

Home Runs and Drag: An Early Look at the 2022 Season

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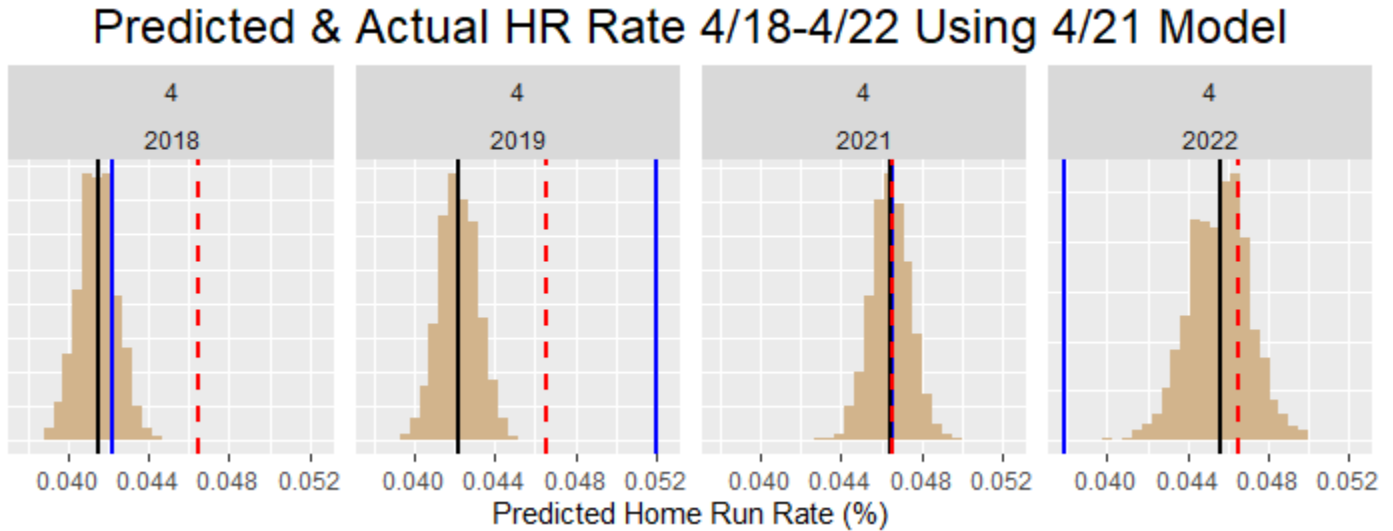


FIG. 1. The data from April 2021 was used to create a generalized additive model for the dependence of home run rate on exit velocity and launch angle. The model was applied to the April data (“the reference”) from the 2018, 2019, and 2022 seasons, resulting in a predicted home run rate, shown as the histogram, with a centroid denoted by the black vertical line. The blue and red vertical lines are the actual home run rates for the different seasons and for the reference season, respectively. Since the 2021 data were used to create the model, the three lines coincide. The deviation of predicted to reference is a measure of differences in the distributions of launch conditions (exit velocity and launch angle) relative to their favorability for home runs. If the predicted is close to the reference, the launch conditions are equally favorable for home runs than the reference, as in 2022. When the predicted is below the reference, the launch conditions are less favorable for home runs than the reference, as in 2018 and 2019. On the other hand, the deviation of actual from predicted is interpreted to be due to the carry of the ball. If the actual equals the predicted, the ball carries the same as the reference, as in 2018. If the actual exceeds the predicted, the ball carries better than the reference, as in 2022. If the actual is less than the predicted, the ball carries worse than the reference, as in 2019.

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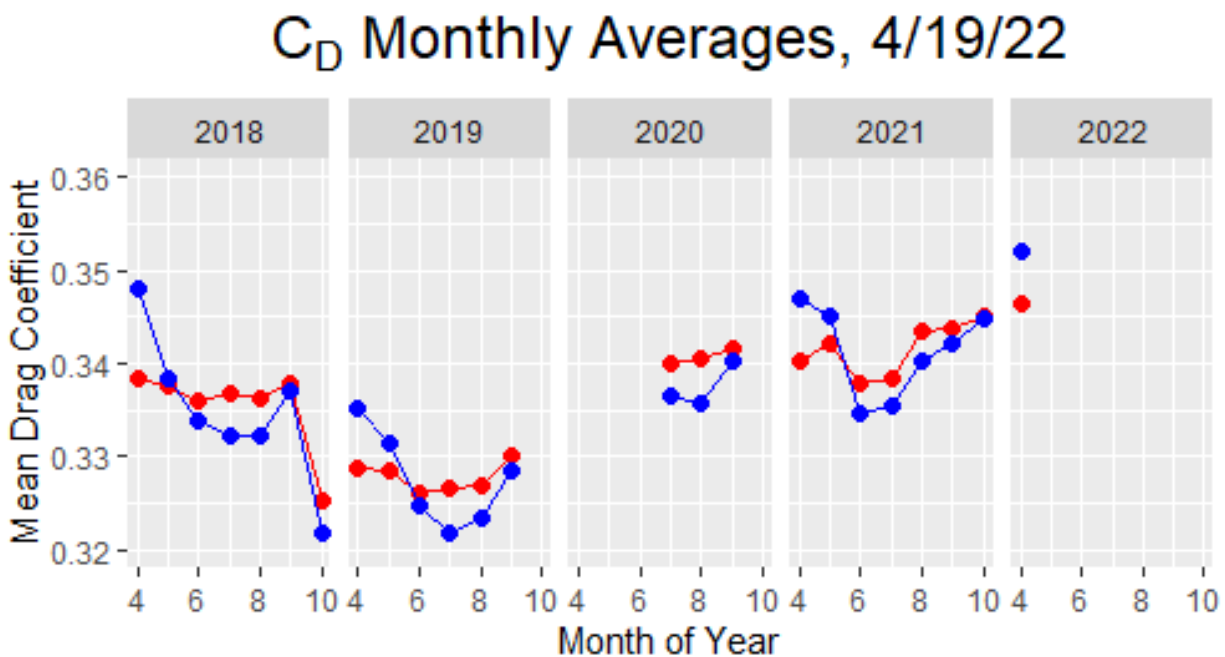


FIG. 2. Monthly averages of drag coefficients for 2018-2022, as determined from fastball data. The red points are the actual drag coefficients, a property of the ball; the blue points are the effective drag coefficients, corrected for air density, a property of both the ball and atmospheric conditions. The latter determines the carry. Relative to the April 2021 reference, the effective drag coefficient is about the same in 2018, smaller in 2019, and greater in 2022, a feature consistent with the home runs rates in Fig. 1.

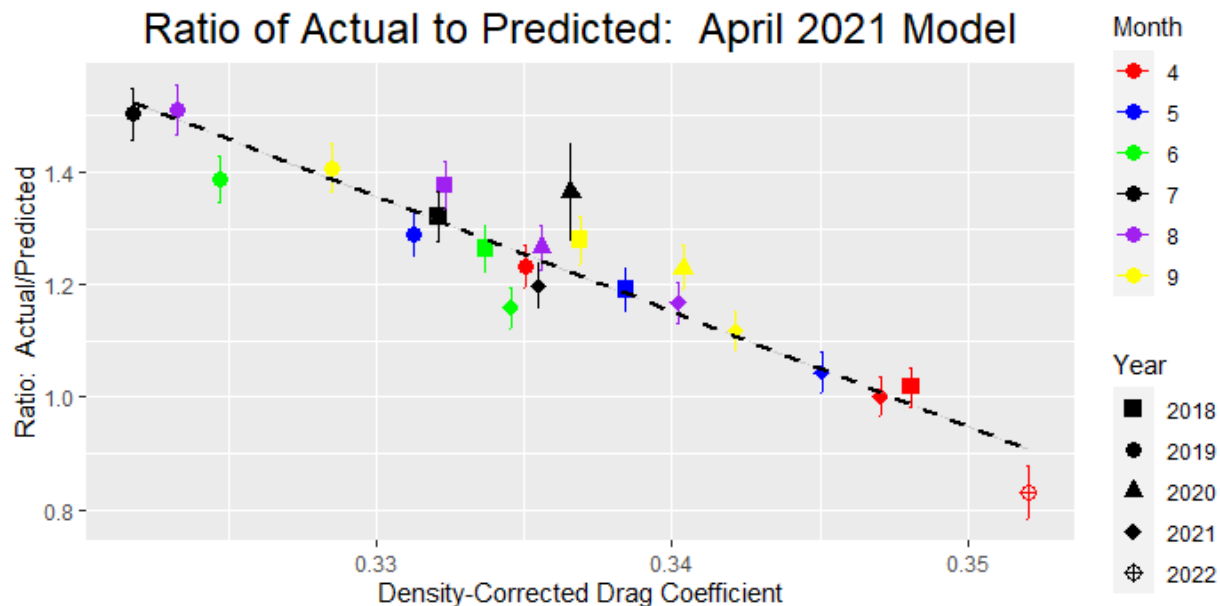


FIG. 3. The ratio of actual to predicted home run rates, using the April 2021 model shown in Fig. 1, is plotted versus the effective drag coefficients shown in Fig. 2. Each point represents a given month and year, 2018-2022, with the standard error given by the vertical line. The data show an approximate linear relationship between the ratio and the effective drag coefficient over many months of data. The 2022 point currently lies slightly below the line, albeit with a relatively large standard error.