I am attempting to investigate the impact of a short week of rest for NFL teams on the probability of winning a game. To investigate this I will focus on the outcomes of games following a Monday Night Football (MNF) appearance.

My approach will be to compare the total winning percentage for teams that play after a MNF appearance to the *expected winning percentage* (EWP) of these teams in games after a MNF appearance. I will use the closing wagering lines to estimate the EWP for these teams; based on my source of EWP this investigation becomes more of an investigation of possible wagering market inefficiency for games involving teams playing after appearing on MNF.

The football wagering market has many options for wagering on a particular game; I will look at the money line and the point spread. An example money line is -260/+220 for wagers placed on the favorite/underdog to win the game; for every $1 wagered at +220 the return for a win is the original $1 plus $2.20. For wagers placed on the favorite of $2.60 the return on a win is the $2.60 plus $1, or for every $1 bet a bettor receive $1 plus $1/2.6 for a winning wager on the favorite. In general, money lines are of the form +X/-Y and equate to wagering on which team will win the game. The point spread offered for the example -260/+220 money line was -5.5 (-110). The point spread wager allows a bettor to wager on the margin of victory, in this case 5.5 points, and will typically pay a price for the wager, here -110. A wager of $1 for the favored team wins if the team wins by more than the 5.5 point-spread, returning the original $1 wager plus $1/1.1. A wager of $1 for the underdog wins if the team loses by less than the 5.5 point-spread or wins, returning the same amount as the wager on the favored team of $1 plus $1/1.1.

There is an inherent house edge in both money lines and point-spreads, commonly referred to as the *vig*, or vigorish. Risk tolerance of individual line setters largely influences the allocation of the house’s edge based on the quantity of wagers placed on either side of a wager. Many risk averse book makers will adjust the lines in order to equally spread their exposure, thus assuring a smaller but guaranteed profit on a given game. More risk tolerant bookmakers that feel they have an edge by taking disproportionate action on a wager will allow their exposure to exceed 70-80% of the total wagers on the side of the wager that the bookmaker believes has an expected disadvantage. I will make the incorrect assumption that the closing lines in the data set reflect a bookmaker with equal exposure to each side, in order to more simply estimate the wagering market’s expected winning percentage for teams following a MNF appearance.

I have a small number of paired observations for point spreads with money lines, while I have substantial data for point spreads. If we can assume that an individual bookmaker is expressing the same opinion of probability with both their point spread lines and the money lines then we may infer a formula to translate point spread in to money line. This will be helpful, as the money line provides a simple solution for the bookmaker’s expected winning percentage of teams following a MNF appearance:

Given +X/-Y; Assume house edge equal for both sides of wager

Let H = the houses edge as a fraction of the wager amount

Let p = estimation of wagering market’s expected probability of the favored team winning

Let W = amount wagered

Then W\*(1-p

I have 10 years of point spreads, but only a limited number of **money** lines

* I prefer money lines because they should theoretically map to a p(team wins)

## Given:

### m = {m1, …, mn} with mi = money line for game i

### x = {x1, …, xn} with xi = point spread for game i

## find f\*(x) = ŷ such that we can guess y from x

### lm(y ~ x)

* + - * x is discreet while