

How can we best predict future outcomes in sports? Part of the fascination and love of sports in the public domain comes from the fact that sporting events, to a certain extent, are unpredictable. Some of the greatest games and moments in sports history have been unbelievable upsets such as the Miracle on Ice, or Leicester City's improbable Premier League title in 2015-16. Is there a way to quantify these probabilities (other than Vegas)? For example, when the Oklahoma City Thunder host the Los Angeles Clippers on Thursday, in a game that will have a huge impact on the Western Conference standings, what are the chances that the Thunder win, and by how much? For the purposes of this prediction, I attempted to rank 2023-24 NBA teams using a regularized normal and a regularized binomial Bradley-Terry Model. I used score differential data for each game thus far in the 2023-24 season taken from basketball-reference (<https://www.basketball-reference.com/>), and found the best and worst teams according to the model to be:

Regularized Normal Bradley-Terry Model Rankings (Betas)

Top 5 Teams	Bottom 5 Teams
1) Boston Celtics (11.49)	1) Charlotte Hornets (-10.03)
2) Oklahoma City Thunder (9.86)	2) Washington Wizards (-7.26)
3) Minnesota Timberwolves (8.78)	3) Detroit Pistons (-6.95)
4) Los Angeles Clippers (8.22)	4) San Antonio Spurs (-6.16)
5) New York Knicks (6.95)	5) Portland Trail Blazers (-5.43)

Home-court advantage had a beta of 2.34. A surprising result is the Pistons only being 3rd-worst, as they currently sit last in the NBA with a 8-44 record. It seems this model seems to take into account score differential much more than the binomial model below, as the top and bottom 5 rankings are identical to ranking all teams by point differential.

Regularized Binomial Bradley-Terry Model Rankings (Betas)

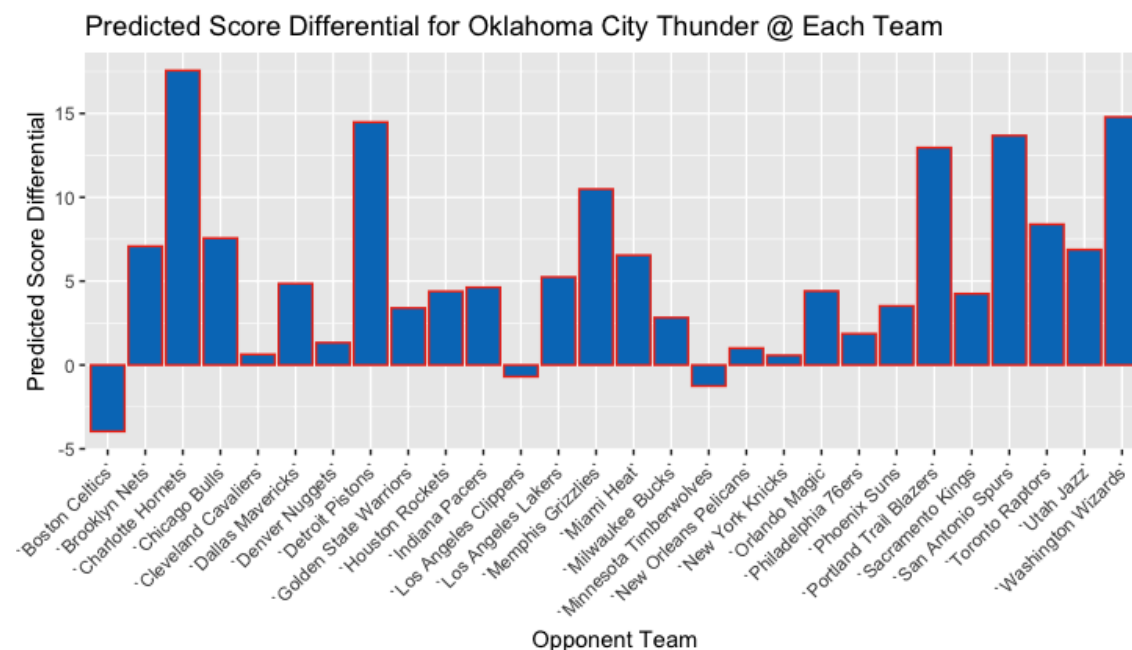
Top 5 Teams	Bottom 5 Teams
1) Boston Celtics (1.61)	1) Detroit Pistons (-1.68)
2) Minnesota Timberwolves (1.27)	2) Washington Wizards (-1.55)
3) Oklahoma City Thunder (1.24)	3) Charlotte Hornets (-1.39)
4) Denver Nuggets (1.21)	4) San Antonio Spurs (-1.27)
5) Los Angeles Clippers (1.20)	5) Portland Trail Blazers (-0.60)

Home-court advantage had a beta of 0.32. Both these models place the Boston Celtics as the best team in the NBA by a fairly significant margin, which many fans (myself included) agree with. The Celtics currently sit top of the NBA with a 40-12 record, 4 games above the next best team.

Prediction: Los Angeles Clippers @ Oklahoma City Thunder

When estimating the result of the upcoming showdown between the Clippers and Thunder, the regularized Bradley-Terry normal model gives the Thunder around a 4-point edge. The regularized Bradley-Terry binomial model gives the Thunder around a 59% chance of winning. I believe this is a fair prediction, as the teams seem to be pretty evenly matched, with OKC's home-court advantage giving them a slight boost. The last time the Clippers played the Thunder on the road, Vegas favored the Thunder by 6.5, but this was in large part due to Clippers star Kawhi Leonard being out with an injury.

Visualization: OKC Thunder chances on the road



This visualization plots the expected score differential (based on the Bradley-Terry normal model) if the Thunder were to go on the road and play each other team in the NBA. You can see they would be favored by the model in almost every game, except for against the Celtics, Clippers, and Timberwolves. This bodes well for their playoff chances, as winning on the road is crucial to advancing in the playoffs.

Interpretation

While the Bradley-Terry model is a great way for estimating team strengths, we must keep in mind that it is just an estimate. The model assumes that team strengths remain constant over time, and in the ever-changing landscape that is NBA basketball, this is simply not true. With the Trade Deadline recently passing, lots of teams' rosters look very different than they were a week ago. Teams like the Knicks and Mavericks who added key players mid-season may very easily "out-perform" their Bradley-Terry estimate for the rest of the season. NBA GMs and fans alike can use these estimates and predictions to form a baseline expectation for a given game or an evaluation of a given team, but must look at the whole picture to avoid getting caught up in statistical noise.