Examining the Decline of Save Percentage in the NHL

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Introduction

- Save percentage (SV%) is the percentage of shots on goal stopped by a goaltender
- SV% has seen a sharp decline since 2016, falling from .915 to .904 in 2023 (Figure 1)
- What could explain this decline aside from a drop in goaltender performance?

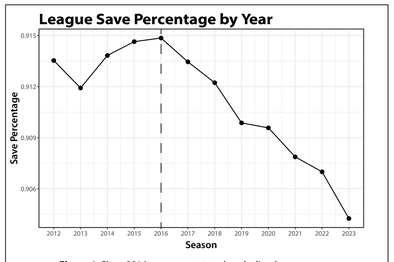

Figure 1: Since 2016, save percentage has declined every season

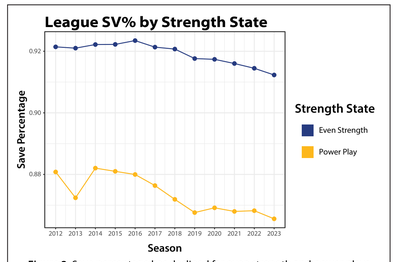

Figure 2: Save percentage has declined for even strength and power plays

Data & Methods

Data

- 1,258 rows of individual goalie season data from Hockey Reference
- 4,694,966 rows of play-by-play data from every NHL game since the 2011-12 season. Scraped using the hockeyR package. Includes many shot attributes including distance and angle

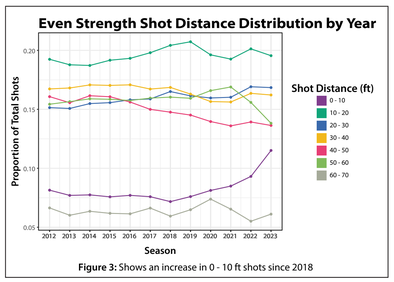

Figure 3: Shows an increase in 0 - 10 ft shots since 2018

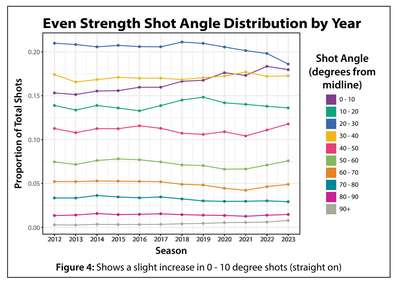

Figure 4: Shows a slight increase in 0 - 10 degree shots (straight on)

Methods

- Hypothesis: shot quality has improved over time
- Filtered play-by-play data for fenwick events (shot, missed shot, goal)
- Created the following variables:
  - Rush - TRUE when preceded by a neutral/defensive zone event 4 or less seconds prior
  - Rebound - TRUE when preceded by a fenwick event 2 or less seconds prior
  - Angle Change - Difference in angle from previous shot for shots classified as rebounds
  - Cross Ice - TRUE when preceded by an offensive zone event on the opposite side of the ice 2 or less second prior
  - Forecheck - TRUE when preceded by a takeaway/giveaway in the offensive zone 2 or less seconds prior
- Split the data by even strength and power play
- Trained logistic expected goals models on each year using the above variables to estimate coefficients for goal scoring

Results & Analysis

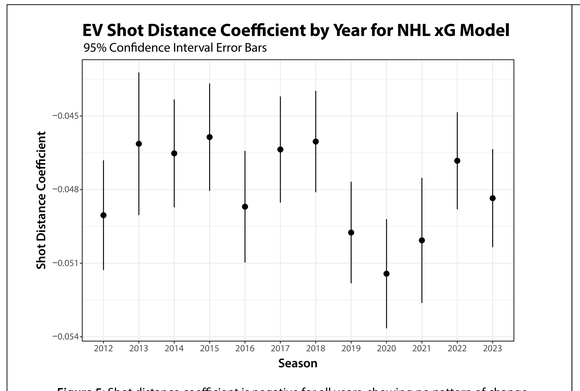

Figure 5: Shot distance coefficient is negative for all years, showing no pattern of change

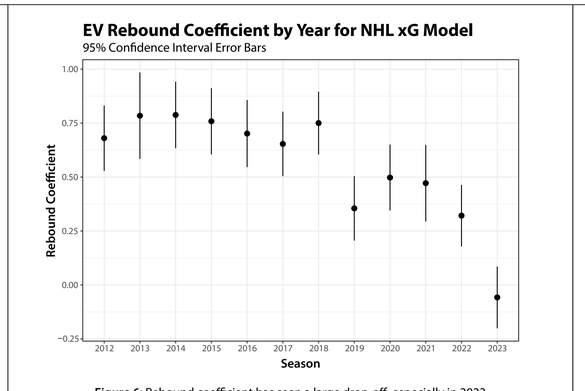

Figure 6: Rebound coefficient has seen a large drop-off, especially in 2023

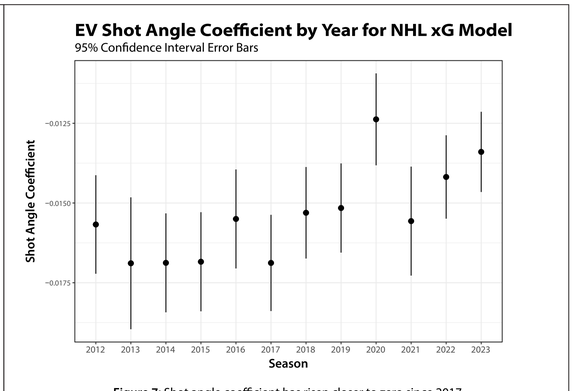

Figure 7: Shot angle coefficient has risen closer to zero since 2017

- Distance and angle coefficients are negative across all years, meaning that as they increase, the chances of scoring decreases. The angle coeffcient has risen closer to zero, meaning that this negative effect as angle increases is becoming less important for scoring goals (more goals being scored at higher angles).
- The large drop in the rebound coefficient could point to a change in how the data is collected, becoming more accurate over time.

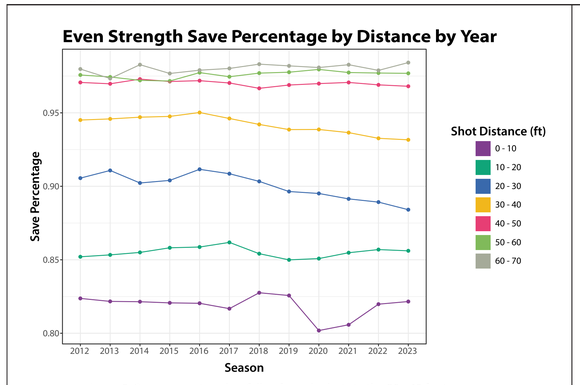

Figure 8: Save percentage has fallen for only shots in the 20 - 40 foot range

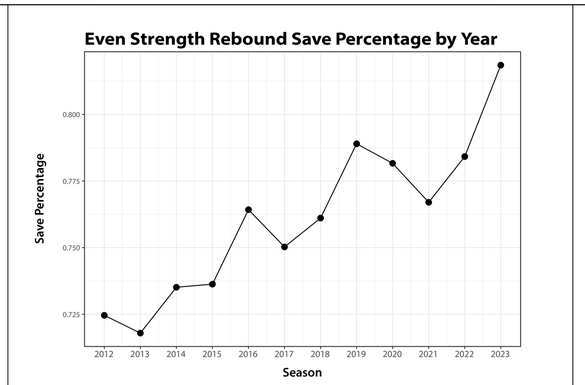

Figure 9: Save percentage on shots that qualified as rebounds has risen signifcantly

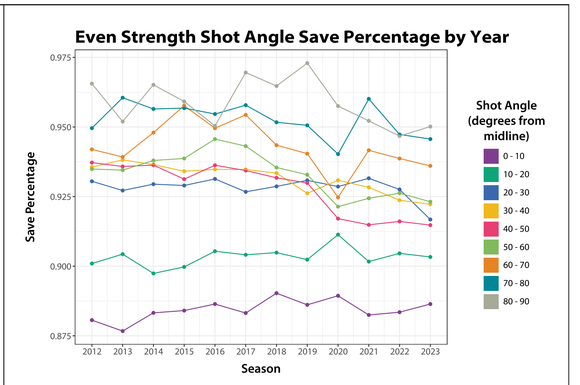

Figure 10: In general, save percentage is falling for shots with angle greater than 20 degrees.

- Save percentage broken down by distance shows that a decline is only present in shots between 20-40 feet. The same could be said for shots with an angle greater than 20 degrees. This could be evidence that shooters are becoming more effective at scoring from these areas of the ice.
- Save percentage on shots classified as rebounds has risen, which makes sense given the decrease in coefficients (less likely to score on a rebound than before).

Conclusions & Future Work

- A small percentage of the decline can be explained by starting goaltenders playing less over time (Figure 11)
- We have reason to believe that over time, shooters have become more effective, specifically in shots from 20 - 40 ft and shots with an angle greater than 20 degrees which has led to a decline in save percentage
- In the full report (available online), we compared results with a privately tracked dataset provided by Sam Ventura to examine some of the downfalls of using public play-by-play data
- We are excited to continue working with Sam to try and better answer this question

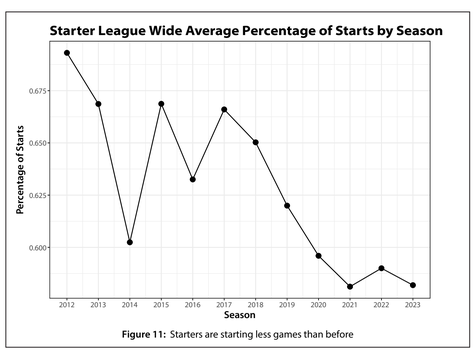

Figure 11: Starters are starting less games than before

References

- McCool, J. (n.d.). Are Expected Goal Models Biased? Retrieved from https://www.statsportsconsulting.com/wp-content/uploads/McCool_Otthac-1-1.pdf
- McCurdy, M. (2023). Magnus 7: xG, Shooting, and Goalie-ing. Retrieved from https://hockeyviz.com/txt/xg7

Acknowledgements

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