Super Bowl and Multi-Sport Outcome Prediction Using Solver Optimization

Benedict Daxell Santoso – ISOM 232 – Homework 2

Section 1: Super Bowl Predictor (NFL)

Using data from the 2025 NFL regular season sourced from Pro-Football-Reference, a least-squares rating model was created. This model optimized team ratings and a home-field advantage parameter through Excel Solver by minimizing the sum of squared errors between predicted and actual game margins. The Super Bowl was considered a neutral-site game, so no home-field advantage was factored into the final prediction. Based on these ratings, the model forecasts that the Seattle Seahawks will beat the New England Patriots by about 4.18 points.

Section 2: Model Interpretation (Very Important but Short)

The optimized model yielded an average team rating close to zero, indicating correct application of the Solver constraint and that ratings are relative to the league average. The estimated home-field advantage was approximately 9.82 points, indicating a strong home advantage in the 2025 dataset. Although this figure exceeds historical benchmarks discussed in class, it reflects the actual data characteristics from that season and underscores how real-world variability can affect model parameters.

Section 3: NBA Solver Model Results

Using the same modeling approach applied to NFL data, a prediction model for NBA game outcomes was developed with historical results from the 2026 NBA season. After cleaning the data in Power Query, an Excel Solver-based optimization model was used to estimate team strength ratings and home-court advantage.

The Solver model aimed to minimize the total squared error (SSE) between observed and predicted margins. Team ratings and the home-court advantage parameter were adjustable but constrained so that the average team rating was zero, ensuring the model's identifiability. The Solver successfully converged, providing a feasible and stable solution.

To demonstrate the use of the optimized ratings, a neutral-site comparison was created between the **Boston Celtics** and the **Los Angeles Lakers**. Based on the estimated ratings, the model forecasts the Boston Celtics as about **6-point favorites** over the Los Angeles Lakers on a

neutral court. This comparison shows how NBA ratings can be converted into expected point differences between teams.

Section 4: NBA Model Observations and Comparison with NFL Results

When interpreting the NBA Solver results, it is important to note that the scale of the outputs differs from the NFL model because of structural differences between the sports. NBA games tend to have much higher scores and more observations, resulting in larger absolute SSE values and a more concentrated distribution of team ratings.

Furthermore, the estimated home-court advantage in the NBA is less pronounced than the home-field advantage in the NFL model. This aligns with expectations since NBA home games usually provide a smaller scoring benefit than NFL games, where factors like travel distance, crowd noise, and game structure have a greater impact.

Despite the differences in scale, the NBA model is still well-defined and internally consistent. The average team rating hovers around zero, with ratings spanning positive and negative values. Predicted margins differ significantly across games, and squared errors vary per observation. These aspects suggest that the Solver optimization worked correctly and that the model effectively measures relative team strength, similar to the NFL framework, while also capturing sport-specific nuances.