Examining the Decline in Save Percentage in the NHL

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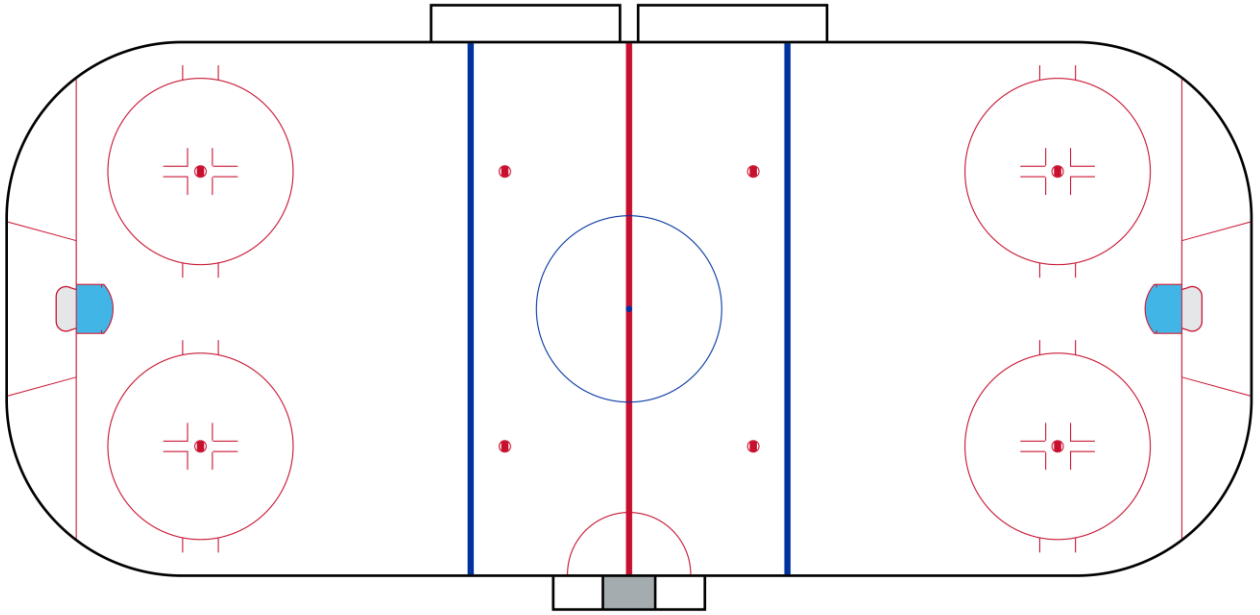
Background Information

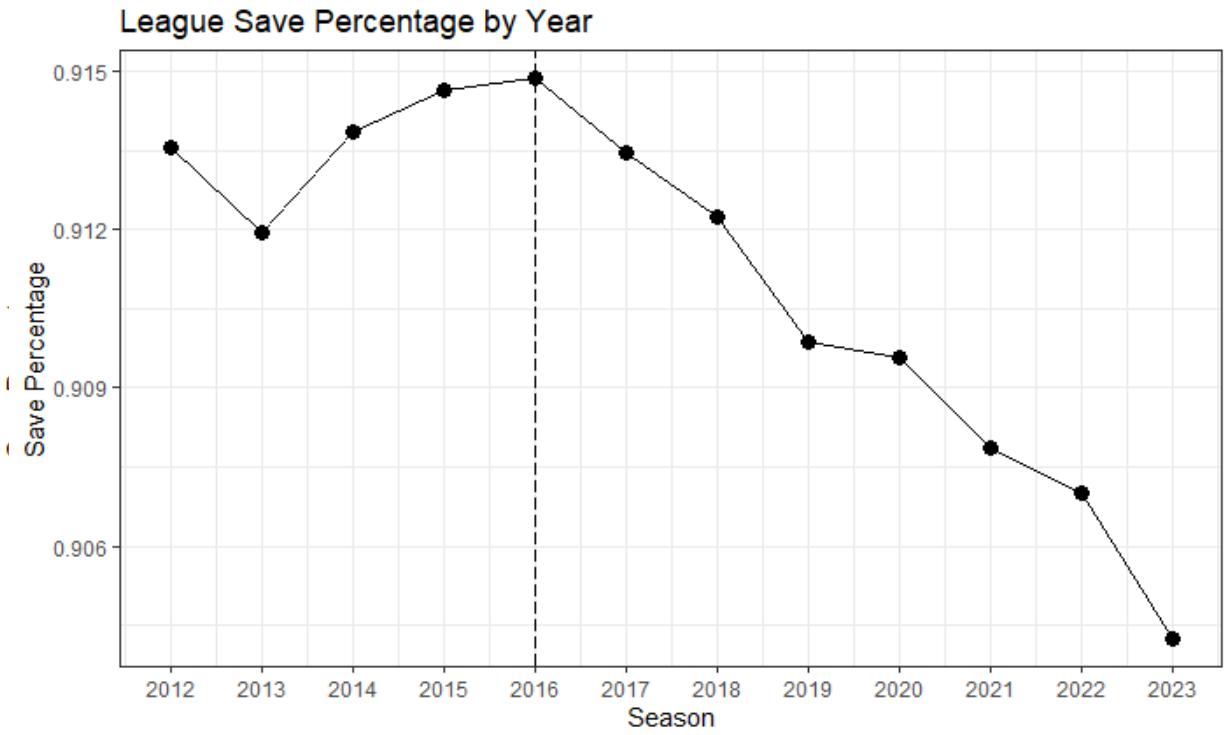
- How Hockey is Played
  - 5 on 5 with Goalies
- Some Terminology
  - Save Percentage
  - Fenwick Event
  - Power Play vs. Even Strength



The Data

- Goalie data scraped from Hockey Reference
- Regular Season Play-by-Play data scraped using the hockeyR package for all seasons since 2011-12. Includes location data for the puck for each event, including additional information about what is going on at that time.

Save Percentage is Dropping

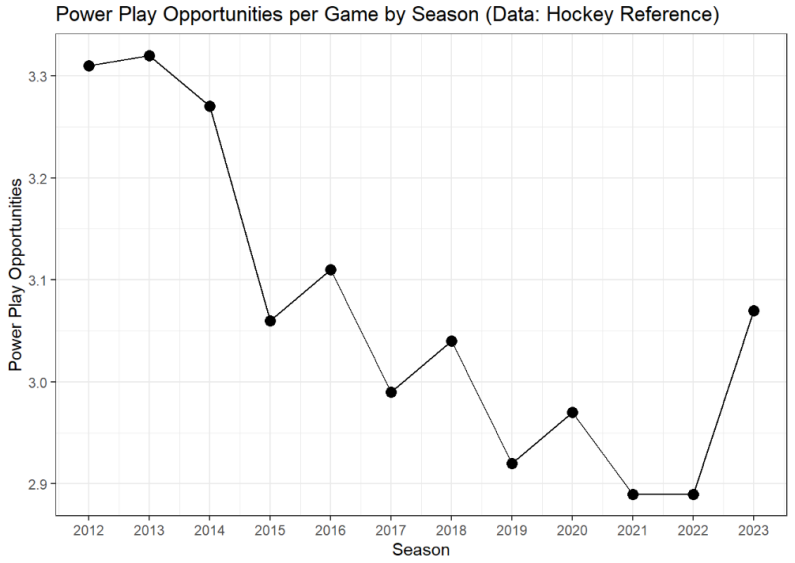


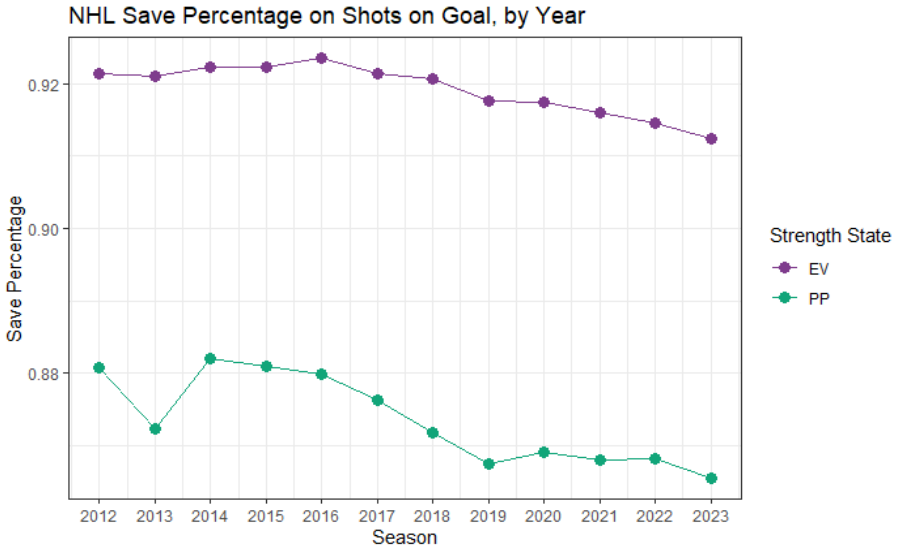
What could explain this decline?

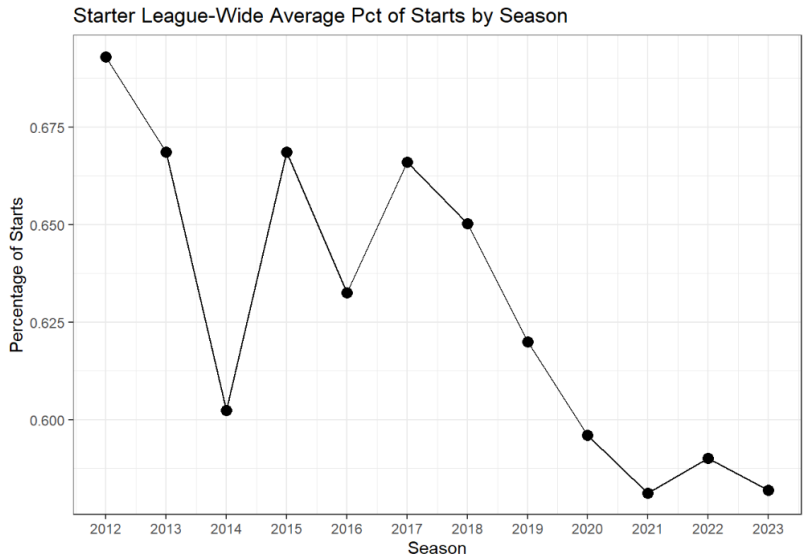
- Initial Reaction: Goalies are Getting Worse
- We think that there is something more to it
  - Alternate Hypotheses:
    - Starting Goalies are Playing Less
    - More Power Plays Opportunities
    - Better Shots Being Taken

Exploring the Data

- We began to look into how league-wide play has evolved over the years, notably since 2016 when we began the descent of save percentage.



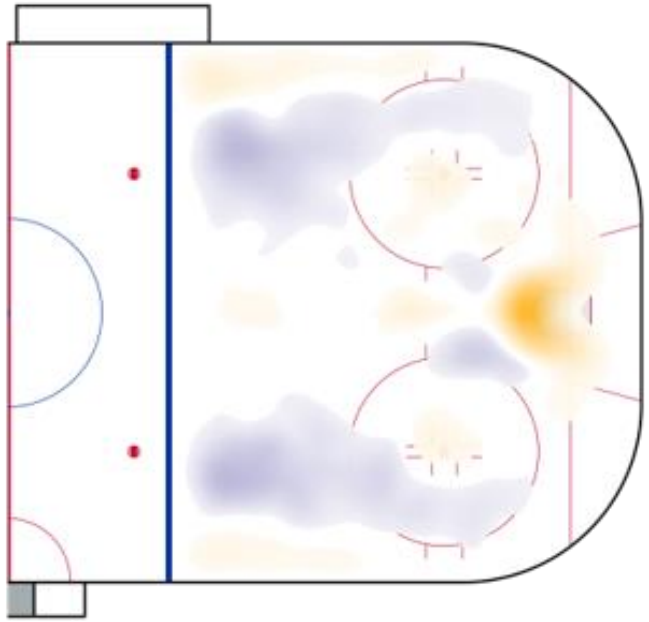


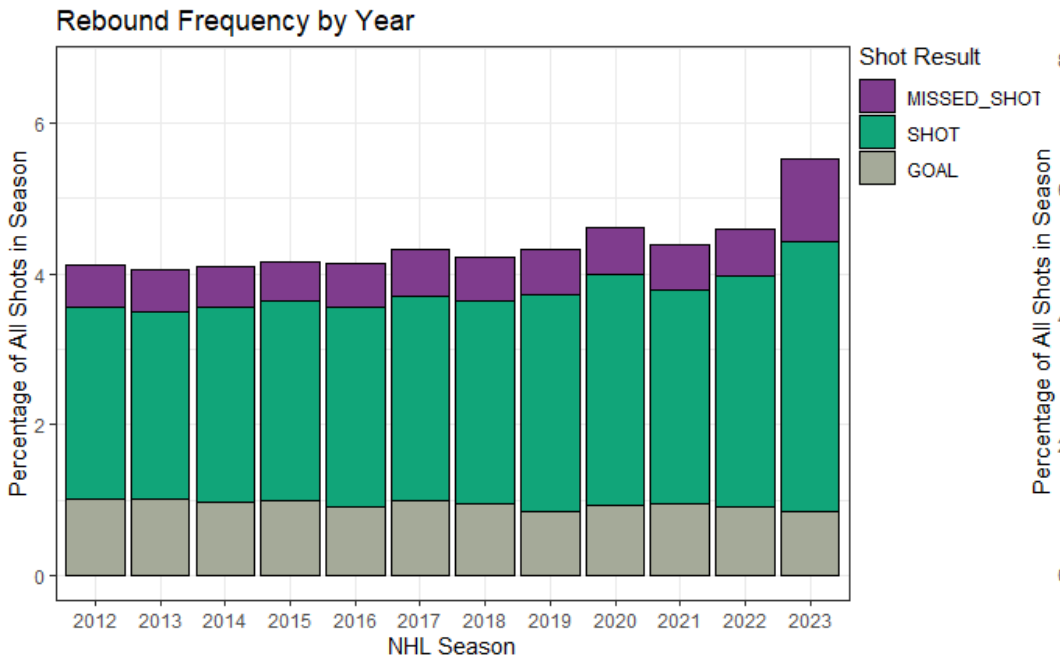


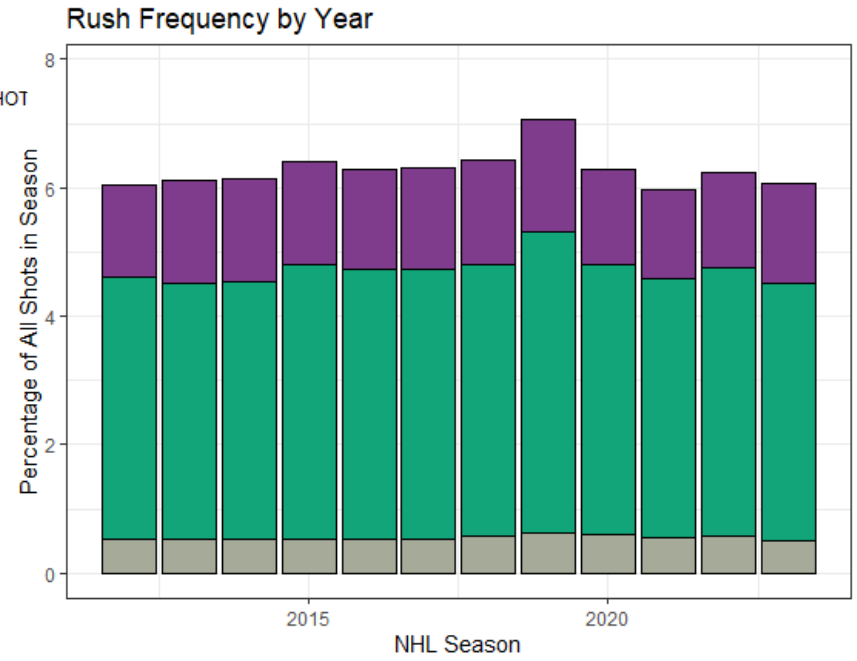
More Observations

- We also looked into how frequencies of different shots are changing.
- To learn more, we created new variables that could provide additional information about different shot attempts, including:

  Rush, Rebound, Angle Change, Cross Ice, and Forecheck





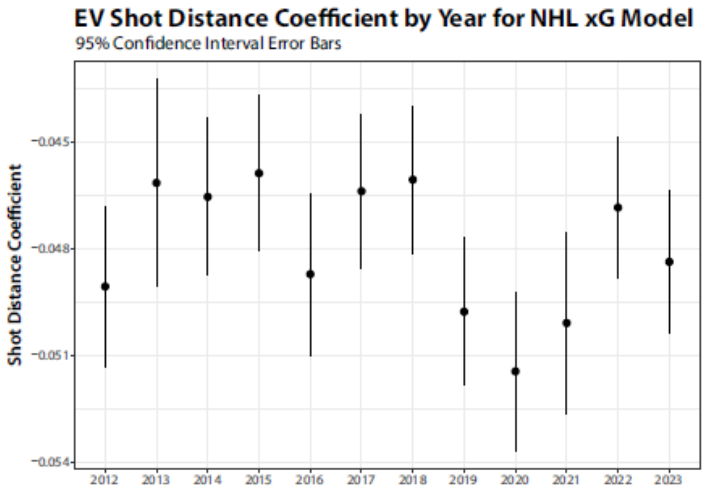


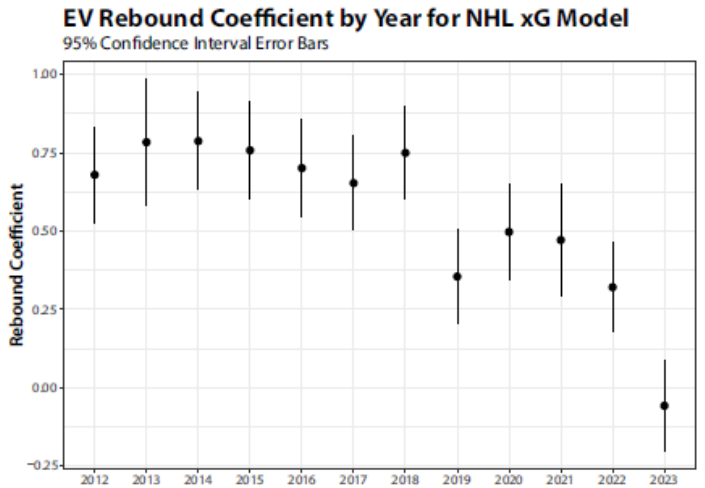
Methods for Analysis

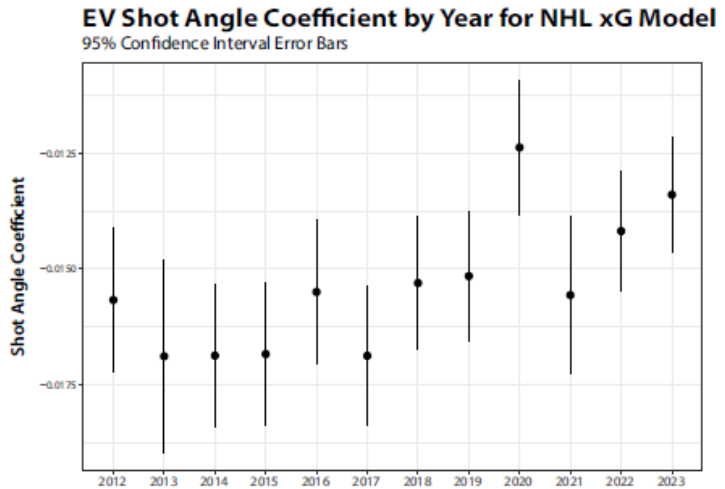
- Hypothesis: Shot quality has improved over time
- Filtered play-by-play data down to just fenwick events
- Split the data by even strength and power play
- Selected Variables
  - Shot Distance, Shot Angle, Rush, Rebound, Angle Change, Cross Ice, and Forecheck
- Trained logistic models for expected goals for each year to estimate coefficients for goal scoring

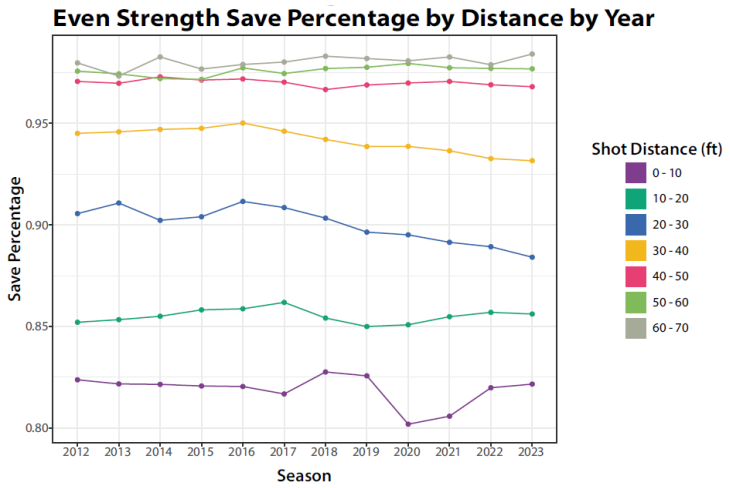
Notable Coefficient Trends

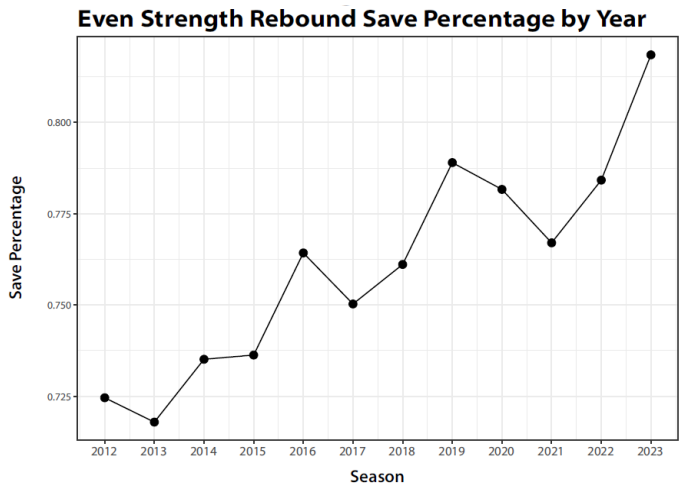
By looking at the change over time of the coefficients within each season's logistic regression model, we can observe how the definition of a "good" shot changes, as defined by results of NHL play.

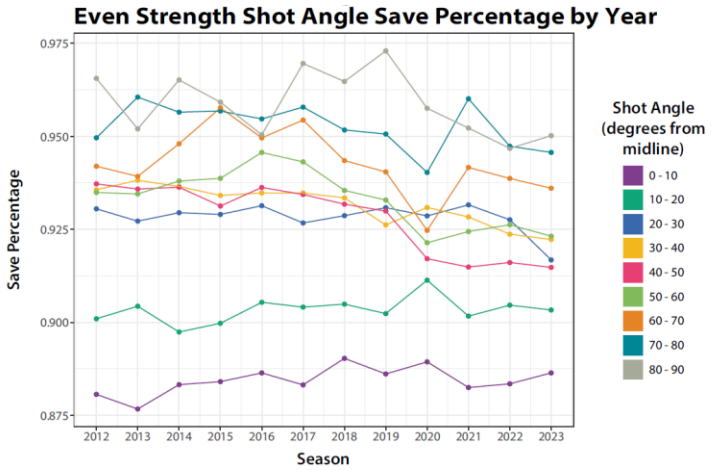






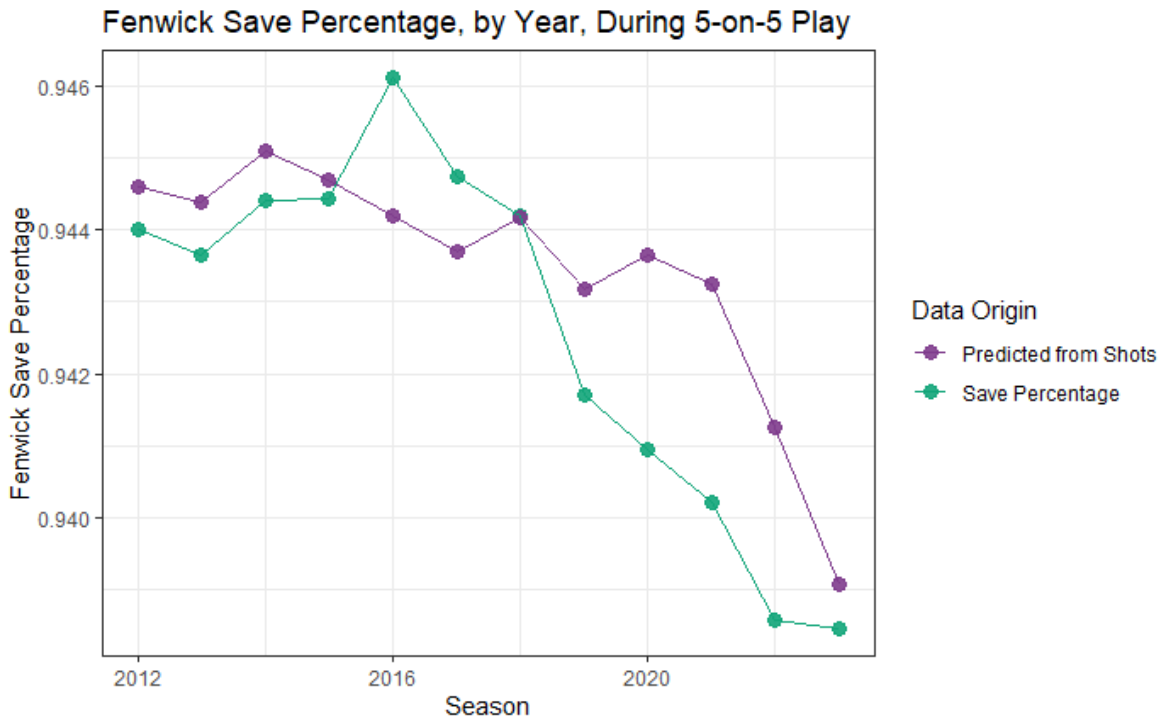


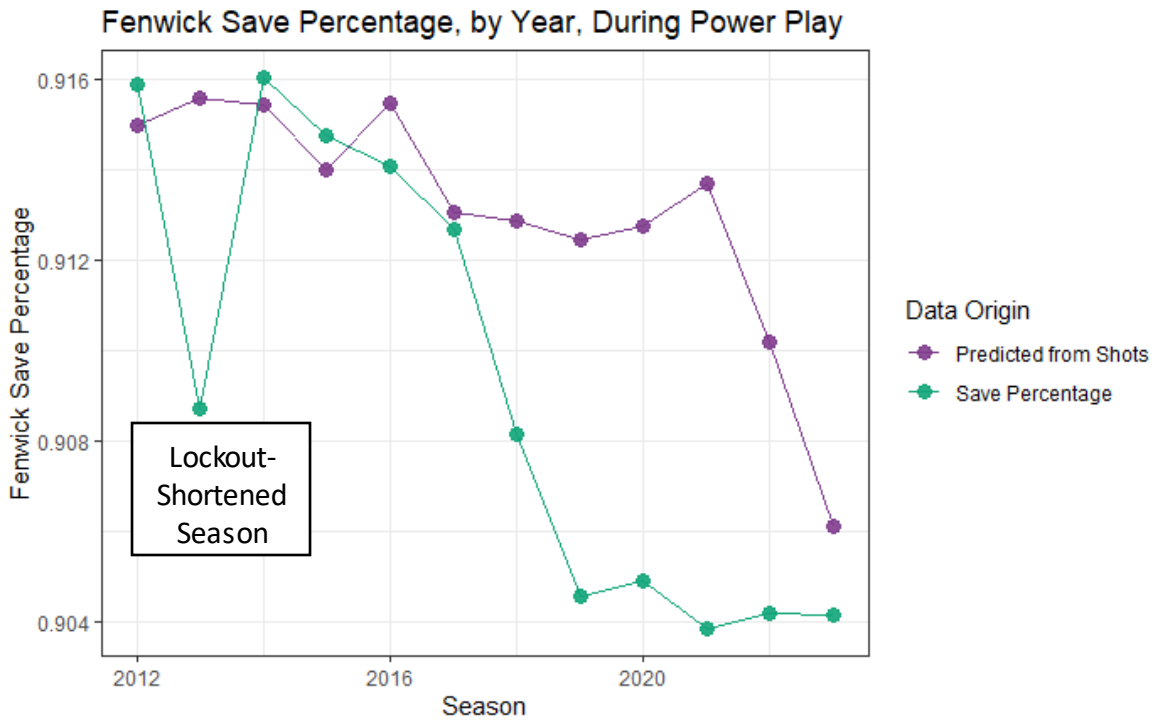




Additional Analyses

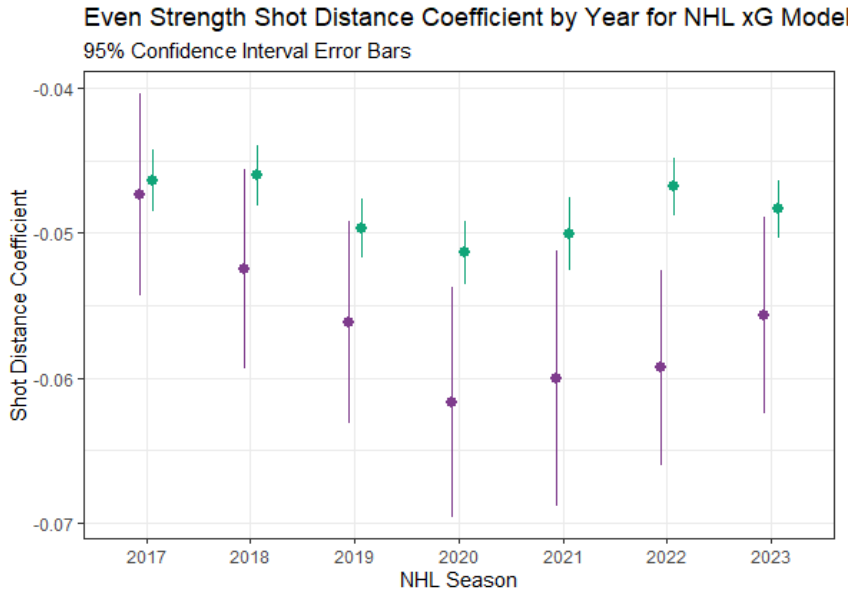
- In order to observe from a broader scale, how overall shot quality was changing over time, we measured the expected goals for each year, using a model fit on the years when most play was stable.

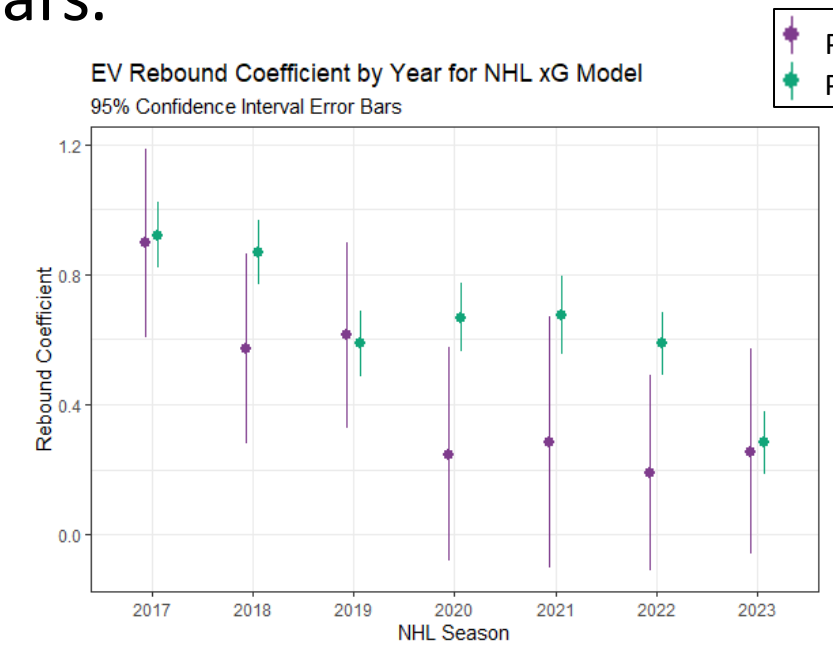


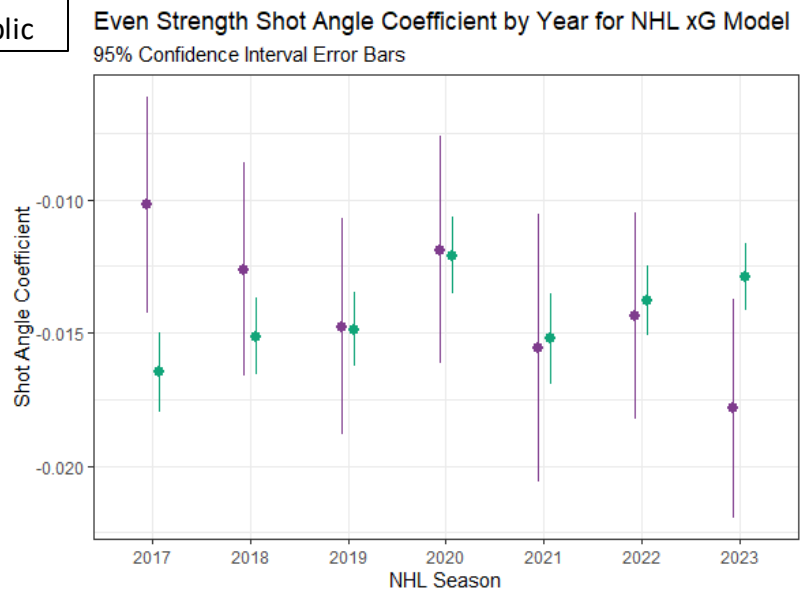


Limitations

- Publicly available NHL data continues to get tracked more accurately, causing issues when comparing between seasons.
- In order to address this, Sam Ventura provided us with a sample of data collected by a 3rd party for NHL teams which has much greater consistency across years.







Conclusions

- A small percentage of the decline can be explained by starting goaltenders playing less over time.
- The overall quality of shots is improving, leading to better opportunities to score.
- We have reason to believe that over time, shooters have become more effective, specifically in shots from 20 – 40 ft and shots from an angle greater than 20 degrees which has led to a decline in save percentage.