Team 7

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**Quantifying the “Home-Field Advantage”**

1. Introduction

The “home-field advantage”, most popularly used in football and baseball, is a phenomenon in which the home team is observed to boast a benefit or advantage over the visiting team during a game. Our project was designed to determine if playing a home game can in fact lead to a higher season ranking and if so, what areas could be improved to ensure a team’s success. In order to simulate this, we generated figures comparing different city statistics and their correlation with NFL team success. Data was extracted from ESPN’s NFL database and the US Census Bureau spanning several demographics between 2015 and 2018. The aim of this exercise was to examine the unemployment rate, percent white composition, and population size of each major metropolitan area and determine the impact of each factor on their ranking at the end of the season. Unemployment was selected because it can be interpreted as an indicator of a city’s success. Percent white composition was chosen with the intention of accounting for any possible bias associated with position rankings. Population size was selected because larger cities presumably have large fan bases not only for football, but also basketball and other professional sports. These variables were utilized to highlight any trends in the relationship and identify major areas that may benefit or limit a team’s success.

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**Figure 1:** 2015 Unemployment Statistics and Racial Composition versus NFL Rankings

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**Figure 2:** 2018 Unemployment Statistics and Racial Composition versus NFL Rankings

2. Analysis of Unemployment as a Success Factor

Figures 1 and 2 compare the NFL position and the unemployment rate in each team’s city. Based on the data, it is difficult to determine a causal relationship between unemployment and team position. In particular, Charlotte, North Carolina, experienced a decrease in the unemployment rate between 2015 and 2018. However, the Carolina Panthers dropped from 1st to 21st in the same time frame. On the other hand, Los Angeles, home of the Los Angeles Rams, saw a drop in the unemployment rate from about 5.5% to 4.25% while their position jumped from 21st to 1st in the season. Notwithstanding these divergent events, this does not imply that there exists no relationship between the unemployment rate in a team’s home city and its performance. Increasing unemployment could reduce coaching and training quality for each team. Rising unemployment would also mean lower salaries for players, thus, having less of an incentive to perform better. Additionally, rising unemployment would mean less disposable income for fans to spend on game tickets and other forms of financial support for their favorite teams. This would imply that cities with more support from fans would be less vulnerable to losses incurred by increasing unemployment rates because they would still have reasonably strong financial and physical backing. This is most clearly evidenced by the first and third figures which depict unemployment rates in 2015 and 2018. Major sports cities like Chicago, Los Angeles, and Houston experience different changes in the unemployment rate, yet the Bears, Rams, and Texans all ranked higher in 2018 than they did in 2015.

3. Analysis of Racial Composition as a Success Factor

In order to elucidate any perceivable bias in team rankings, we decided to compare the white racial composition of these NFL cities with their final season rankings. In 2015, the San Francisco 49ers had the lowest percentage of white racial composition out of all NFL cities, at about 50%. In 2015, the 49ers finished at a pitiful 28th place. In 2018, white racial composition dropped just below 50% in San Francisco, however the 49ers finished in 31st place. On the complete opposite side of racial spectrum, Pittsburg had one of the highest white racial compositions, at over 80%. The Steelers finished at 10th place in 2015, and at 12th place in 2018; the racial composition remained nearly the same. Now let’s take a look at a team in the middle of the league in terms of white composition. Dallas’ metropolitan racial composition in 2015 was roughly 70% white, and they finished the season in 29th place. However, in 2018, the white population in Dallas decreased slightly to about 68%, while the Cowboys finished 9th in the league. Ultimately, there was no discernable relationship between white racial composition and team success.

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**Figure 3:** 2015-2018 NFL Rankings versus Hometown Metropolitan Populations

4. Analysis of Hometown Metropolitan Population as a Success Factor

Finally, we compared the NFL team’s rank with their respective metropolitan populations in order to determine if there is a relationship. In 2015, the Bears finished near the bottom of the league, at 22nd. In 2015, the population of the Chicago metropolitan area was roughly 9,500,000, making the Chicago area one of the most populous cities in America. In 2018, while the population remained about the same, the Chicago Bears finished in 3rd place in the league. On the other hand, the Green Bay Packers have the smallest metropolitan population in the entire NFL. In 2015, the Packers finished in top ten, at 8th, with a population of roughly 300,000. In 2018, with a similar population, the Packers finished in the bottom half of the league at 21st. Thus, it is evident that there is no conceivable relationship between metropolitan population and team success.

5. Analysis of Relationships Between Variables

Although the variables do not demonstrate a strong correlation with NFL team position, it is plausible that there may exist some confounding variables. Factors such as fan morale during each game may improve team performance. This can also be applied to each metropolitan area. Los Angeles, which has a greater population compared to other cities, would most likely exhibit more team support and memorabilia sales. This could give larger cities an advantage, as more sales would give each team the capital required to afford better training programs. Additionally, these cities would benefit from a more selective recruiting process. Moreover, Los Angeles may have more competitive recruitment programs with potential athletes playing at higher skill levels. These factors may not be accounted for when comparing overall team success. However, it is also worth considering based on the data that a large metropolitan area does not necessarily constitute a larger fanbase, as demonstrated in the New York Jets’ rankings; the years 2016-2018 consistently saw New York City’s home team among the bottom performers of the league.

6. Recommendations for Improving Success

Upon reviewing these statistics, one might ponder as to how these areas can be improved in order to maximize team success, all while keeping costs at a minimum. From an economic standpoint, advertising efforts can be made to cushion the impacts of rising unemployment rates. By focusing increased advertising in cities where the NFL has less financial support, we could boost the appeal of watching and attending football games, which would help increase the team’s revenue and ultimately reduce the losses incurred by fluctuating unemployment. Furthermore, involvement in the community is paramount in the success of any business, and this is especially true for any sports team. Employing local residents and giving back to the community is a great foundation for improving any team’s fanbase. While it may be true that winning attracts fans to the stadium, the surefire way to garner unconditional support is by strengthening ties with their hometown.