until Week 13 of the regular season. During the 2008 regular season, West coast teams visiting the East coast only won 3 out of 17 games, or 17.64% of games they played on the opposite coast. Conversely, the East coast teams traveling West won 8 out of 15 games or 53.33%. Nichols' study analyzes the effect of jet lag on NFL players and the subsequent outcome of the game. The data includes 5,453 regular season NFL games, and the results indicated that the further a visiting team travels, the more likely the home team is to win (Nichols, 2014). This increase in the likelihood of winning mostly occurs when the visiting team is traveling West to East because they are losing daylight hours. Nichols found this statistically significant even when a team only had to cross one time zone.

Lastly, Leifer conducted an experiment on social support and its perverse effects. He examined professional sports for his experiment. Leifer found that perverse effects can help lead to positive outcomes from social support in major league sports (Leifer, 1995). There is long standing evidence and research that shows supportive publics (home-field fans) can positively affect a wide array of performances in and across major league sport contest. In a Chicago

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Tribune article, the qualified authors made more references to home and away location of the game rather than factors such as talent, injuries, and present team momentum (Leifer, 1995).

This brings up an interesting thought: home-field advantage is a bigger driving force towards a team success over a team's talent, number of injuries, and total momentum.

Although we will not be measuring all factors that create a home-field advantage in our experiment, we believe understanding these factors will help explain why home-field advantage is an important variable in our study. From work written on the causes of home field advantage, researchers have narrowed down these causes to five main reasons: influence of the crowd, familiarity with the context, travel fatigue, rule factors that favor the home team, and territoriality (Legarez et al., 2012). While we will not be measuring these variables, they provide an explanation for home advantage. In fact, much of the research we have sifted through, allows us to agree with Legarez, and the notion that researchers have not been able to identify a dominant factor responsible for home-field advantage (2012). Home-field advantage is most likely a mix of all the factors mentioned above and combined with others such as ticket sales, competitiveness of a given game, weather, individual key player trends, and other factors difficult to study. We plan to research the significance of home-field advantage on winning percentage and also analyze if season length directly impacts home-field winning percentages across the NFL, NBA, and MLB.

Home-Field Advantage Impact on Winning Percentage

It is a common belief that the home team in major sporting events will have an advantage. Therefore, we have defined an advantage as winning more than fifty percent of their home games. In this section, we will look at data that supports this notion based on historical games across the NFL, MLB, and NBA.

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In a study that pulls data from the 1971-1972 season, MLB teams won 53% of their home games and NFL teams won 55% of their home games (Schwartz & Barsky, 1977). In another popular study across a more recent five year period, results showed that home MLB teams won 53.7% of home contests, NFL teams won 58.2% of home games, and NBA teams won a staggering 61% of home games (Carron & Paradis, 2014). According to both of these studies, the home team is winning more than 50% of their home games across all three professional sports we are studying.

Craig Wills' study was a bit different from the previous studies mentioned, but still emphasizes the home-field advantage across sport leagues. Wills collected data on the percentage of time spent maintaining a lead compared between home and away teams (Wills, 2017). While this data is not what we will be studying in our research, his findings further emphasize the importance of being a home team. Wills finds that in the NFL and NBA, the home team spends 30% of the game in the lead for good, whereas the away team only spends around 20% of the game in the lead for good (Wills, 2017). NHL home teams spend 23% of the game in the lead for good compared to the away teams who spend 18% of the game in the lead for good (Wills, 2017). Lastly, MLB home teams spend 28% of the game in the lead for good and away teams spend 26% of the game in the lead for good (Wills, 2017). Wills' data provides us with a different look at home team success.

Another outlook observes the probabilities of different teams beating an equal caliber team at home across different sports. This outlook is interesting because it takes into account the caliber of the teams playing and how home-field will help a team beat their comparable opponent (Lopez et al., 2017). This study found that NBA teams will win 62% of home games against equal teams, NFL teams will win 59% of home games against equal teams, NHL teams will win

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56% of home games against equal teams, and MLB teams will win 54% of home games against equal teams (Lopez et al., 2017).

While this data presents us with the idea that home-field advantage matters in professional sports, it is important to also look at factors inducing the phenomenon of home-field advantage across different sports. To compound that, the data shows that the phenomenon of home field advantage is not one that is particularly new to professional athletics, yet it shows it has been statistically significant for decades. One factor that we will focus on is the length of the sport's season and its potential impact on home team's winning percentages.

Duration of Season

Professional baseball, football, and basketball have different regular season lengths. Baseball's season consists of 162 games, football's has 16 games, and basketball has an 82-game season. The differences between these sport's season length could have an impact on the home team's winning percentage by acting as a moderator between the home team and their winning percentage.

Jamieson did research where he used many moderators, but one specific moderator of interest is the effect of season length on home-field advantage (2010). Jamieson coded each study by sport by breaking up sports with a season with fewer than 50 games, between 51-100 games, and greater than 100 games (2010). Jamieson's meta-analysis included seasons from prior to 1950-2007 and a wide range of sports (2010). He gathered data from professional baseball, football, hockey, basketball, cricket, and soccer to name a few (Jamieson, 2010). His analysis produced a significant effect for season length. Per Jamieson's findings, the home-field winning percentage for sports with more than 100 season games was much smaller (55.9%) than that for sports with between 51-100 games (60.1%) and sports with seasons less than 50 games

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(62%) (Jamieson, 2010). It is important to note that these statistics need to be approached with caution because baseball was the only sport measured with more than 100 games. Since baseball was the only sport measured in that category, we are unsure if baseball generally has a weaker home-field advantage or if the length of the season could explain the difference across sports (Jamieson, 2010). Jamieson provides some reasoning for why a longer season could create smaller home-field advantages, however. As the number of games per season increases, the importance of each game may decrease (Jamieson, 2010). While Jamieson's results do show a significance in season length impacting home-field advantage, the significance from sport to sport is generally insignificant. For example, when Jamieson only studied the winning percentages of home baseball teams and home football teams, the difference was insignificant (Jamieson, 2010). This leads us to believe that season length may not be a direct factor driving home-field advantage.

Based on other studies conducted on home team winning percentages across baseball, football, and basketball, the winning percentages are not significantly different either. Jones looks at winning percentages using a decade to decade approach and finds that baseball wins around 54% of home games, football wins around 57% of home games, and basketball wins around 60% of home games (Jones, 2015). These numbers are strikingly similar and further emphasize Jamieson's study, leading us to further question if duration of the season has an impact on a home team's winning percentage.

Hypotheses

Based on the previous research, we have created two hypotheses for the study we will conduct.

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Hypothesis 1: The home team in the NBA, NFL, and MLB will have a significant advantage over the away team by winning more than 50% of games.

Hypothesis 2: The duration of each season (NFL, NBA, MLB) will not have a significant impact on the home team's winning percentage.

Method

Participants

We conducted a non-experimental research design and got data from all NFL, NBA, and MLB. We collected data from the 2015 NFL, NBA, and MLB seasons and the 2016 NFL season. We chose to collect data from both the 2015 and 2016 seasons for the NFL, due to the small amount of games compared to the NBA and MLB. In total, we had a sample of 4,141 games across the three major professional sports leagues we researched.

Measures and Procedure

We collected our data from researching public archives of regular season games on ESPN.com. This data was coded into our computer software to ensure our results were measurable. Also, we coded our duration of season by differing between season lengths. We specified between the 16-game season (NFL), the 82-game season (NBA), and the 162-game season (MLB). This allowed us to keep our data organized and easily analyze statistical significance.

Statistical Analysis

For our first hypothesis, we used a one-sample *t*-test to find the significance of the home team's advantage. To analyze the differences between the season lengths in our second hypothesis, we used an ANOVA to find a significant difference. Once we created our ANOVA, we used a Bonferroni Post Hoc test to learn which groups had significant differences.

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Results

Hypothesis 1

Using a one sample *t*-test, we were able to find the frequency and the significance of the home team wins over the away team in the NFL, NBA, and MLB combined. In our sample of 4,141 games ($N=4141$) from the 2015 (NFL, NBA, MLB) and 2016 (NFL) seasons, we found that the home team won 55.5% of their home games. Therefore, our statistics showed that home field advantage had a significant impact on the result of the games ($M= .55$, $SD= .50$), $t(4140)=7.08$, $p<.001$. Our first hypothesis predicted that the home team would win more than 50% of their home games. Based on our results, we believe we can confidently support our first hypothesis and claim that the home team has a significant advantage over the away team across the NFL, NBA, and MLB combined.

Hypothesis 2

In our data analysis on the impact of the season length on the home team's winning percentage, we used an ANOVA to test the significant differences between a 16-game season (NFL), an 82-game season (NBA), and a 162-game season (MLB). Based on our previous research, we believed that there would not be a significant difference between the multiple season lengths with season length acting as a moderator. Our omnibus *F*-test showed us that there was an overall significant effect of season length on home team winning percentage, $F(2, 4138)= 4.51$, $p=.01$. In order to identify which season lengths had a significant difference on home team winning percentage, we conducted a Bonferroni Post Hoc test to understand our results more specifically. Specifically, the 82-game season resulted in a significantly more home team winning percentage (58.9%) than the 162-game season home winning percentage (53.6%). It is difficult for us to directly contribute this significant difference to the length of the season,

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since there was no significant difference between the 16-game season home winning percentage (55.9%) and either the 82-game season or the 162-game season home winning percentage.

Therefore, we cannot confidently say that season length has a significant impact on home team winning percentages.

Discussion

The results of this study are consistent with previous research regarding these hypotheses. Our first hypothesis correctly predicted that from our sample of 4,141 games, obtained from the NBA and MLB season of 2015 and NFL seasons of 2015 and 2016, home teams would have an advantage and win over 50% of games. In fact, we found that home teams won 55.5% of games. Our result of home teams winning 55.5% of games corresponds to research done in 1977 by Schwartz and Barsky who found that MLB and NFL teams won 53% and 55% of their respective home games. It also corresponds to a study Carron and Paradis mention in an article they published in 2014, where MLB teams won 53.7%, NFL teams won 58.2% and NBA teams won 61% of home games.

Out of all the moderators mentioned earlier and different potential directions to further study this topic of home field advantage, we chose season length and had to conduct an analysis of variance among groups. We defined our groups as the individual sports because they each have different season length. NFL has a 16-game season, NBA has an 82-game season and MLB has a 162-game season. Our second hypothesis was that the duration of season will not have a significant impact on the home team's winning percentage. However, our hypothesis was incorrect and our ANOVA test showed that there was a significant difference between groups. To figure out which groups, we had to conduct a Bonferroni Post Hoc test. We found that there was a difference between NBA (58.9%) and MLB (53.6%) home winning percentages, with

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NBA having significantly more wins. This somewhat aligns with Jamieson's meta-analysis that showed home winning percentage for sports with between 51-100 games (60.1%) and sports with seasons less than 50 games (62%) was greater than sports with more than 100 season games. MLB has the sole season over 100 games being, a 162-game season, so it is possible that players weigh each game as less important.

Limitations and Future Research

Unfortunately, we came across limitations in analyzing our research explaining why professional sports teams have a significant advantage at home. Some of these limitations included crowd noise, familiarity, travel fatigue and territoriality. We attempted to use these variables in our study to get a better explanation as to why playing at home promotes a significant advantage, but were unable to properly measure these and get results that would back our study. Although it would have been difficult to implement into our research, we came up with a few future research ideas that could have been extremely helpful to make our study more specific. One idea we proposed was to survey professional athletes about why they personally feel that their team performs better at home than on the road. Even though we collected over 4,000 samples of data, we analyzed that the addition of even more samples could have been more helpful in determining if season length significantly affected home-field advantage across our three professional sports team studied. The final future research idea we proposed would have been to take advantage of today's newer technology measuring crowd noise in sports stadiums and arenas. Although it would have been very difficult to obtain access to this information, knowing decibel levels for home team's stadiums could have given us great information that we could have incorporated into our study to back our hypothesis even further.

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While there still could be a lot of research done on the topic, our study provides valuable data into the question of home-field advantage in professional football, basketball, and baseball. We conclude that the home team has a significant advantage over the away team, adding to many other research studies' assertions. We also explored the idea that season length may act as a moderator for home-field advantage. What we found was that there was statistical significance across our different season lengths, similar to past research. In conclusion, home teams have an advantage over the away team and the different season lengths across different sports may act as a moderator.

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