Is Home Field Advantage Present In the NFL?

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Luke Avila, Landon Erway, Max Megaffin, Storm Pickens

Abstract
In this research project, we are trying to reject the null hypothesis that there is no home field advantage in the NFL. This is important because if there is a true home field advantage in the NFL, we would be able to more accurately predict the scores of future NFL games based on the teams that are playing, they in-game statistics, and who is the home and away teams. Our main findings include that there is a significant relationship between time of possession, first down, turnovers, and third down conversions and the score of the game. However, there is no statistical evidence of a home field advantage in the NFL. There are teams that tend to have a better score margin when at home than on the road, yet, as a whole, NFL teams and their score margins are not affected by whether or not they are at home or on the road.

Introduction
Home field Advantage in the National Football League is a notorious topic discussed all throughout the game. Previous studies have found that this advantage does exist; however, the home field advantage is diminishing year over year (Sharp, 2019, Owen 2019). Our study tests the most current and complete NFL season (2018) in an attempt to see if home field advantage still exists in the game today, despite societal/technological advances.

Methodology & Model
The data in our study comes from Pro Football Reference, which is a website dedicated to NFL statistics. Our sample consists of 1,280 data points from 256 regular season games from the 2018 NFL season. We used margins from meaningful in-game statistics such as First Down margins, Turnover margin, and more to see if they impacted the score margins in favor of the home team more than the away team.

Selected Results
As you can see in the graph titled “Actual vs Model’s Prediction”, our regression model follows the data set that we have well. This graph accurately follows what our expectations for the project. We anticipated having evidence of a home field advantage in the NFL. However, this is misleading as you can see in the table in the top right corner. We have statistical significance in all of our explanatory variables, yet we do not have a statistical relationship with our constant. This is not a good thing for our regression and gives us issues.

Another issue that we had was multicollinearity. It was difficult for us to fix our issue of multicollinearity because of our data set. Our data contains both positive and negative numbers, and also zero. With that in mind, we cannot rely on our regression results. Our marginal effect for third down conversion margin (tdc_margin) is 25.49, holding the rest of our other explanatory variables constant. This essentially tells us that third down conversion margin explains the most of our variation of our dependent variable (score margin).

If you look at the graph in the bottom left corner of our poster, you will see that the average score margin for home team is greater than zero. This indicates that more teams outscore their opponents at home than do not. The interpretation of this is that the majority of the league has a positive score margin at home. However, we cannot rely on the graph alone, and when we run the regression we actually get a negative intercept for our regression model. This means that we have no significant evidence of a home field advantage in the NFL.

Conclusion
In conclusion, our results failed to show any statistical evidence of home field advantage in the NFL in 2018. We know that this result is not completely reliable and trustworthy because of our multicollinearity. We tried to fix this by doing a transformation on our data, however, we were unable to perform a transformation on our data because our data set contains positive, negative, and zero as a value. We believe that if we could do the research project again, we would try and find more data.

Selected References