Faceoffs: The Market Inefficiency for Champions?

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Introduction

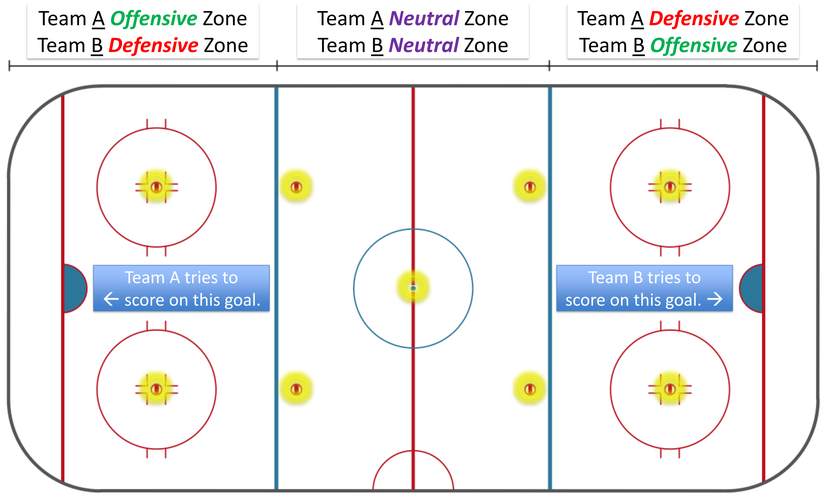
How much do faceoffs actually matter in winning hockey games? Many of the recent seismic developments in hockey analytics have been characterized by the importance of puck possession, a key determinant in the latest models such as expected goals and other metrics like Corsi. Yet amid this shift to focusing on possession, there is yet to be consensus or any similarly robust models on the importance of faceoffs, the most frequent and decisive determinant of possession occurring on the order of 60 times per game. This project analyzes how faceoffs drive offensive and defensive results and impact teams' ability to win games by mapping faceoff outcomes to an amount of goals gained or lost through faceoff performance. We argue that faceoffs are an underappreciated market inefficiency that teams can exploit to win championships and provide models for quantifying and predicting faceoff performance.

Context and Significance

Every time a goal is scored or a player shoots the puck on goal and the goalie catches and freezes the puck, play is stopped and a faceoff occurs. The key action of a faceoff is two players (one from each team) lining up adjacent to each other facing one another. The referee then drops the puck in the middle of these two players and each player tries to hit the puck backwards to one of their teammates. Puck possession is when a player on a given team is handling and in control of the puck and therefore controls what plays are made and what happens. *The notable result here is that neither team had puck possession before the faceoff but that the faceoff deterministically causes one of the two teams to now possess the puck.* This is important because much of hockey analytics is an applied version of the realization that the other team cannot score a goal when you are the team that is possessing the puck and that you cannot score without being the team that is possessing the puck. For example, the other team cannot take a shot on goal against you when the puck is on your stick, and you cannot take a shot on goal against the other team unless the puck is on the stick of a player on your team. Faceoffs are a prime establisher of puck possession, and puck possession is a key driver of scoring goals for your team and not allowing goals to the other team. This reasoning drives our project.

Objectives and Methodology

Our core objective is to determine by situation how much faceoffs influence games. Our data is a custom data set crafted by merging play-by-play data from *Evolving Hockey* and shot-level data, including expected goals, from *Money Puck*. We then augment this data with hand-tracked stats, called microstats, via Corey Sznajder and his *All Three Zones* project. This data critically lets us capture zone changes, which are integral to any possession-oriented model. We analyze over 265,000 faceoffs and over 7 billion data points in our models.



Note in the above diagram that the circles highlighted in yellow mark potential faceoff sites, each of which occur in either the offensive, neutral, or defensive zone of a given team. Observe that, if a faceoff is in the offensive zone of one team, it is by extension necessarily in the defensive zone of the other and vice versa. We map faceoff outcomes for each location to how many expected goals on average a team will accrue as a result of winning this faceoff. We first begin with a descriptive approach and then shift to using machine learning, specifically random forest models, extreme gradient boosting (XGBoost) models, and a neural network.

Results

Descriptive Faceoff Values by Situation

Faceoff Location	Faceoff Winner	Median (xG)	Mean (xG)
Off/Def Zone	*Offensive* Team	0.009	0.023
Def/Off Zone	*Defensive* Team	0.009	0.020

R-Squared Coefficients by Approach for XGBoost

Category of Input Metric Provided to XGBoost Model	Offensive Team Win	Defensive Team Win
Box Score Stats	17.7%	16.8%
Individual Expected Goals	17.4%	15.5%
Relative-to-Teammate Stats	17.5%	17.1%
Difficulty of Zone Starts	16.8%	16.2%

Our best current model, XGBoost, shows promise in predictively mapping faceoffs to expected goal outcomes in several contexts.

Conclusion

Before processing and leveraging Corey Sznajder's manual annotations of zone changes, we estimated that a faceoff win in the offensive zone by the offensively positioned team is worth about 0.052 expected goals and a faceoff win in the defensive zone by the defensively positioned team is worth about 0.049 expected goals. Using true zone changes rather than algorithmic predictions of zone changes, we more accurately find that the average offensive zone faceoff won by the offensively positioned team is worth **0.023 expected goals** whereas that of the defensive zone with the defensively positioned team is **0.020 expected goals**. Accounting for all situations (including neutral zone faceoffs), a faceoff win spanning all situations is worth an average of **0.015 expected goals**. This may seem tiny but becomes quite notable when considered in the context of there being a median of 65 faceoffs per game. This means that, in a typical NHL game, there are nearly 0.975 expected goals per game up for grabs via faceoffs. **Nearly one goal per game is available at the faceoff dot!** However, it is unrealistic to benchmark against winning all (or anywhere near all) of the faceoffs in a game. Accounting for both the gain of winning a faceoff for your team and forfeited gain of stealing a faceoff win from the other team, we more actionably posit that winning just **six more faceoffs** a game would be the equivalent of adding 0.18 additional expected goals in offense each game. That translates to **15 additional expected goals** over the course of a full season or roughly the equivalent of adding an additional **middle-six forward** who could easily cost $4 million annually against the salary cap for the likely lower cost of personnel that can win six more faceoffs. That surplus value represents nearly five percent of the salary cap, which is invaluable to any team with Stanley Cup aspirations. Our research suggests that faceoffs represent a market inefficiency and ripe opportunity for NHL teams to cost-effectively win more games. **Faceoffs matter.**