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## What Does It Mean To Draft Perfectly? An Evaluation Of Draft Strategy In The National Hockey League

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## Abstract

We define what it means for an National Hockey League (NHL) team to have been successful in drafting, and use this retrospective 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 general manager (GM) could redo a draft with complete knowledge of prospects' career values as well as other teams' choices. A prospect's career value is defined here as aggregate Point Shares (from hockey-reference.com ) through the 2015-16 NHL season, though any valuation metric can be used. When drafting perfectly, a GM picks the best player available as is commonly prescribed, but they start with their last pick and work backwards. This subtle but important distinction alludes to the game theoretic considerations of the draft. Simply put, the best time to pick a good prospect is just before any opponents do. Every year, each team has a different perfect draft value, which is the aggregate career value of their optimal picks. Having more and better picks means more potential value available and a higher perfect draft value. By calculating the percentage of their perfect draft value that a team actually extracts, we now have a simple draft efficiency metric that shows how teams are drafting relative to their best case scenario. This allows us to rank and compare teams equitably by eliminating some of the advantages of having high-value picks.

## Keywords

National Hockey League, amateur draft, game theory

## Disciplines

Business

WHAT DOES IT MEAN TO DRAFT PERFECTLY?

AN EVALUATION OF DRAFT STRATEGY IN THE NATIONAL HOCKEY LEAGUE

By

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An Undergraduate Thesis submitted in partial fulfillment of the requirements for the

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## Abstract

We define what it means for an National Hockey League (NHL) team to have been successful in drafting, and use this retrospective 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 general manager (GM) could redo a draft with complete knowledge of prospects' career values as well as other teams' choices. A prospect's career value is defined here as aggregate Point Shares (from [hockey-reference.com](http://hockey-reference.com)) through the 2015-16 NHL season, though any valuation metric can be used.

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Every year, each team has a different perfect draft value, which is the aggregate career value of their optimal picks. Having more and better picks means more potential value available and a higher perfect draft value. By calculating the percentage of their perfect draft value that a team actually extracts, we now have a simple *draft efficiency* metric that shows how teams are drafting relative to their best case scenario. This allows us to rank and compare teams equitably by eliminating some of the advantages of having high-value picks.

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## Introduction

The National Hockey League is comprised of 30 professional ice hockey teams in the United States and Canada. Every year, the league holds an amateur entry draft, with all players eligible to be selected once they are 18 years old. Teams are given the sole rights to their drafted players for two years, during which time they may sign to them to an entry-level contract. There are seven rounds in the NHL draft, and each team is initially allocated one pick per round. The first half of the first round has the most valuable picks, which are distributed by a lottery system to teams that fail to make the playoffs (“Draft Rules,” 2013). The draft is generally constructed in a such a way that bad teams should be able to use it to acquire top-tier talent and improve league parity. Players who go undrafted may still sign contracts with NHL teams, but roughly 90% of today’s NHL is made up of drafted players. Additionally, draft picks are a common currency in player trades.

One of the most intriguing recent NHL Draft stories is the case of 2011 draft-eligible Johnny Gaudreau. In April 2011, he was a 5’6" South Jersey native putting up excellent scoring numbers in the United States Hockey League. However, concerns about his size meant that he was ranked 193<sup>rd</sup> among draft-eligible North American skaters by the NHL Central Scouting Service. Since there are roughly 210 draft picks per year, he was far from a certainty in terms of being drafted by any team.

Gaudreau was eventually taken with the 104<sup>th</sup> overall pick by the Calgary Flames, well past the point in the draft where most prospects are expected to become NHL players. This decision would seem to indicate a lack of confidence on the part of the Calgary Flames, but this is far from the truth. A piece in the *Calgary Herald*, written before the start of his NHL career, details the scouting espionage that went into drafting Gaudreau (Cruickshank, 2014). In order to disguise their interest in Gaudreau, Calgary never approached him before the draft, for fear of other teams valuing him higher. Furthermore, this quote from John Weisbrod, then a scout for the Boston Bruins, is particularly interesting:

*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.*

If the Bruins should have taken him a round earlier, why didn't they? The Bruins attempted to leverage the fact that Gaudreau was a seemingly unknown entity to postpone selecting him. They may have rated him very highly, but they weren't convinced that anyone else had, leading to their decision to wait. They were using game theory, and analysts should model the draft process in a way that reflects these considerations.

## **Background**

NHL teams spend millions of dollars every year on scouting departments with the sole purpose of identifying valuable prospects to draft and sign to entry-level contracts. Though they never publicly admit to doing so, teams have "tanked" entire seasons by trading away good players for draft picks and icing a team of inexperienced minor leaguers. The purpose of this strategy is to lose more games and position themselves to receive higher draft picks by lottery. A recent example is the 2015-16 Toronto Maple Leafs, who maximized their probability of selecting top-ranked Auston Matthews in the 2016 NHL Draft by finishing last in the NHL. The draft lottery did end up working out in their favor, and the Leafs got their man, who propelled the team to the playoffs in the 2016-17 NHL season. While tanking is a rather extreme route, every team knows how critical the draft is to building a strong team. Furthermore, general manager positions can be gained and lost over perceived proficiency in drafting, which is what makes retrospective draft evaluation a particularly relevant issue.

The importance of drafting talent versus acquiring it through free agency cannot be overstated.

The NHL has a hard salary cap of \$73,000,000, and the best players can command contracts of upwards of \$10,000,000 per year. In order to fill out a roster of 23 or so players, it is necessary to find value elsewhere, particularly with younger players. Entry-level contracts cover the first three seasons of every player's career at a maximum average annual value of \$925,000 in addition to four years of restricted free agency ("Frequently Asked Questions," 2016). This means that young star players like Connor McDavid, Shayne Gostisbehere, and Artemi Panarin, the 2016 Calder Trophy finalists, are currently performing at a level well above their pay grade for the teams that drafted them.

Moreover, the probability that any one of them is traded to or signed by another team during the prime of their career is slim. Out of the top 20 points scorers in the 2015-16 NHL season, only four players represented teams that did not offer them their first contract. If a team cannot draft elite talent, it is highly improbable that they will be able to acquire enough of it through trades and free agent signings.

In summary, unless the salary cap is abolished and entry-level contracts become shorter and more expensive, drafting will remain an important part of constructing a competitive NHL team for the foreseeable future. Moreover, in order to optimize drafting in the future, teams must have a sense of what constituted favorable outcomes in the past.

## **Previous Work**

Amateur drafts in many professional leagues have received scholarly attention as a way to apply statistical and analytical methods to a sports problem. The people behind *Moneyball* were some of the first to posit that certain features were not being priced into the market correctly, for example the value of drafting a more experienced college player versus a high school phenom in baseball (Caporale & Collier, 2013). Since then, researchers across all major sports have analyzed the relative value of draft picks, the success of specific teams in drafting talent, and more.

One of the most popular topics in draft research is defining the relative value of picks. How much less is a second overall pick worth than a first, and does this relationship hold through each round? This type of research is particularly enticing because the data is readily available, and it has implications for how teams construct trades around draft picks. In fact, NFL teams use a well-known chart to evaluate potential trades, supposedly developed by the Dallas Cowboys and MIT professors in the early 1990s. The chart shows a roughly exponential decay in pick value. In order to test its accuracy, Hurley, Pavlov and Andrews (2012) go on to construct a Negative Binomial Distribution model with three classes of players, and they find that the probability of someone belonging to the class with the most NFL games played decreases as the player is drafted later. However, their new construction of “The Chart” of pick valuation substantially differs from the original one, suggesting that conventional wisdom cannot capture the actual magnitude and shape of that decline in value.

In terms of hockey-specific analysis, Schuckers (2011) and Tulsky (2013) construct draft pick value charts with similarly decaying trends. Tingling, Masri and Martell (2011) show that, beyond the first three rounds of the NHL draft, there is no significant difference in drafted players’ success rates. They define success as the percentage of drafted players who play 160 or more games, and most researchers use similar games played criteria as response variables. In fact, the most obvious extension of present-day draft research is constructing additional response variables that measure the quality of a player’s contribution to his professional league rather than the quantity. This is what informs our decision to use Hockey Reference’s Point Shares as our player valuation metric. Furthermore, the relative value of draft picks is a component of this analysis, but we see that it varies based on the player quality available at different points in a specific draft.

Most previous analyses of drafting have a league-wide scope, which is why the game theoretic implications have not been studied in great detail. For example, Schuckers and Argeris (2015) show that teams collectively outperform NHL Central Scouting rankings when it comes to ordering draft prospects



from best to worst NHL outcomes. However, they probably do not outperform each other when observed over many years. Draft decisions are evaluated based on whether one of the best players available was selected with each of a team's picks. In contrast to this approach, we aim to reward teams for taking excellent players as late as possible. This is often intentional, as was the case with Calgary's decision to draft Johnny Gaudreau in the fourth round of the 2011 NHL Draft.

Finally, Sprigings (2016) creates a draft probability model for several highly rated players in the 2016 NHL Draft to inform teams' decisions to trade picks in the hopes of acquiring a specific prospect. It is necessary to forecast these probabilities in order to use a game theoretic drafting approach rather than simply selecting the best player available at each pick. Simply put, teams will want to know how long they can afford to wait to select someone, as this becomes a critical consideration along with the projected value of the prospect in question.

## **Methodology**

All draft position and player value data was scraped from [hockey-reference.com](http://hockey-reference.com). The player value metric used is Career Point Shares (aggregated through the 2015-16 NHL season), which are an estimate of the expected number of points in the team standings that are contributed by each player (Kubatko, 2011). Point Shares was chosen for its interpretability as well as being mostly non-negative. When we aggregate and compare these values, we should not penalize teams for picking a subpar NHL player rather than not picking one at all. For this reason, all negative outcomes were set to 0.

Since teams have shown that they approach the draft with game theory in mind, we should construct a notion of drafting that reflects these strategies. We can start by applying the method of backward induction, well-established in the field of game theory ever since the publication of von Neumann and Morgenstern's *Theory of Games and Economic Behavior* in 1944. Backward induction

involves calculating optimal payouts from the last to first decision in order to determine a complete, rational set of decisions for any actor.

In the case of drafting, the last decision that a team will make is their last available pick. We can recommend selecting the best player left on the draft board at that point, and then iterate this strategy backwards until their first pick. This ensures that a player is never selected before absolutely necessary, and a team can optimize the total value of the selected players. In the case of Johnny Gaudreau, NHL teams would have certainly been willing to use their first round picks on him after knowing the outcome of his NHL career. However, all they needed to do was select him right before Calgary did at 104<sup>th</sup> overall.

A historical case can illustrate this point most effectively. Suppose we build a time machine in order to fix one specific team's draft decisions. If we go back to the 2007 NHL Draft and act on behalf of the Philadelphia Flyers, we have the benefit of perfect information, while every other team would act just as they did previously.

We would redo the Flyers' second overall pick, originally used on James van Riemsdyk. One might initially consider the strategy of best player available. According to Career Point Shares (CPS), Jamie Benn was the best player left on the draft board at that point, even though he was selected much later by the Dallas Stars with the 129<sup>th</sup> overall pick. However, using backward best player available, we realize that we only have to spend the 122<sup>nd</sup> overall pick on Jamie Benn. As any value pick chart shows, this pick is worth considerably less than the second overall pick, and so we maximize return on investment. Then, we can use the second overall pick on someone like Max Pacioretty. Pacioretty, according to Career Point Shares, is not quite as valuable as Jamie Benn. However, he was picked 22<sup>nd</sup> overall by the Montreal Canadiens, and so he would not have been available later on in the draft. Table 1 shows a comparison between the Flyers' actual draft selections, recommended selections based on best player available, and the optimal selections when working backwards.

**Table 1: Optimizing the Philadelphia Flyers' 2007 Draft Selections<sup>1</sup>**

<i>Pick</i>	<i>Actual Selections</i>	<i>CPS</i>	<i>Best Player Available, Perfect Information</i>	<i>CPS</i>	<i>Backward Best Player Available, Perfect Information</i>	<i>CPS</i>
2	James van Riemsdyk	31.6	Jamie Benn	55.8	Max Pacioretty	46.2
41	Kevin Marshall	0.0	P.K. Subban	52.8	P.K. Subban	52.8
66	Garrett Klotz	0.0	Alec Martinez	27.7	Alec Martinez	27.7
122	Mario Kempe	0.0	Jake Muzzin	24.6	Jamie Benn	55.8
152	Jon Kalinski	0.2	Carl Gunnarsson	23.9	Carl Hagelin	21.1
161	Patrick Maroon	9.3	Carl Hagelin	21.1	Carl Gunnarsson	23.9
182	Brad Phillips	0.0	Justin Braun	21.1	Justin Braun	21.1
<b>Totals</b>	<b>Actual Value Drafted</b>	<b>41.1</b>		<b>227</b>	<b>Perfect Draft Value</b>	<b>248.6</b>

We see that backward best player available outperforms best player available, and both outperform the Flyers' actual draft selections by a wide margin. Additionally, the difference between working forwards and backwards is not particularly large, but it certainly exists. Here, a difference of 20 Career Point Shares implies one expected additional win per season from 2007 till present. In general, if a draft is less predictable and there is value to be had in all rounds, the difference between selecting the best player available working forwards and backwards increases. If the draft is perfectly ordered, both methods yield the same value, which would also be equivalent to the actual result.

We can calculate this aggregate value of optimal picks, or perfect draft value, for any team in any year. Then, we can construct a draft efficiency score by dividing their actual value drafted by their perfect draft value. For the Flyers in 2007, this score is 41.1 total Point Shares divided by 248.6 possible Point Shares, or about 16.5%. This is a simple yet effective measure of how much value any team ended up drafting relative to their own best case scenario. draft efficiency helps to diminish some of the

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<sup>1</sup> Note that because Gunnarsson and Hagelin were both selected after the 161<sup>st</sup> overall pick, it does not matter whether they are picked 152<sup>nd</sup> or 161<sup>st</sup> overall in this redraft.

advantages inherent to having many high-value picks in a certain draft, because the benchmark of opportunity for those teams becomes higher.

This approach does raise some questions of feasibility. Taking the time machine scenario too seriously will lead to some impossible hypothetical scenarios. What if picking Jamie Benn before Dallas in 2007 causes Dallas to take Carl Hagelin, one of the next players prescribed by the perfect draft? After all, it would be incredibly difficult to take the “butterfly effect” into account. Furthermore, what if taking Benn before Dallas causes him to stall in his progress? Assuming player outcomes are fixed ignores their inherent uncertainty as well as the impact of NHL coaching and development programs. Some very high-risk, high-reward prospects are drafted in later rounds, and we cannot say that they would pan out or bust 100% of the time.

We should consider an alternative understanding of the perfect draft that best captures its evaluative purpose. The perfect draft shows the value that all other teams were able to select and develop at various points in each draft. It shows what could’ve happened if a GM did everything right, and probably also got a bit lucky. It will never be a perfect metric until we simulate multiple trials of reality, but it certainly helps to tease out the inherent biases of fans and analysts when they evaluate drafting more qualitatively. Moreover, this approach can be used with any valuation metric in any league with a draft. As long as a single value can be assigned to each prospect, this algorithm can define a set of optimal draft picks.

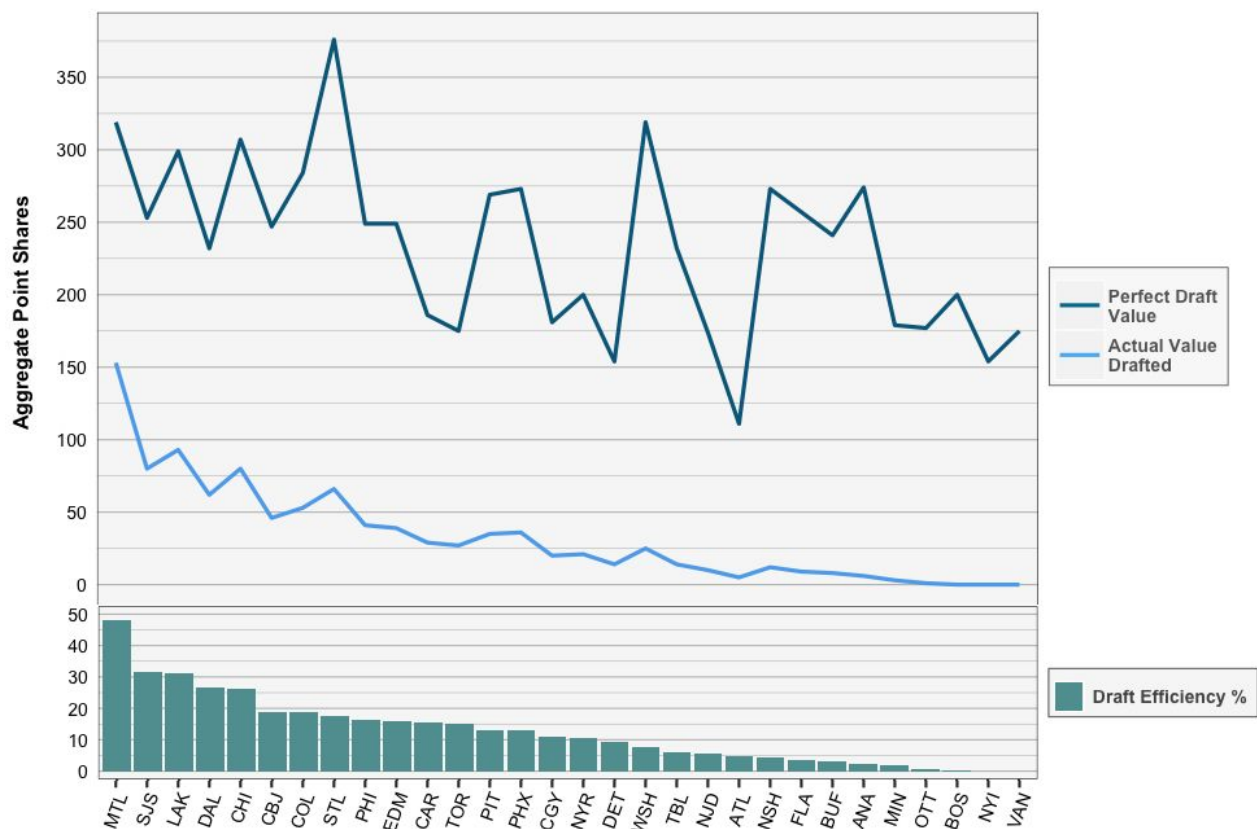
## **Team Performance Results**

Figure 1 shows draft efficiency results for the 2007 NHL Draft. Teams are ordered by their draft efficiency score from best to worst. Montreal does much better than any other team by extracting roughly 50% of the value that was available to them. At the other end of the spectrum, the Islanders and

the Canucks drafted no successful NHLers. It is notable that the Canadiens had three more picks than the Canucks and four more picks than the Islanders, and Montreal's picks were on average about one round better than those of both teams. The Canadiens clearly had more and better opportunities to extract value from the draft, and they were able to take advantage of them. Meanwhile, the Canucks and Islanders basically set themselves up for a high probability of failure.

We find that perfect draft value correlates positively and linearly with actual value drafted ( $r = 0.45$ ) throughout the 2000-09 drafts. See Appendix B, Figure 4 for details. Still, there is clear variation. Montreal is ranked first in draft efficiency for 2007 while Washington is 18<sup>th</sup>, despite having equivalent perfect draft values. In fact, Washington is penalized for not taking advantage of their good picks, and they are ranked below teams whose selections weren't as valuable in an absolute sense.

**Figure 1: 2007 Draft Efficiency Results**



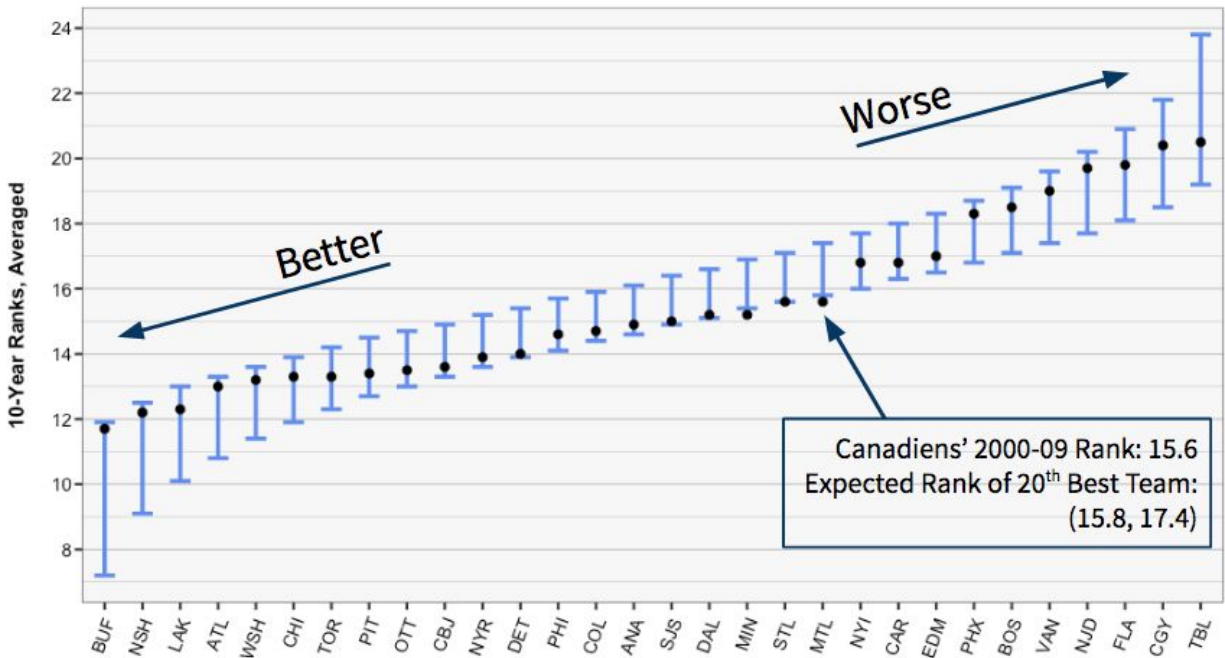
It's important to note that every draft is different and has a unique distribution of draft efficiency scores, as shown in Appendix B, Figure 5. In some years, one team does particularly well, and so everyone else suffers in comparison. Other years, especially the early 2000s, exhibit more parity in drafting. For this reason, we compare team ranks instead of raw draft efficiency percentages for the entire decade. Every year is different, but in every year teams still want to outperform their opponents.

If we evaluate the results over 2000-09, no team does significantly better or worse when regressing team on draft efficiency rank. Full draft efficiency ranking results by year can be found in Appendix B, Table 2. To further understand if there are trends in the ranks, we can repeatedly simulate ranks over 10 years to construct 95% confidence intervals for our expectations of the best team, the second best team, and so forth, in a world where every team is equally proficient at drafting. Figure 2 displays the averaged actual ranks, which are basically in line with what would be expected from randomly generated results, with a couple of exceptions. The top 20 teams display obvious regression to the mean. The best teams perform systematically worse than we might expect, and the middle of the pack teams perform systematically better than we might expect. The Canadiens are singled out in Figure 2, with an average rank of 15.6 that slightly outperforms the 95% confidence interval for the 20<sup>th</sup> best team, (15.8, 17.4). This pattern suggests that, for most of the league, there's a very small gap in terms of average drafting performance, even smaller than what we might expect in a world where all differences in outcomes are due to random variation.

In addition, there is some separation between the top 20 and bottom 10, and the worst third of the league experienced results in line with random chance. While placing in the bottom third of the league could be due to bad luck, there is some evidence that these teams were making subpar draft decisions. Calgary's decision to draft Johnny Gaudreau in 2011 was a departure from their draft strategy in the 2000s, when they were fond of drafting larger, less skilled players (Cruickshank, 2014). Mostly due to drafting the small, skilled Gaudreau, they rank third in 2011 draft efficiency, a better result than they

were able to achieve at any point within the previous decade.

**Figure 2: Expectations for Draft Efficiency Ranks**



### What Does It Mean to Be “Good at Drafting?”

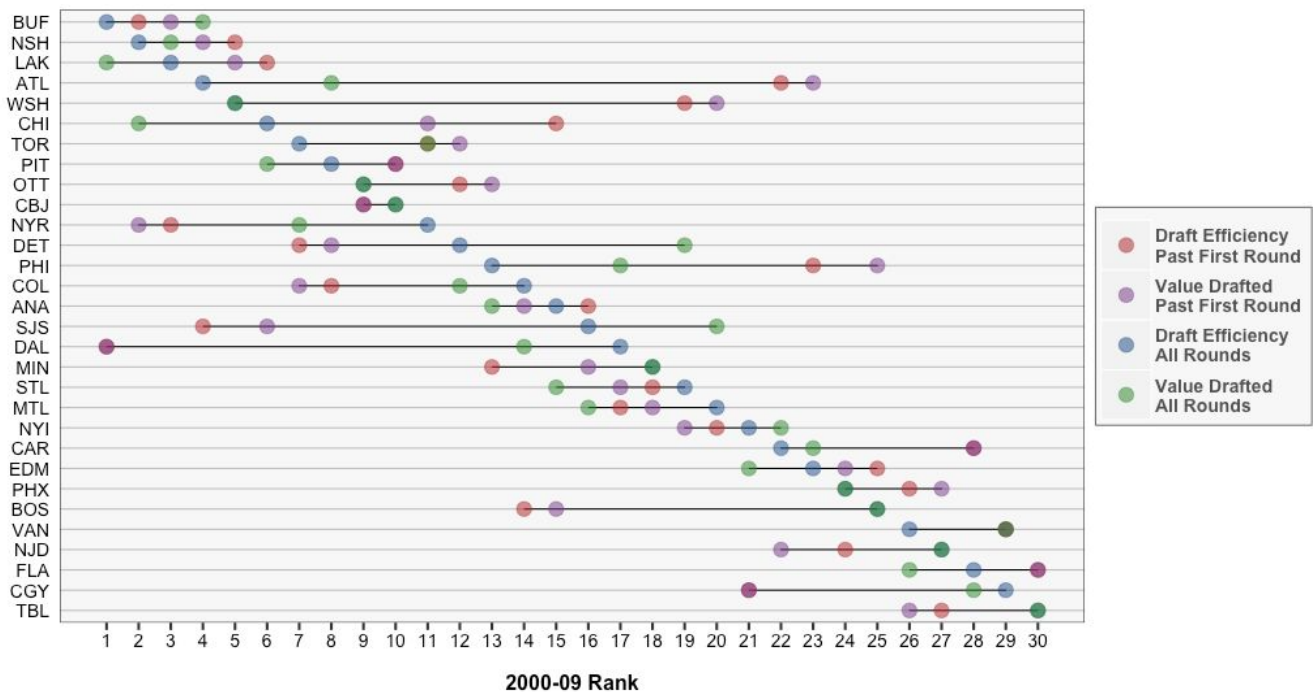
It’s difficult to discuss drafting success in the 2000s without mentioning the Chicago Blackhawks. With notable drafted talents such as Patrick Kane, Jonathan Toews, Brent Seabrook, Corey Crawford, Duncan Keith, and more, they tend to fall at or near the top of any lists of the best drafting teams in hockey. According to averaged draft efficiency rank, they are sixth in the NHL over this time period, which already seems a bit low given their tremendous on-ice success in recent years.

However, during the 2000-09 drafts, they had at least 9 more picks than any other team, including the first overall pick in 2007, third overall in 2006 and 2004, and so forth. For every Jonathan Toews the Blackhawks drafted, they made a selection like Kyle Beach, who failed to make an impact at the NHL level. If we rank teams simply based on the total Point Shares they drafted in each year, the

Chicago Blackhawks are actually second in the 2000s, just losing out to the top-ranked Los Angeles Kings. However, using draft efficiency penalizes their drafting performance the most out of all teams because their perfect draft values are particularly high.

One of the other ways to eliminate the advantage of having high-value picks is to ignore the ones that are allocated via lottery. Schuckers (2011) and Tulsy (2013) find that these are the most valuable picks by a large margin. The first overall pick, for example, is generally unattainable for playoff-bound teams. If we eliminate the first half of the first round, then, in the interest of fair comparison, we should exclude the entire first round. Doing so yields similar ranks for some teams and dramatically different ones for others. Figure 3 displays some of the disparities in ranks among four possible systems. Teams have a total value rank and an efficiency rank for the entire draft as well as for the second round and beyond. The ranking systems are ordered in the legend from most to least penalization of pick value. For a complete listing of ranks in each system, see Appendix B, Table 3.

**Figure 3: Team Performance Under All Ranking Systems**





Now, we get to the heart of the issue of why teams like the Blackhawks as well as teams like the Detroit Red Wings are considered good at drafting. The Blackhawks drafted a lot of high-value players, but they also had a lot of misses, and so they are penalized with all efficiency-based measures. They go from second in the league to 15<sup>th</sup> as we take away their relative advantages. Meanwhile, the Red Wings were fairly mediocre in terms of value drafted, but they did an excellent job of efficiently extracting value from their not-so-great picks. They have the opposite trajectory in rankings, going from 20<sup>th</sup> to fourth in the NHL as other teams' pick advantages are removed.

This analysis lends credibility to the idea that teams should set themselves up to succeed by accumulating many high-value draft picks. Then, even if they're roughly average at finding value in all rounds of the draft, they still perform very well in absolute terms. No team will care about their draft efficiency score as long as they are consistently drafting valuable players. Despite the Red Wings' impressive ability to find value in late rounds, teams would probably rather model themselves after the Blackhawks. In fact, having many chances to succeed in the draft is the main idea behind strategies like "The Process" of the Philadelphia 76ers in the NBA (Hinkie, 2016).

## **Future Work**

The first question to ask about any draft research is "can this help a team draft better?" This project is mostly descriptive and retrospective in nature, but it can at least serve as a warning sign for teams who are doing particularly poorly. Of course, they often know this already due to lack of on-ice success, although having high picks for a few years can help to mask deficiencies. Still, we do not find a statistically significant difference in team drafting abilities throughout the 2000s, and there is a healthy amount of random variation in all parts of the process. Evaluating one general manager or draft analyst based on these results may not present a fair assessment of their abilities.

There are ways to incorporate these ideas more prospectively into future draft strategies. First, teams need to model outcomes for each draft prospect, which is presumably being done by each team to some degree. Second, a team will need to model the distribution of picks around which a prospect is expected to be selected. Dawson Sprigings' NHL Draft Probability Tool (2016) shows how this distribution can be estimated using pre-draft rankings from various sources, but the accuracy of these estimates will drop in later rounds. See Appendix A for a simple demonstration of how projecting other teams' preferences can inform a draft ordering decision. In general, there will need to be a certain level of precision attainable by this approach before it becomes better than simply selecting the best player available.

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## Appendix A

Suppose there is a two-round draft with all 30 NHL teams. The Toronto Maple Leafs have the first and 31<sup>st</sup> picks. You are a Leafs scout and have identified two players whom you believe will have impressive NHL impacts based on internal team projections. All other players have a value of 20. You also know the likelihood that each player will be drafted before the 31<sup>st</sup> pick if you do not take them first. Given the large number of players available to be drafted, it is reasonable to assume independence.

<i>Player</i>	<i>Projected NHL Value</i>	<i>Hypothetical Scouts' Rank</i>	<i>P(Taken Before 31<sup>st</sup> Pick)</i>
X	90	20	0.5
Y	60	1	0.99

If you select X and then select the best player available, your expected total NHL value is 110.4:

<i>Available at 31<sup>st</sup> Pick</i>	<i>Probability</i>	<i>Total NHL Value</i>
Y	0.01	90 + 60
Other	0.99	90 + 20

If you select Y and then select the best player available, your expected total NHL value is 115:

<i>Available at 31<sup>st</sup> Pick</i>	<i>Probability</i>	<i>Total NHL Value</i>
X	0.5	60 + 90
Other	0.5	60 + 20

In this case, the behaviors of other teams motivate ordering your picks less intuitively in order to maximize expected value. Of course, there are different risks attached to using this methodology versus using the strategy of “best player available.” It’s worth noting that this will essentially converge to “best player available” if you agree with the market’s assessments of prospects. Furthermore, this example seems extreme, as scouts are not completely inept at evaluating top-end talent. Still, some teams continue to be fond of picking their favorite prospects without regard for underlying market preferences.

## Appendix B

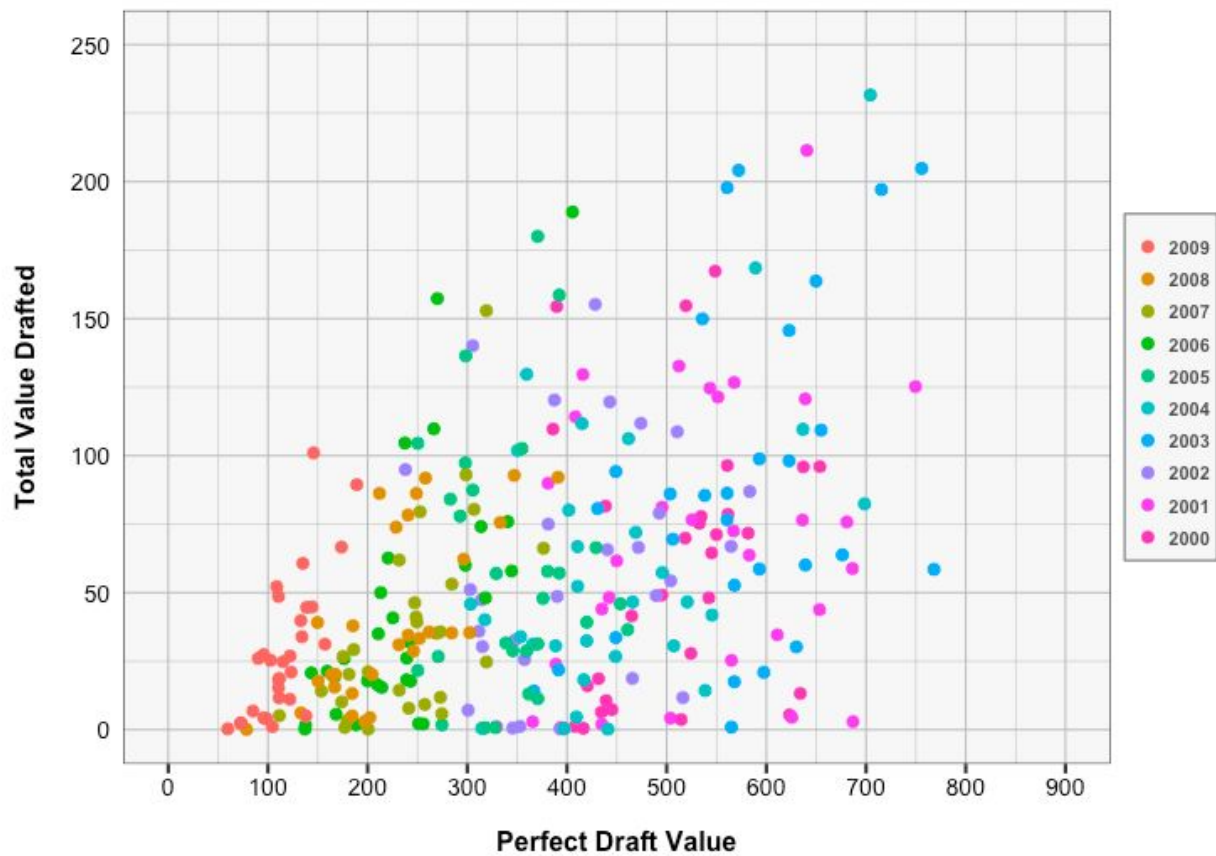
**Table 2: NHL Team Draft Efficiency Ranks, 2000-09**

<i>Team</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>Average</i>
Sabres	21	2	6	3	7	22	12	24	10	10	11.7
Predators	11	12	20	5	6	9	26	22	5	6	12.2
Kings	3	9	23	19	27	4	13	3	6	16	12.3
Thrashers	7	8	5	10	30	12	10	21	15	12	13
Capitals	22	18	13	24	2	26	2	18	2	5	13.2
Blackhawks	26	10	3	1	14	23	6	5	27	18	13.3
Maple Leafs	12	16	4	26	28	3	3	12	12	17	13.3
Penguins	16	24	14	6	4	1	5	13	29	22	13.4
Senators	6	1	29	16	18	24	7	27	3	4	13.5
Blue Jackets	17	21	7	18	26	13	4	6	13	11	13.6
Rangers	1	7	22	28	8	15	19	16	4	19	13.9
Red Wings	10	26	1	8	11	14	21	17	17	15	14
Flyers	4	6	11	7	29	19	11	9	23	27	14.6
Avalanche	14	17	8	23	21	11	17	7	28	1	14.7
Ducks	5	15	15	2	25	10	24	25	20	8	14.9
Sharks	28	3	27	4	20	5	20	2	11	30	15
Stars	13	4	18	20	23	7	25	4	25	13	15.2
Wild	2	13	12	13	22	21	22	26	19	2	15.2
Blues	24	22	26	14	12	8	8	8	9	25	15.6
Canadiens	18	11	21	11	5	2	28	1	30	29	15.6
Islanders	9	30	9	27	16	28	9	29	8	3	16.8
Hurricanes	20	28	2	15	9	17	16	11	26	24	16.8
Oilers	19	14	16	25	15	20	18	10	7	26	17
Coyotes	25	25	25	30	10	6	23	14	16	9	18.3
Bruins	23	19	24	12	3	25	1	28	22	28	18.5
Canucks	29	5	28	21	1	16	15	30	24	21	19
Devils	8	29	30	9	13	18	29	20	21	20	19.7
Panthers	30	20	10	22	17	30	14	23	18	14	19.8
Flames	15	23	19	17	24	27	27	15	14	23	20.4
Lightning	27	27	17	29	19	29	30	19	1	7	20.5

**Table 3: 2000-09 NHL Team Rank by System, Most to Least Penalization of Pick Value**

<i>Team</i>	<i>Draft Efficiency, Past First Round</i>	<i>Value Drafted, Past First Round</i>	<i>Draft Efficiency, All Rounds</i>	<i>Value Drafted, All Rounds</i>	<i>Total Effect of Efficiency, First Round Exclusion</i>
Capitals	19	20	5	5	-14
Thrashers	22	23	4	8	-14
Blackhawks	15	11	6	2	-13
Flyers	23	25	13	17	-6
Kings	6	5	3	1	-5
Hurricanes	28	28	22	23	-5
Penguins	10	10	8	6	-4
Oilers	25	24	23	21	-4
Panthers	30	30	28	26	-4
Senators	12	13	9	9	-3
Ducks	16	14	15	13	-3
Blues	18	17	19	15	-3
Predators	5	4	2	3	-2
Coyotes	26	27	24	24	-2
Canadiens	17	18	20	16	-1
Maple Leafs	11	12	7	11	0
Canucks	29	29	26	29	0
Blue Jackets	9	9	10	10	1
Sabres	2	3	1	4	2
Islanders	20	19	21	22	2
Devils	24	22	27	27	3
Lightning	27	26	30	30	3
Rangers	3	2	11	7	4
Avalanche	8	7	14	12	4
Wild	13	16	18	18	5
Flames	21	21	29	28	7
Bruins	14	15	25	25	11
Red Wings	7	8	12	19	12
Stars	1	1	17	14	13
Sharks	4	6	16	20	16

**Figure 4: Actual Value Drafted vs. Perfect Draft Value, 2000-09**



Earlier drafts fare better in terms of actual value drafted and perfect draft value because players have accumulated more career value. Every additional Point Share of perfect draft value leads to an average increase of 0.13 Point Shares of actual value drafted, and this effect is statistically significant with  $p < 0.01$ . Still, there are many instances of teams with high perfect draft values completely failing to draft NHL-caliber players.



Figure 5: Draft Efficiency Percentage Distributions

