Looking Backward

Draft Case Study: Johnny Gaudreau

"Calgary beat us to the punch. There were people banging their hands on the table like, ‘Oh, we should have taken him a round earlier.’ It's a calculated risk. The Flames got Gaudreau in a really good spot.

-John Weisbrod, former Bruins scout

In a competitive environment like drafting, teams care about other teams’ choices. If you think he’ll be around at your next pick, just wait. Calgary waited as long as they could before drafting Johnny Gaudreau, which maximized their 4th round pick's return on investment and helped them extract value from all rounds. We can model drafting in a way that reflects this consideration: teams aren’t always trying to select the best player available.

Let’s Talk About Game Theory

Now, to evaluate drafting, we can travel back in time...

Did You Team Draft Badly in the 2000s?

Perfect Draft Value = Total Career Value of Optimal Picks = 246.8 Point Shares

Actual Value Drafted = Total Career Value of Actual Picks = 41.1 Point Shares

This means that the Flyers extracted roughly 16.5% of the value that was available to them in the 2007 draft. We can evaluate any team's actual performance versus their best case scenario in a given year using draft efficiency. It's an easy way to compare team draft outcomes more fairly than by simply summing up drafted player values. With draft efficiency percentages, teams with better picks have higher benchmarks for success in terms of their perfect draft values.

Why Should You Care Now?

What do these ideas mean for an NHL scouting department trying to figure out next year's picks? The optimal solution for maximizing the total value of a team's draft picks relies not only on expected future NHL value, but also on when prospects are projected to be drafted by other teams. With enough predictive precision, we can simulate draft outcomes and prescribe a set of picks that results in more value added than simply always selecting the best player left on the draft board.

It turns out that precisely predicting the future is quite difficult.

For one thing, the question of assigning draft position probabilities to all relevant prospects is tricky; as we don’t know ahead of time who will be drafted. Fortunately, we can rely on the NHL Central Scouting Service’s pre-draft rankings to define our prospect pool; roughly 85% of players selected in recent NHL entry drafts were ranked by the CSS beforehand. Those rankings are divided by position (skater or goalie) as well as by junior team location (North America or Europe). Using 2011-17 CSS data, we can get a sense of how the probability of being selected in each round varies by pre-draft rank. See below for the results of logistic regressions predicting draft round from skater ranks.

Moving forward, we can add in more prospect ranking systems as well as other relevant variables (size, age, junior point production, etc.) in order to define probability estimates at the pick level rather than the round level. Then, we feed those probabilities into our draft optimizer along with our NHL value projections.

Looking Forward

What Does It Mean To Draft Perfectly?

We define what it means for an NHL team to be successful in drafting, and use this framework to determine if any teams exhibited a sustained edge in drafting from 2000 to 2009. At a high level, we compare actual draft outcomes to teams’ perfect draft outcomes. The perfect draft can be thought of as what would happen if a GM could redo a draft with complete knowledge of prospects’ career values as well as other teams’ choices, while all other teams act just as they did previously.

Optimizing the Philadelphia Flyers’ 07 Draft Selections

Best Player Available

Pick | Player | PS
--- | --- | ---
2 | Jamie Benn | 55.8
41 | P.K. Subban | 52.8
66 | Alec Martinez | 27.7
122 | Jake Muzzin | 24.6
152 | Carl Gunnarsson | 23.9
161 | Carl Hagelin | 21.1
182 | Justin Braun | 21.1

Backwards Best Player Available

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41 | P.K. Subban | 52.8
2 | Max Pacioretty | 46.2

Looking Backward

We initially order our preferences by best player available. From 2000 to 2009, no team is significantly better or worse than average when it comes to drafting.

We need to define a few extra inputs:

Here, we have sample input values** for a 5-pick draft (presumably occurring in 2019). The NHL value function is truly up to you: it can be statistically modeled or even calculated based on scout projections. In this sample scenario, your estimations of some prospects differ from market estimations. Suppose you have the 5th and 9th picks in this draft: how can you leverage your superior knowledge?

Every Available Prospect $\text{Draft Position Probability Distribution}$

E[Salary] Preference

Player | Pick 1 | Pick 2 | Pick 3 | Pick 4 | Pick 5 | Value | Preference
--- | --- | --- | --- | --- | --- | --- | ---
Connor McDavid | 0.9 | 0.05 | 0.03 | 0.01 | 0.001 | 5 | 1
Jack Eichel | 0.05 | 0.6 | 0.3 | 0.03 | 0.02 | 4 | 2
Pavel Zacha | 0.03 | 0.2 | 0.4 | 0.03 | 0.07 | 1 | 5
Kyle Connor | 0.01 | 0.1 | 0.2 | 0.6 | 0.09 | 2 | 4
Travis Konecny | 0.01 | 0.05 | 0.07 | 0.06 | 0.81 | 3 | 3

**These are fictional values. Please don't tweet angrily at me if you love Pavel Zacha or something.

We can try moving him down to 4th on the preference list, despite our (hypothetical) belief that he will be a better NHL player than Kyle Connor. This results in a higher expected value of all draft picks because we can usually wait to select Konecny without missing out.

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