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Stat 157
December 11, 2008

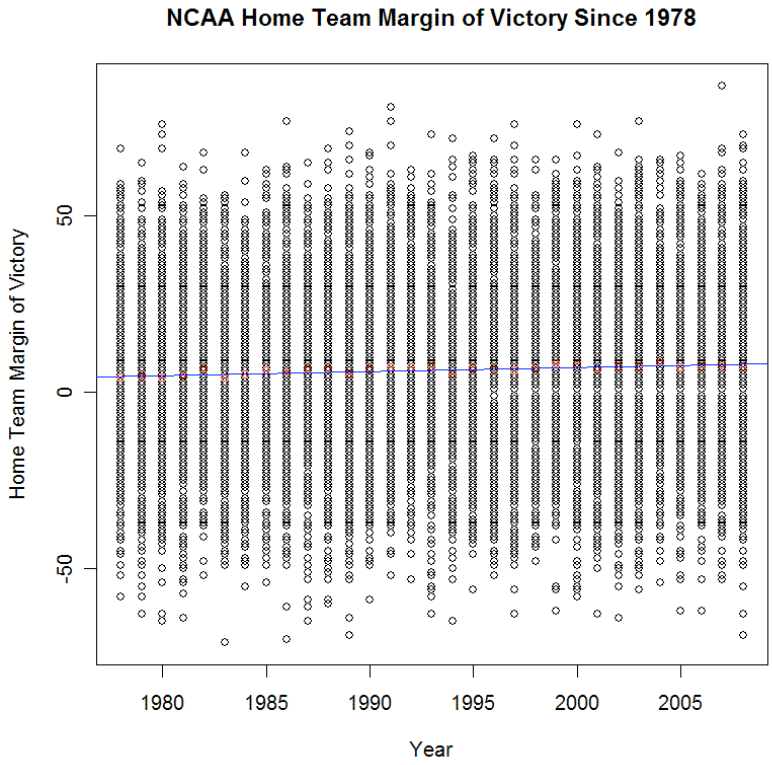
Easier Schedules and Increasing Home Field Advantage in College Football

Since the creation of the BCS (Bowl Championship Series) in 1998, it has become common practice among sportswriters and fans to challenge the ranking system in college football and debate why one, if not both, teams do not deserve to play in the national championship game. One of the classic topics for discussion is the impact of home field advantage on the outcomes of games. Through analysis of data involving point spreads, game scores, and stadium attendance, I will demonstrate that home field advantage is real and that it has steadily increased over time. Furthermore, I will bring forth possible explanations for this increase that may actually be more compelling than the increase in home field advantage itself.

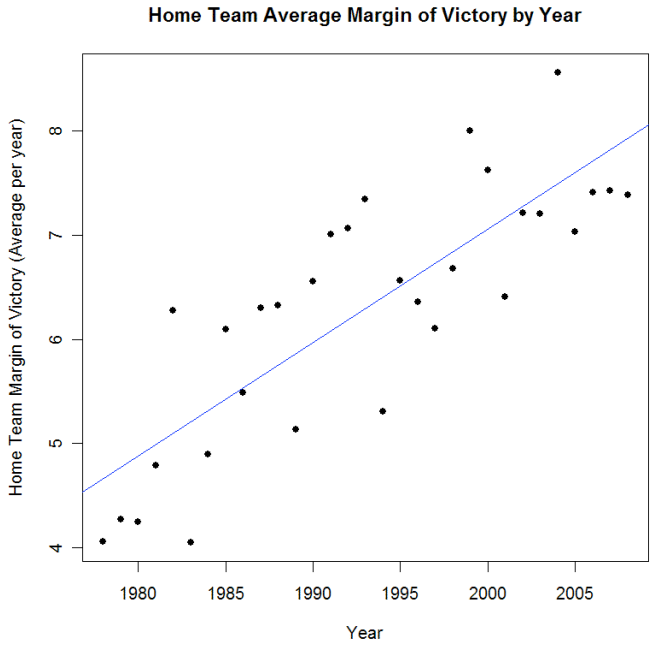
Home field advantage is the idea that home teams have a significant advantage when playing in their home stadium versus when they are the visiting team playing at an away stadium. There are many factors that contribute to home team advantage, such as familiarity with playing fields and certain routines, and wildly cheering fans that can boost players' adrenaline and motivation. In 2008, home teams in college football won by an average of 7.39 points per game and had a winning percentage of 63.2%, so clearly there is a positive relationship between playing at home and winning games.

Over the last thirty years, home teams have steadily won by more points and have had increasing winning percentages. Each dot in the graph below represents the number of points that the home team beat the away team by in every college football game since 1978. The vertical lines of dots represent specific years, and the red dots represent the average values for

each year. The blue line is a regression line that runs through the average home team winning margin for each year.

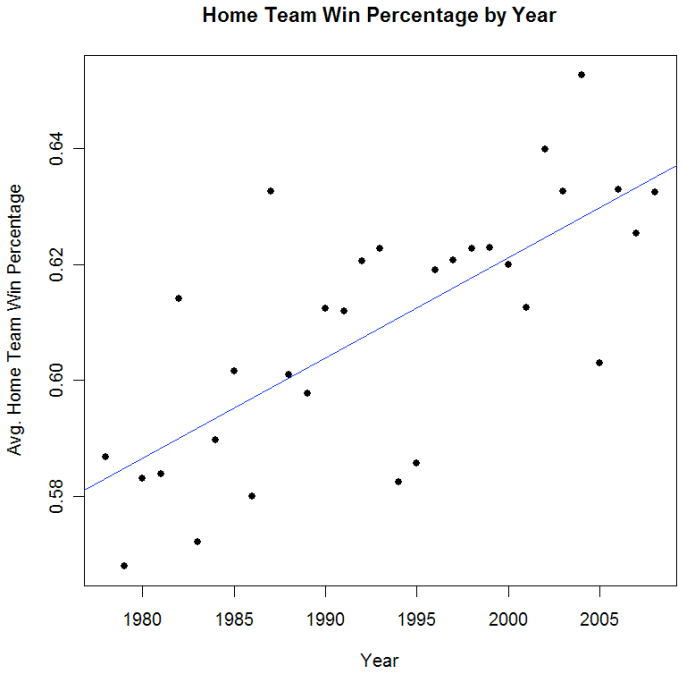


It may seem like there is no difference from year to year, but that is because the range of winning margins is so large. The following graph is a similar version of the previous graph, except that it only shows the average values for each year.



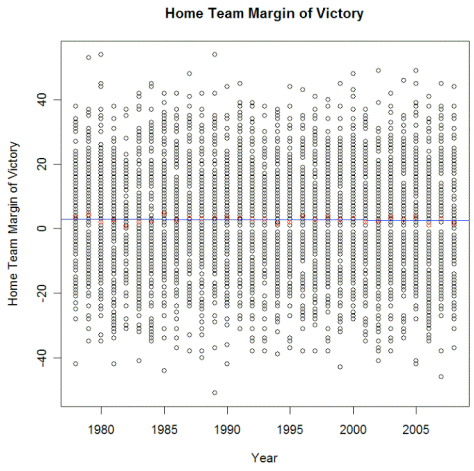
r = 0.818

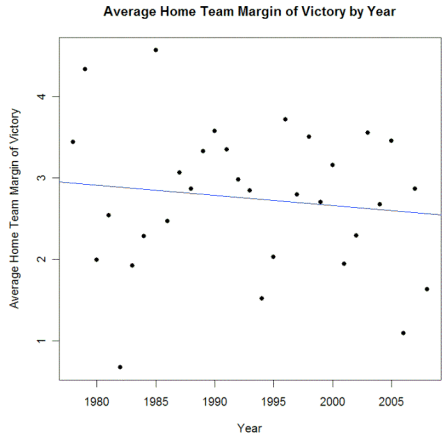
In 1978, home teams beat visiting teams by an average of 4.06 points per game, whereas in 2008 the average home team margin of victory gradually increased to 7.39 points per game. The linear correlation for the relationship between average home team margin of victory and the year the games were played is 0.818, which is very strong. The same strong relationship is found in winning percentages, as shown below. In 1978, the average winning percentage for a home team was 58.7%, but now it has increased to 63.2% as of 2008.

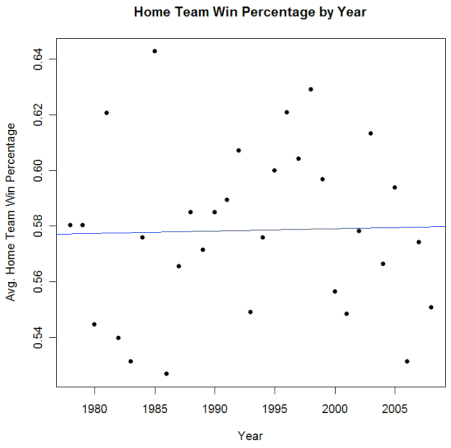


r = 0.726

To put all of this into perspective, the graphs below are the same as the previous graphs except they are from the NFL instead of college football.

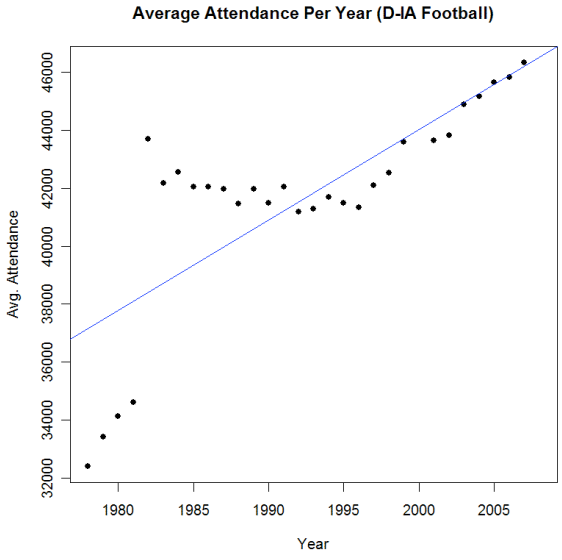


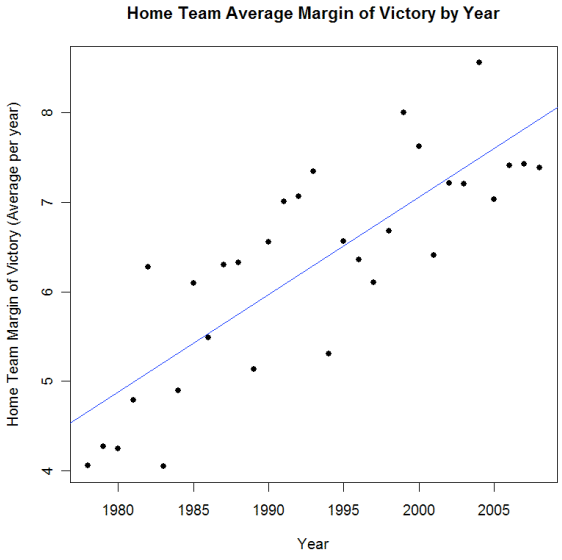




The two graphs on the left show that, if anything, home teams are losing by an average of more points now than they used to. However the correlation is very weak, at -0.128. The graph on the right demonstrates the large variations in home team winning percentage each year, and that they essentially have not changed over the last thirty years. Thus, the high correlation and larger change in average margin of victory and winning percentage in college football must be taken seriously. The numbers for the NFL can be thought of as a control group, where it is the same sport, but played under different home and away conditions.

There are many factors that could account for the increase in home field advantage in college football, but I will now focus on three such factors that I believe have the largest impact. The first factor of home team advantage is the large crowd that cheers on the home team. When home team players make good plays, their crowds cheer passionately for them, boosting the players' spirits and confidence. If referees are in doubt about calling penalties against the home or away team, it is much easier to penalize the away team so there are not 70,000 people booing them. This leads directly to the question of whether the attendance at home stadiums affects the performance of players. The graphs below show a very strong positive correlation (r = 0.737) between attendance and home team margin of victory.

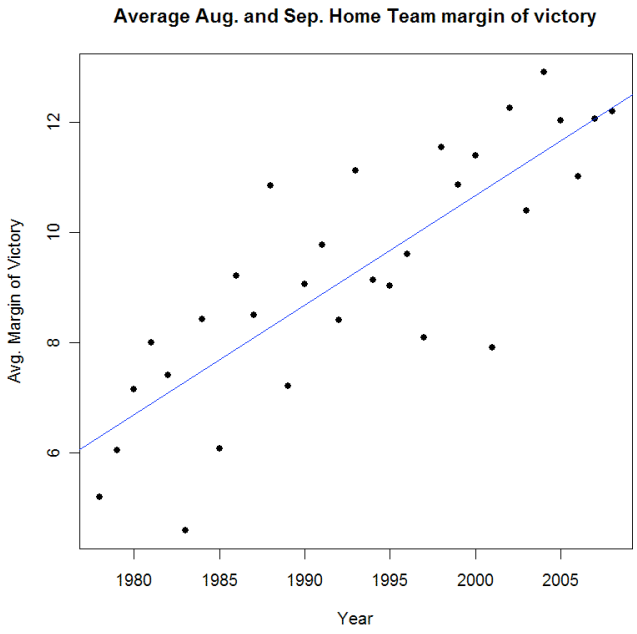


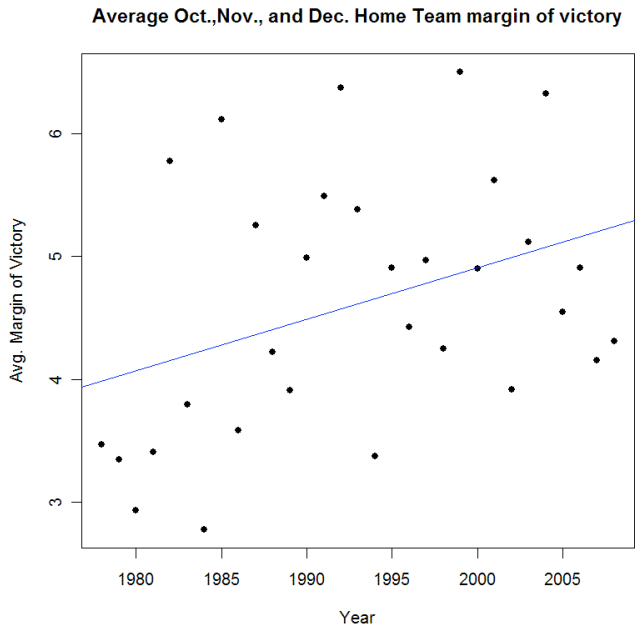


The problem with using increasing attendance to explain increasing home team margin of victory is that the cause-and-effect relationship might actually be reversed. As home teams win more games, more fans will want to attend their games.

The next two causes of home field advantage involve the process of home teams scheduling easier opponents. One theory is that home teams are scheduling easier non-conference opponents to gain bowl eligibility and the other is that home teams are trying to win by larger scoring margins to impress pollsters who will determine who plays for the national championship. There is no playoff system in college football- instead the sport uses a system of bowl games to determine the final rankings. The bowl game system has existed for over 90 years, but has drastically changed in the last thirty years. In 1978, there were 19 bowl games. The premier bowl games featured the conference champions from each of the major conferences at the time, and the national champion was determined by the media polls who voted based on the outcomes of these games. Thus, in order to win the national championship back then, it was of little importance which opponents teams chose to play outside of their conferences. Now, in 2008, there are 31 bowl games- 12 more than in 1978. Additionally, bowl game officials now choose teams based more on their overall (non-conference and conference) records than their conference records alone. The impact of this selection process is that non-conference games are more significant today than they were in the past. For example, the University of South Florida this year has a conference record of 2-5 (2 wins, 5 losses). Their non-conference record, however, is 5-0, boosting their overall record up to 7-5. In the past, their conference record would have carried more weight in the bowl selection process and they most likely would not have been invited to a bowl game. Under the new system, which includes more bowl games and a new rule forcing bowl games to choose teams with seven overall wins, South Florida will play

in a bowl game. Clearly, it was to South Florida's advantage to schedule five "easy" non-conference games so that they could have a much easier route to a bowl game, which grants them money and respect. Situations similar to South Florida's are common, as at least ten other teams this season have needed a better record in their non-conference games than their conference games to earn enough wins to compete in a bowl game. It is for this reason that teams are scheduling easier non-conference games than they used to. The graphs below show how home teams' average margin of victories in August and September have greatly increased over the last thirty years while in the remainder of the season they have not. August and September are traditionally when easy non-conference games are played because teams like to begin their season with wins.

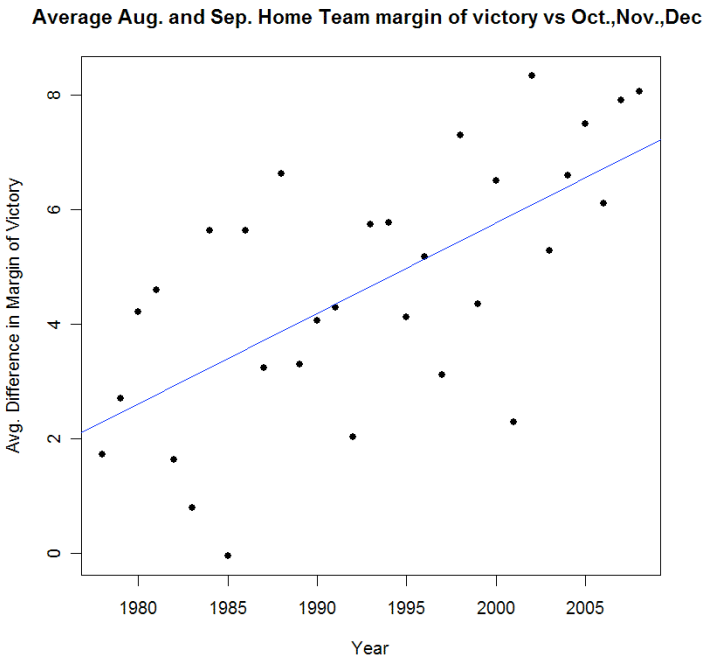




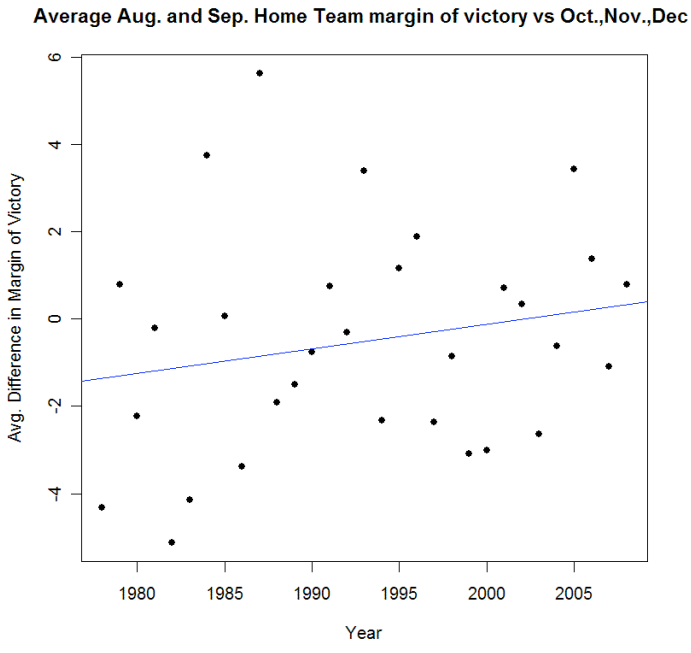
In August and September of 1978, home teams won by an average of 5.201 points per game, while in 2008 they won by an average of 12.197 points per game. The correlation between August and September average margins of victories and the years these averages were recorded

is 0.815. Comparing the average home team margins of victory in August and September to the average overall home team margins of victory gives a correlation of 0.837. Running the same comparisons for October, November, and December to the years the data were recorded and the overall home team margins of victory result in correlations of 0.368 and 0.716. These values are much lower than the correlations in August and September, which demonstrates the significance of the increasing August and September home team margins of victory. To show that early season (August and September) home team margins of victory are higher than later in the season, the graph below on the left plots the difference between early season home team margin of victory and late season margin of victory. The graph below on the right shows the same numbers, except run with NFL data instead of college data to again implement a type of control group.

College Football



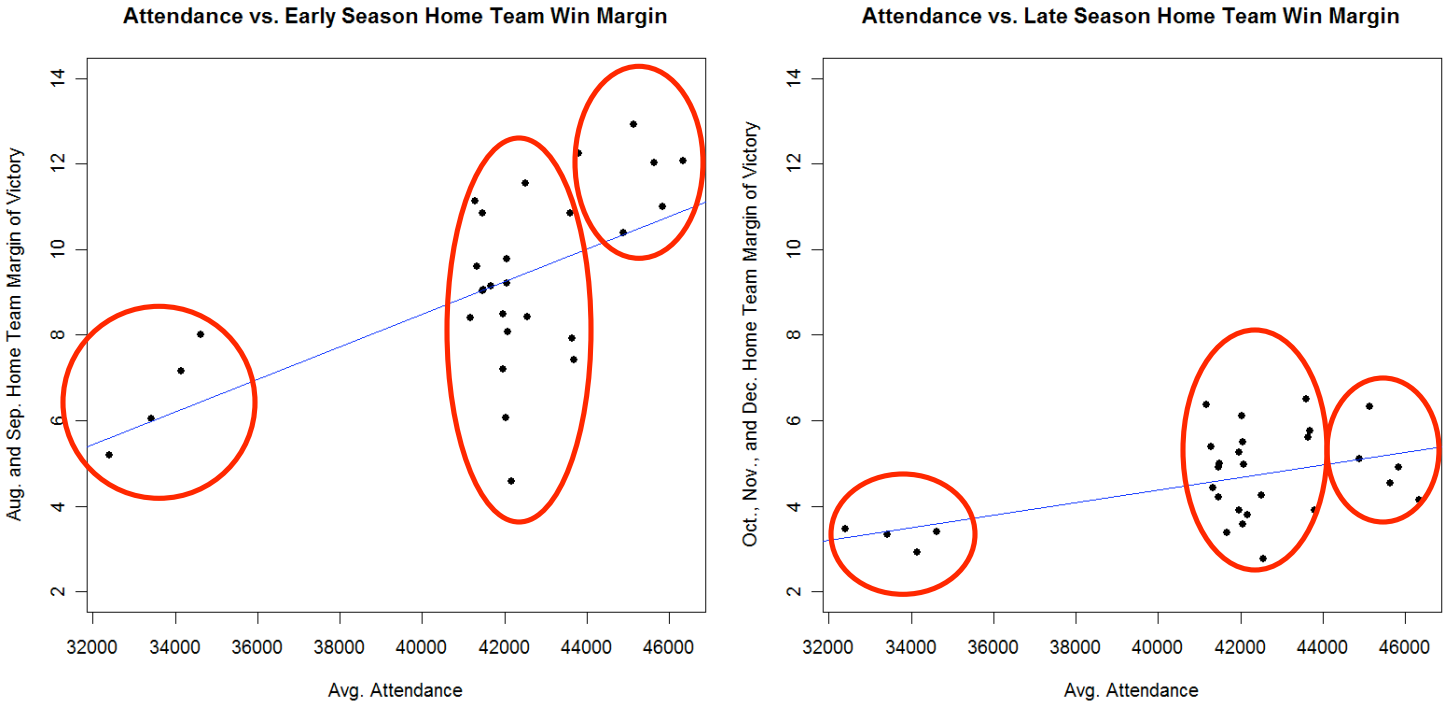
NFL



In college football, this early season versus late season difference ranged from 1.736 points per game in 1978 to a low of -0.046 in 1985 to a high of 8.343 in 2002 to 7.891 in 2008. In the NFL, this number has been negative 18 times, three times less than negative four, while in college football the value was negative only one time, when it was -0.046. Not only in the average difference between early season and late season margin of victory greater in college football than in the NFL, but it has been increasing with a correlation of 0.647 and a higher positive range of 1.736 to 7.891 points per game in college football than in the NFL where the correlation is only 0.205 and the range is -4.327 to 1.000 points per game. Comparing the increase in the difference between early and late season home team margin of victory to overall home team margin of victory results in a correlation of 0.505.

The data involving early and late season variations in home team margins of victory shows that home teams scheduling easier non-conference opponents in the beginning of the season is a greater factor than their desire to impress pollsters with larger victories. The reasoning for this assertion is that, although home teams are still winning at home, they are not winning by much more than they used to in the latter part of the season. Early in the season home teams have increased their victory margins by an average of approximately six points per game over the last 30 years. If home teams were focused on impressing pollsters, there would have been a much larger increase in margins of victory for the later part of the season.

Increasing stadium attendance and easier non-conference scheduling both offer statistically-sound explanations for the increasing home team margins of victory. Comparing stadium attendance and early / late season margins of victory suggests that attendance and easier schedules are closely related. The graphs are at the top of the next page:



High attendance is positively correlated with larger home team margins of victory. This correlation is stronger in the early season (r=0.620) than in the late season (r=0.488). The data in the graphs above can be split into three distinct groups, represented by the red ovals. The left oval in each graph represents the data in the 32,000 to 36,000 attendance range, the middle oval represents the 40,000 to 44,000 attendance range, and the right oval represents the 44,000 to 46,000 range. When attendance is very low, there clearly is a smaller home team margin of victory in the early and late season. When home team margins of victory are very high in the early season, average attendance for the year is also very high, while in the later part of the season this has a smaller effect. The middle oval shows that if attendance is approximately average, the winning margin can vary to a large degree both in the early and late season. This shows that easier scheduling in the early season is more likely to cause increasing attendance than increasing attendance causing a higher victory margin.

In summary, in college football the increasing average margin of victory by home teams early in the season is the driving force behind the increasing home team advantage over the last thirty years. Although there is a home team advantage in the later part of the season as well, it is much larger at the beginning of the season. Home teams win by an average of 12.2 points per game in August and September, but only win by approximately 4.2 points per game in the later part of the season. Easier non-conference scheduling in the beginning of the season plays a large role in not only boosting home team margins of victory but also raising stadium attendance and increasing a team's chances of playing in a bowl game. Of course, the difficulty of non-conference schedules is not the only factor that accounts for better home team performance. Higher attendance and a growing motivation to impress pollsters are also valid reasons why home teams are performing better. Home field advantage in college football is real and increasing.