"The KHL Effect"
The Evolution of Entry Draft Discrimination in the National Hockey League 2009 -2010

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Abstract

This paper attempts to determine if previously observed patterns of discrimination against French Canadians and Europeans are still present in the National Hockey League entry draft. Also tested is the theory that different areas in North America have different preferences in terms of who to draft based on country of origin or language spoken. In a departure from previous works, Russians are teased out of the European category to see if a 'KHL effect' – a hesitation to import Russians based on past unreliability – is present. It is determined that Russians are underrated substantially at the time of the draft, Europeans a little less so and French Canadians face no discrimination.

1.0 Introduction

Discrimination in the National Hockey League, in all its forms, has been studied extensively in the past. It has been shown that French Canadians and Europeans are underrated in terms of their draft ranking and underpaid in relation to other players with similar statistics. There is also evidence that the location of the team drafting players has an effect on the rank at which they are chosen. There is, however, no econometric study using data from the last fifteen years. So the question remains how have these discriminatory practices evolved over time?

Much has changed since Lavoie (2003) studied these relationships using data from the 1993-1994 season. The league expanded from 26 to 30 teams, which increased the competitiveness for players and therefore the thoroughness in which they are scouted (Gabriel, 2011). The scouting process itself has become more expansive thanks in large part to technology. We operate in a new age of connectivity compared to 1994 when the first commercial cellular phone was just being released. Only a few hundred people on earth had internet access compared to today's estimated 1.1 billion (Leiner, 2010). The National Hockey League has embraced this rapid expansion and as a result the size and scope of hockey exposure in general has increased. Specifically, advances in portable video and the internet make the relay of highlight reels simpler, faster and less expensive. Players have a greater percentage of their developmental years filmed and a larger number of their years statistically recorded. This provides a massive, easily accessible source of information that should help reduce the amount of discrimination based on less quantifiable measures like language spoken.

The first objective of this paper is to test the theory that French Canadian hockey players are still discriminated against in the draft by repeating the methodology used in Lavoie (2003)

with data from the 2009-2010 season and comparing the results. Presumably the hypothesized gift of greater objectivity will allow us to see a reduction in measurable entry draft prejudice.

The disappearance of bias as a result of society's evolution, whether partial or complete, is not a result everybody expects. In a 2010 publication entitled "Discrimination in the NHL," former player Bob Sirois attacks the objectivity of the NHL scouting system in the present day;

> "Talent scouting is much more a question of intuition, feeling or even gut instinct. Myths, prejudices, stereotypes and favouritism are an integral part of each National Hockey League draft." (Sirois, 30)

I hypothesized that these prejudices are playing a lesser role as technology objectifies the scouting process by increasing its reach and making it more transparent to people outside the system. I will also test to see if Europeans still face discrimination in terms of draft ranking. In a departure from previous works, Russians will be teased out of the European category to determine if a "KHL effect" comes into play.

The KHL, or Kontinental Hockey League, is regarded as the most elite of European hockey leagues and today numbers more than 700 players[1]. For reference, the NHL fielded 691 skaters in 2009-2010[2]. Not only is the KHL larger but it boasts a bravado at the management and ownership levels that is making North American general managers nervous. Already the likes of Marcel Hossa, Alexei Yashin and Alexander Radulov play in the KHL, and there have been whispers of more imported Russian talent leaving the NHL and returning to their homeland. This, combined with the physical distance and less intensive scouting that causes all Europeans to be underrated, may account for the large amount of discriminatory evidence present in previous works.

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[1] "About the Kontinental Hockey League." *Kontinental Hockey League - Official Website.* AccessedNov 21, 2010. <http://en.khl.ru/official/22007/>.

[2] *National Hockey League Official Guide and Record Book 2009-2010.* Toronto: Dan Diamond and Associates, 2010. Print.

The second objective is to test to see what entry discrimination, if any, remains in specific locations. In previous works, evidence of two significant trends was noticed; French Canadians being underrated by American teams and Europeans being underrated by English Canadian teams (Lavoie, 2003). I will repeat these tests to see if empirical evidence still supports this discrimination. An interactive variable representing Russian imports will be added so they can again be tested as a separate sample from Europeans. This will demonstrate if any specific location is more susceptible to the aforementioned "KHL effect."

The paper is structured as follows. First, I present a brief outline of the literature related to entry draft discrimination; second, there is a description of how the current data set was constructed and an outline of the methodology used to test for the presence of discrimination in the 2009-2010 data; third, I present the new regression results and discuss how they differ from the 1993-1994 results; finally, I draw conclusions based on the above results about the disappearance of discrimination against French Canadians and why the poor reputation of Russian (and to a lesser extent European) players is decreasing their draft value.

2.0 Background Theory

Entry Discrimination in the National Hockey League has been evaluated several times before, and although there are slight variations in methodologies from author to author, the results are fairly straightforward and allow for interesting comparisons with this paper's findings.

Tingling and Masri (2010) examine the expanding role of scouting in the National Hockey League and posit that this expansion can be attributed to growth in size of player contracts as well as the league-regulated maximum total team payroll known as the "salary cap". Teams have to be thorough in investigating low-cost prospects to remain competitive. This

creates a need for more complete, unbiased evaluation of prospective talent. The authors plot team wealth versus drafting success on scatterplots to see if any relationships are evident but find no discernable trends. They suspect this is because team wealth is a very subjective measure. Also at both ends of the spectrum they feel innovation in drafting methods is stifled. When poor, there is simply no money. When rich, an aura of complacency and tradition outweighs new ideas. The authors conclude that the relationship between wealth and innovation is more complex than the simple linear model they attempted to examine. In spite of these empirical problems this paper provides valuable information on the evolution of scouting in its review of literature. Due to the inherent presence of restrictions in the many financial areas of professional sports the authors make the following conclusion:

> "Greater attention is being placed on scouting and the draft to acquire lower cost players (Allen 2008) with teams increasing emphasis on management and player evaluation and player databases because administration expenses are excluded from the salary cap." (*Tingling, 4*)

This supports my hypothesis that technological innovation is making talent evaluation less subjective and less influenced by prejudice.

Lavoie (2003) is the paper I draw the closest comparisons with. He builds on previous studies where he determined that French Canadian players, defensemen most notably, face discrimination in terms of both entry rank and salary. In his 2003 work, he focuses on the entry draft and tries to determine if team location has any effect on draft bias. Using lifetime points per game as the dependent variable he constructed interactive variables representing the three main NHL regions and evaluated the coefficients in front of them to determine if those areas are prejudiced towards any specific groups. Height, weight, age, draft rank, penalty minutes and "defensive play" were also included as independent variables. The "defensive play" variable

proxies for how strong a player is defensively. This is added because measuring offensive performance only is not sufficient to determine someone's draft value. A more detailed description of this variable can be found in the 'description of data' section that follows.

His results are unambiguous. He first evaluates a sample of only Canadian players without the defensive play variable. He finds that French Canadians are undervalued at draft time and outperform their English Canadian counterparts, drafted at the same position, by 9.02 points per season and 10.04 points per season in 1983 and 1993 respectively. This model, which had been used in previous studies, was criticized for being underspecified. To correct for this, variables were added to the regressions including: European and American dummy variables to see if they also faced discrimination; the defensive play variable; and age, height, penalties and weight (which also proxy for defensive prowess). Again it was found that French Canadians were undervalued by roughly the same amount (9.5 points per season) and Europeans were undervalued by even more (11.07 points per season).

To test for the location of entry discrimination, Lavoie built interactive variables to determine if players from a certain background are valued differently in three different areas; English Canada, French Canada and the United States. The results were as follows; French Canadians were undervalued in the United States, Europeans were undervalued everywhere, English Canadians were overvalued everywhere, and Americans were overvalued in Quebec and undervalued in English Canada[3]. We will see how all these results compare to similar regressions with updated data.

In a 1989 publication entitled '*The Economic Hypothesis of Positional Segregation: Some Further Comments*' Lavoie speaks about racial discrimination through a variety of sports and concludes that the "barriers to entry against a minority group are therefore the highest where

[8]Not all these values were statistically significant.

assessment is most subjective and difficult" (Lavoie, 1989). This statement helped mould the thesis of this project around the idea that if technology makes it possible to decrease subjectivity and in turn decrease the difficulty of assessment, which is in our case scouting, then these barriers to entry will decrease or desist.

Lavoie and Grenier (1992) examine discrimination with salary as their main variable of interest. They run the exact same first regression as Lavoie (2003) including draft rank, the defensive play variable and a French Canadian dummy variable to test entry discrimination. They find that a French Canadian drafted at the 100^{th} rank will perform as well as an English Canadian drafted at the 50^{th} rank (Lavoie and Grenier, 1992). This result is only marginally significant however and I will repeat this test with 2009 data to try and support the theory that entry discrimination is decreasing

Lavoie (2000) tests empirically the location of salary discrimination. The regression employs salary as the dependent variable and alters slightly the independent variables but creates the same interactive variables as in Lavoie (2003), Longley (1995) and the present study. His results are as follows: French Canadian forwards seem to be underpaid in America and English Canada but these results are not significant. European forwards face lower salaries in all of Canada and Americans face lower salaries in English Canada. French Canadian defensemen are underpaid in English Canada and European defensemen are overpaid in French Canada (Lavoie, 2003).

3.0 Data Analysis

3.1 Description of Data

The dataset was constructed using the 2011 publication of the '*National Hockey League Official Guide and Record Book*.' All undrafted free agents were excluded because without a draft rank entry discrimination is impossible to quantify empirically. Also excluded were those that had played less than twenty games in the previous season. This was done to eliminate the possibility of players coming up from minor league teams temporarily and skewing per game statistical analysis due to a small amount of career games played. For example, the variable 'Penalties' is a measure of lifetime penalty minutes per game (PIMPG) and this is used to proxy for physicality and thus defensive prowess.

Table 1

Defensemen	183
Forwards	378
Total Observations	561
% French Canadian	6.42
% English Canadian	46.17
% Non-Russian European	22.46
% Russian	4.46
% American	20.50
Total %	100
% Drafted to Quebec	5.17
% Drafted to Rest of Canada	19.08
% Drafted to USA	75.76
Total %	100

If a young player were to come up and play for one game and record a penalty, which is not an uncommon occurrence as young players tend to be overeager to prove their ability, he would have a disproportionately high lifetime PIMPG value (2). This would qualify him as more physical than Darcy Tucker (1.49), which is most likely not the case. The sample does not include goaltenders and the 'Quebec' variable includes both the Montreal Canadians and the Quebec Nordiques as players were drafted to both teams before 1994 when the Nordiques were relocated. The sample is broken down above in table 1.

Below is a description of the variables used in the regressions performed in this paper. The first section, 'Entry Draft Discrimination', covers the variables found in Tables 2, 3 and 4. The second section, 'Location Specific Entry Draft Discrimination', covers the variables that appear in Table 5.

Entry Draft Discrimination: Variables Used

Dependent Variable:

Lifetime Points Per Game

This is used as the dependent variable in all four tables and was constructed by dividing career points by career games played. All statistics in the sample are taken from regular season data.

Independent Variables:

Draft Number – The rank at which the player was drafted before their rookie season.

Defence – Assigned a value of '1' if the player is a defenseman, '0' if the player is a forward.

Height – Player's height, in inches.

Weight – Player's weight, in pounds.

Penalties -

Calculated by dividing career penalty minutes by career games played. Used to proxy for physicality and defensive ability.

Language spoken/ethnicity -

The variables 'French Canadian', 'European', 'Russian', 'English Canadian' and 'American' are assigned a value of '1' if the player is from those areas. French-speaking Canadians who live in English Canada were included in the 'French Canadian' sample. Players' biographies were used to determine linguistic origin.

Defensive Play -

The data used to build the defensive play variable was obtained from a website entitled 'Behind the Net.' It is an independent body that compiles statistics other than those kept by the official NHL statistics and records department. One of these fringe statistics is a measure of 'plus/minus' while the player is on the penalty kill. This is used to proxy for defensive ability because if a player is exceptionally talented on defence the coach will reward them with a higher number of minutes on the penalty kill. As a result defensively skilled players will have a large negative value in this adjusted plus/minus category. One might wonder intuitively why, if they were so talented on defence, would they have a high negative value in any measure of plus/minus? This is because when playing at a numerical disadvantage, four or three players versus five, goals will be scored by the more numerous regardless of who is playing defence. The player's role is only to minimize scoring opportunities. Lavoie and Grenier (1992) and Lavoie (2003), using data from 1989 and 1994, found approximately five players per team with high negative values in this category and assigned them all a value of '1' for Defensive Play. I repeated this methodology using current data and noticed that closer to ten players per team were

being utilized heavily on the penalty kill. Potential reasons for this are discussed in the 'Regression Results' section.

Location Specific Entry Draft Discrimination: Variables Used

Interaction Variables

The analysis of entry discrimination based on the location of the drafting team requires a slightly more intricate statistical approach. When collecting the data three specific location trends were recorded: whether the player was drafted to French Canada, to English Canada, or to the United States. Combining these results with the player's origin (recorded in the language/ethnicity variables above) interactional variables can be constructed. Three separate sets of these variables are required, one for each of the three regressions run. All regressions use the same sample set of data.

Regression A: Players drafted to Quebec

- ***French Canadian Drated*** – Assigned a value of '1' if the player is French Canadian and was drafted to Quebec, assigned a '0' otherwise. ***(Reference category: Omitted in Regression A)***
- ***English Canadian Drafted*** – Assigned a value of '1' if the Player is English Canadian and was drafted to Quebec, assigned a '0' otherwise.
- ***Non-Russian European Drafted*** - Assigned a value of '1' if the Player is European and was drafted to Quebec, assigned a '0' otherwise.
- ***American Drafted*** - Assigned a value of '1' if the Player is American and was drafted to Quebec, assigned a '0' otherwise.
- ***Russian Drafted*** - Assigned a value of '1' if the Player is Russian and was drafted to Quebec, assigned a '0' otherwise.

Regression B: Players drafted to Rest of Canada (ROC)

- ***French Canadian Drafted*** – Assigned a value of '1' if the player is French Canadian and was drafted to ROC, assigned a '0' otherwise.

- ***English Canadian Drafted*** – Assigned a value of '1' if the Player is English Canadian and was drafted to ROC, assigned a '0' otherwise. ***(Reference category: Omitted in Regression B)***

- ***Non- Russian European Drafted*** - Assigned a value of '1' if the Player is European and was drafted to ROC, assigned a '0' otherwise.

- ***American Drafted*** - Assigned a value of '1' if the Player is American and was drafted to ROC, assigned a '0' otherwise.

- ***Russian Drafted*** - Assigned a value of '1' if the Player is Russian and was drafted to ROC, assigned a '0' otherwise.

Regression C: Players drafted to United States

- ***French Canadian Drafted*** – Assigned a value of '1' if the player is French Canadian and was drafted to an American team, assigned a '0' otherwise.

- ***English Canadian Drafted*** – Assigned a value of '1' if the Player is English Canadian and was drafted to an American team, assigned a '0' otherwise.

- ***Non-Russian European Drafted*** - Assigned a value of '1' if the Player is European and was drafted to an American team, assigned a '0' otherwise.

- ***American Drafted*** - Assigned a value of '1' if the Player is American and was drafted to an Americas team, assigned a '0' otherwise. ***(Reference category: Omitted in Regression C)***

- ***Russian Drafted*** - Assigned a value of '1' if the Player is Russian and was drafted to an American team, assigned a '0' otherwise.

It must be noted that the 'Others' category in Table 4 is simply the remaining observations in each specific location regression. For example in Regression A, the 'Others' variable would be assigned a value of '1' if the player was drafted to an American team or to the Rest of Canada.

3.2 Methodology

Two main regression models were used for the purposes of this paper. The first is a simple model of entry draft discrimination based on player origin. There are several variations

of this model and these can be seen, along with the original, in tables 2, 3, and 4. The second model attempts to capture entry draft discrimination based on location of the drafting team and these results are presented in table 5. The regressions are of the following form:

Table 2:

$$\textbf{Lifetime Points Per Game} = \beta_0 + \beta_1 \textbf{DraftNumber} + \beta_2 \textbf{DraftNumber}^2 + \beta_3 \textbf{Defence} + \beta_4 \textbf{FrenchCanadian} + \epsilon$$

This sample includes only Canadian players (N=295). Americans and Europeans were excluded because by including only Canadians and using English Canadians as the reference category we can determine exactly how much a French Canadian outperforms an English Canadian drafted at the same rank.

Based on this structure I expect to see a negative value for β_1 because a player that has a lower draft number will most likely have a higher career point output. The second term, 'DraftNumber^2', is included to determine if the relationship is linear. If significant and positive, which is what was found in Grenier and Lavoie (1992) and in Lavoie (2003), this implies that after a certain amount of the draft has elapsed the relationship between draft rank and lifetime points per game is no longer negative. I expect to see the gap between β_1 and β_2 increase because as we become more skilled at evaluating talent choices made in the later draft rounds become more reliable. The final variable, 'FrenchCanadian', measures the difference in offensive output between French Canadian and English players drafted at the same rank. Lavoie (2003) found that French Canadians are outperforming their English counterparts by anywhere from 5 to 10 points a season. If my hypothesis is correct, we will see this number decrease or go to zero.

Table 3:

(1)

$$\textbf{Lifetime Points Per Game} = \beta_0 + \beta_1 \textbf{DraftNumber} + \beta_2 \textbf{DraftNumber}^2 + \beta_3 \textbf{Defence} + \beta_4 \textbf{DefensivePlay} + \beta_5 \textbf{FrenchCanadian} + \epsilon$$

Following the methodology put forth in previous works this is the first specification increase to the model presented in table 2. Again the sample contains only Canadians but now the 'DefensivePlay' variable is included in the regression. Based on past results, I expect this variable to be significant and have a positive β_4 co-efficient because a player that has a substantial set of defensive skills will have a relatively lower career point output. In terms of β_5, Lavoie (2003) found that French Canadians were undervalued at draft time when estimating this model but we shall see if this remains the case using more current data.

(2)

$$\textbf{Lifetime Points Per Game} = \beta_0 + \beta_1 \textbf{DraftNumber} + \beta_2 \textbf{DraftNumber}^2 + \beta_3 \textbf{Defence} + \beta_4 \textbf{DefensivePlay} + \beta_5 \textbf{Height} + \beta_6 \textbf{Weight} + \beta_7 \textbf{Penalties} + \beta_8 \textbf{FrenchCanadian} + \epsilon$$

The model becomes more elaborate here with the addition of 'Height', 'Weight' and 'Penalties.' Assuming height and weight proxy for physicality and defensive ability, I expect to see negative values for β_5 and β_6. I also expect a negative relationship between 'Penalties' and offensive performance for two reasons; firstly you can't score while in the penalty box and secondly 'Penalties' proxy for defensive ability and defensive players tend to score less. Interestingly enough, when these extra parameters are added in Lavoie (2003) 'DefensivePlay', 'Height' and 'Weight' are no longer significant but 'Penalties' is. 'FrenchCanadian' remains significant and we shall see if this result holds up.

(3)

$$\textbf{Lifetime Points Per Game} = \beta_0 + \beta_1 \textbf{DraftNumber} + \beta_2 \textbf{DraftNumber}^2 + \beta_3 \textbf{Defence} + \beta_4 \textbf{DefensivePlay} + \beta_5 \textbf{FrenchCanadian} + \beta_6 \textbf{European(Russians incl.)} + \beta_7 \textbf{American} + \epsilon$$

Here the sample is expanded to include all observations, and English Canadians are still used as the reference category. Lavoie (2003) found evidence of French Canadians and Europeans being underrated in 1994 with this model. I expect to see evidence of discrimination against Europeans (positive and significant β_6 term) in large part because of the presence of the KHL.

(4)

$$\textbf{Lifetime Points Per Game} = \beta_0 + \beta_1\textbf{DraftNumber} + \beta_2\textbf{DraftNumber}^2 + \beta_3\textbf{Defence} + \beta_4\textbf{DefensivePlay} + \beta_5\textbf{Height} + \beta_6\textbf{Weight} + \beta_7\textbf{Penalties} + \beta_8\textbf{FrenchCanadian} + \beta_9\textbf{European(Russians incl.)} + \beta_{10}\textbf{American} + \epsilon$$

I expect the results here to mirror those in regression **(3)** despite the addition of 'Height', 'Weight' and 'Penalties.' In Lavoie (2003), the addition of these parameters slightly decreases the β_8, β_9 and β_{10} coefficients but the results remain consistent.

Table 4:

(1)

$$\textbf{Lifetime Points Per Game} = \beta_0 + \beta_1\textbf{DraftNumber} + \beta_2\textbf{DraftNumber}^2 + \beta_3\textbf{Defence} + \beta_4\textbf{DefensivePlay} + \beta_5\textbf{FrenchCanadian} + \beta_6\textbf{Non-RussianEuropean} + \beta_7\textbf{American} + \beta_8\textbf{Russian} + \epsilon$$

(2)

$$\textbf{Lifetime Points Per Game} = \beta_0 + \beta_1\textbf{DraftNumber} + \beta_2\textbf{DraftNumber}^2 + \beta_3\textbf{Defence} + \beta_4\textbf{DefensivePlay} + \beta_5\textbf{Height} + \beta_6\textbf{Weight} + \beta_7\textbf{Penalties} + \beta_8\textbf{FrenchCanadian} + \beta_9\textbf{Non-RussianEuropean} + \beta_{10}\textbf{American} + \beta_{11}\textbf{Russian} + \epsilon$$

These regressions constitute the main departures from previous works. The 'Russian' variable is now added to see how much of the European bias was as a result of the Russian "KHL effect." I expect the β_9 term in regression (2) to become smaller relative to Lavoie (2003). I expect β_{11} to be substantial and significant because it should capture the distance (which is a barrier to effective scouting), the inferiority of the European Central Scouting system, and the aforementioned 'KHL effect'.

Table 5:

$$\text{Lifetime Points Per Game} = \beta_0 + \beta_1 \text{DraftNumber} + \beta_2 \text{DraftNumber}^2 + \beta_3 \text{Defence} + \beta_4 \text{DefensivePlay} + \beta_5 \text{Height} + \beta_6 \text{Weight} + \beta_7 \text{Penalties} + \beta_8 \text{FrenchCanadianDrafted} + \beta_9 \text{EnglishCanadianDrafted} + \text{NREuropeanDrafted}^4 + \beta_{10} \text{AmericanDrafted} + \beta_{11} \text{RussianDrafted} + \beta_{12} \text{OthersDrafted} + €$$

In order to test for the location of entry discrimination three regressions denoted A, B, and C in Table 5) are run as explained earlier. In each regression a reference category is established and the associated variable removed. This way, by evaluating the coefficients in front of the interactive variables, it can be determined which location discriminates against which group of origin. Lavoie (2003) posits that, as you add more variables to a model with limited observations, it can be difficult to achieve significant results. This is a danger faced here with such a small number of French Canadian and Russian Players. Also, the small number of Canadian teams makes for an even smaller cross sample of players who are both from one of these small groups and have been drafted to one of these small groups. In spite of these challenges I still expect to see evidence of discrimination against Russians and Europeans in Canada or in the United States.

3.3 Regression Results

The first step in testing of the evolution of entry discrimination is to repeat exactly past analyses of said discrimination with contemporary data and compare the results. Table 2 outlines the first and simplest measure of draft discrimination and can be compared directly to the results found in Lavoie (2003). The sample contains only Canadians so a direct empirical comparison can be drawn between French Canadians and English Canadians drafted at the same rank.

[4] NR represents Non-Russian.

Let's look first at the 'French Canadian' variable. In 16 years the value of the co-efficient has dropped from 0.122 to 0.0271 and the associated T-Statistic has decreased from 2.44 to 0.75. Ignoring the lack of significance, which may be because French Canadians represent only 6.4% of the sample, a French Canadian player will account for approximately 2 more points in an 82 game season than his English Canadian counterpart drafted at the same rank. This has decreased from a 10 point difference found in 1994.

Table 2

Draft Discrimination, Canadian players only. Dependent variable: Lifetime Points per Game. Reference category: English Canadians.

	2009-2010 $R^2 = 0.236$ N = 295	1993-1994 Adj $R^2 = 0.16$ N = 281
Constant	0.550*** (0.0233)	0.668***
Draft Number	-0.00281*** (0.000531)	-0.00228***
Draft Number^2	0.00000785*** (2.23e-06)	0.0000110**
Defence	-0.151*** (0.0255)	-0.230***
French Canadian	0.0271 (0.0362)	0.122**

Standard errors are in parentheses. Asterisks indicate one-tail statistical significance at the:
***1% level, ** 5% level, *10% level.

The 'Defence' variable has seen a slight decrease in its co-efficient size while remaining very significant. This could be explained because defensemen have become more offensive than they were 16 years ago. Now just playing the position of defence, which is the effect the

'Defence' dummy variable captures, doesn't decrease your offensive output as much as it used to.

I hypothesized that the relationship between 'Draft Number' and 'Draft Number squared' would be altered by the increasingly objective and efficient process of scouting. If the draft is becoming more intensive in the later rounds then the point where the inverse relationship between draft rank and lifetime points per game breaks down will happen later in 2010 relative to 1994. This should translate in to a bigger gap between 'Draft Number' and Draft Number^2'. In actuality it has increased by 0.00053 from 1994 to 2010. This may seem small, but when you derive it mathematically it translates to a substantial difference. For example if we set up the following parabolic function:

$$y = ax + bx^2$$

where x represents Draft Number and y represents Lifetime Points Per Game. In the model described in table 2 as we increase the draft number, we will decrease the lifetime points per game up until a minimum value for y. At this point the relationship loses its inverse properties and the curve will flatten. Intuitively this is the point where draft status is interchangeable. For example the average 150th pick will not drastically outscore the average 170th pick.

1993 – 1994	**2009 – 2010**
$y = -0.00228x + 0.0000110x^2$	$y = -0.00281x + 0.00000785x^2$
$\partial y/\partial x = -0.00228 + 2(0.0000110)x$	$\partial y/\partial x = -0.00281 + 2(0.00000785)x$
Set $\partial y/\partial x = 0$	*Set* $\partial y/\partial x = 0$
Therefore draft rank where y is minimized:	*Therefore draft rank where y is minimized:*
$x = 0.00228/0.000022$	$x = 0.00281/0.00000785$
$= 103.64$	$= 178.98$

Table 3

Draft Discrimination, Dependent variable: Lifetime Points per Game. Reference category: English Canadians. Defensive play variable included.

	(1) 2009-2010 $R^2 = 0.237$ N = 295	(2) 2009-2010 $R^2 = 0.301$ N = 295	(3) 2009-2010 $R^2 = 0.225$ N = 561	(4) 2009-2010 $R^2 = 0.285$ N = 561
Constant	0.548***	2.306***	0.545***	1.985***
	(0.0245)	(0.473)	(0.0200)	(0.355)
Draft Number	-0.00281***	-0.00295***	-0.00270***	-0.00285***
	(0.000532)	(0.000523)	(0.000400)	(0.000392)
Draft Number^2	7.98e-06***	8.43e-06***	8.38e-06***	8.69e-06***
	(2.24e-06)	(2.18e-06)	(1.69e-06)	(1.64e-06)
Defence	-0.154***	-0.134***	-0.156***	-0.136***
	(0.0272)	(0.0270)	(0.0198)	(0.0195)
Defensive Play	0.00947	0.0253	-0.0156	-0.00791
	(0.0266)	(0.0261)	(0.0194)	(0.0189)
Height		-0.0261***		-0.0198***
		(0.00784)		(0.00570)
Weight		0.000941		0.000111
		(0.00110)		(0.000681)
Penalties		-0.0578**		-0.0614***
		(0.0223)		(0.0177)
French Canadian	0.0281	0.0212	0.0232	0.0145
	(0.0363)	(0.0350)	(0.0371)	(0.0358)
European (Russians incl.)			0.116***	0.0706***
			(0.0213)	(0.0222)
American			0.0132	0.00981
			(0.0232)	(0.0224)

Standard errors are in parentheses. Asterisks indicate one-tail statistical significance at the: ***1% level, ** 5% level, *10% level. Columns (1) and (2) include only Canadian players. Columns (3) and (4) include the entire sample.

Based on this intuition, the draft remains statistically relevant to lifetime points per game for approximately 75 more picks than it did in 1994. This supports my hypothesis that late-round, low-cost prospects are more important now than they were sixteen years ago. They are being investigated more thoroughly because of salary cap restrictions and it is less expensive to do so thanks to technological advancements.

Table 3 incorporates some new independent variables in an attempt to increase the model's predictive power. Regressions (1) and (2) continue to focus on only Canadian players but now include the 'Defensive Play' variable as well as 'Height', 'Weight' and 'Penalties'. Height and Weight proxy for physicality in this scenario as bigger stronger players tend to hit harder and are more intimidating (Longley, 1995). In regressions (3) and (4) the sample is expanded to include all other players besides the French Canadians. The sample size increases from 295 to 561. Two new variables, 'Americans' and 'Europeans', are also introduced to see if either of these groups face any entry discrimination. In this model the 'European' category includes all Russian players. This is consistent with the approach used in Lavoie (2003) but later we will separate the Russians to see how much of the NHL's Central Scouting bias they incur on their own. In regression (1) the French Canadian co-efficient (0.0281) is much smaller than Lavoie's result from the same regression in 1994 (0.125). Also, where Lavoie (2003) found statistical significance at the 5% level none was found using current data. This is evidence against any central scouting prejudice directed towards French Canadian players. The other dependent variables carried through from table 2 remain unchanged. 'Defensive Play' is introduced for the first time but appears to have no significant effect here (t-statistic of 0.36). This is an interesting result because when Lavoie (2003) ran this regression in 1994, 'Defensive Play' was significant and positive. This lent evidence to the theory that highly skilled defensive

Table 4

Draft Discrimination, Dependent variable: Lifetime Points per Game. Reference category: English Canadians. Defensive play variable included. Russian players separated from European players.

	(1) 2009-2010 $R^2 = 0.253$ N = 561	(2) 2009-2010 $R^2 = 0.311$ N = 561
Constant	0.542*** (0.0201)	2.010*** (0.349)
Draft Number	-0.00268*** (0.000399)	-0.00284*** (0.000390)
Draft Number^2	8.44e-06*** (1.68e-06)	8.78e-06*** (1.63e-06)
Defence	-0.154*** (0.0197)	-0.133*** (0.0195)
Defensive Play	-0.0128 (0.0194)	-0.00469 (0.0188)
Height		-0.0193*** (0.00568)
Weight		-2.96e-05 (0.000681)
Penalties		-0.0608*** (0.0176)
French Canadian	0.0241 (0.0370)	0.0154 (0.0356)
Non- Russian European	0.0993*** (0.0225)	0.0884*** (0.0221)
American	0.0133 (0.0231)	0.00995 (0.0223)
Russian	0.197*** (0.0435)	0.194*** (0.0423)

Asterisks indicate one-tail statistical significance at the:
***1% level, ** 5% level, *10% level.

players were also above average offensively and star players were used regularly on the penalty kill. I believe this curious absence of significance can be attributed to a decrease in average shift length in the NHL. Data is only available as far back as 1997 but since then the average shift length has decreased by 7% (Gabriel, 2010). Because of this more players are being rotated on to the ice during both regulation and shorthanded play.

The adjusted plus/minus stat used to build the 'Defensive Play' variable is thus distributed over a larger sample of players per team and becomes less reliable as a predictor of talent. Regression (2) adds 3 new dependant variables, 'Height', 'Weight' and 'Penalties' but this does not significantly alter the results for 'Defensive Play' or 'French Canadian'.

In regressions (3) and (4) the coefficients in front of the 'French Canadian' variable are again small and insignificant. The 'European' variable provides some new and interesting insight however. In 2010 Europeans are underestimated by approximately 9.5 points per season in regression (3), and 5.8 points per season when the extra independent variables are added in regression (4). These are decreased from 13.7 points per season and 10.5 points per season in 1994, respectively. With the French Canadian and European coefficients shrinking relative to the 1994 data it is safe to say there is an overall decreasing trend of discrimination, which is consistent with the improved scouting theory put forth in this paper.

Although the overall trend is decreasing, the remaining evidence of discrimination against European players is still cause for concern. If technology were so good and scouting so efficient, why would European players still be underrated by between 9.5 and 5.8 points per season? The regressions in Table 4 depart from previous works and add a 'Russian' variable to test how much of these discriminatory practices Russian players are responsible for.

Separating the Russian and European players leaves the evidence of discrimination against Europeans relatively unchanged. This is most likely because although advances in scouting have decreased entry discrimination for these players since 1994, discrepancies may exist between the NHL Central Scouting system and its younger European counterpart. For instance the Central Scouting system employs fifteen scouts in North America but only five in Europe (Sirois, 2010). Also, the physical distance is still a barrier practically and financially when recruiting lower round picks.

Let's examine the 'Russian' variable. First note that they face the same distance barrier and European Central Scouting issues as the rest of the Europeans. This should yield similar numbers in terms of how underrated they are at the time of the draft; yet in Table 4 Russian players appear to be underrated by between 15.9 and 16.2 points (in an 82 game season). This is more than *twice* the discrimination faced by Western Europeans. What would cause a team drafting a player to pass up on an extra 16 points a season with no cost difference? This is the theory of the "KHL effect."

I believe the "KHL effect", combined with the physical distance and less intensive scouting that causes all Europeans to be underrated, is what accounts for the large amount of discriminatory evidence present in Table 4. What is encouraging is that an agreement was signed in October of 2010 between the KHL and NHL stating that they will now honour each other's contracts (Wiki, 2011). Hopefully, this eases some of the fear North American teams have when drafting Russian imports. In the next few years, we may see the coefficient in front of the 'Russian' variable becoming smaller and less significant.

The Location of Entry Discrimination

One final notion of discrimination against French Canadian hockey players remains. It was originally put forth by Longley (1995) and revisited by Lavoie (2003) that teams located in Quebec, now just the lonely *Canadiens*, are *more* eager to draft French Canadian talent and this is skewing league wide entry discrimination evidence. In Table 5, I repeat the methodology used by Lavoie (2003) to test for specific draft discrimination on the basis of location, but I also include a Russian interaction variable to see if any one area is more susceptible to the aforementioned "KHL effect."

Table 5

Draft Discrimination on the basis of the location of the drafting team, Dependent variable: Lifetime Points per Game.

	A $R^2 = 0.281$ N = 561 Players drafted by teams located in Quebec	B $R^2 = 0.285$ N = 561 Players drafted by teams in Rest of Canada(ROC)	C $R^2 = 0.280$ N = 561 Players drafted by teams located in USA
Reference Category	French Canadians drafted by teams located in Quebec	English Canadians drafted by teams in ROC	Americans drafted by teams located in the USA
Constant	1.751*** (0.367)	1.976*** (0.356)	1.925*** (0.353)
Draft Number	-0.00279*** (0.000399)	-0.00281*** (0.000399)	-0.00289*** (0.000396)
Draft Number^2	8.61e-06*** (1.67e-06)	8.62e-06*** (1.68e-06)	9.18e-06*** (1.66e-06)
Defence	-0.133*** (0.0198)	-0.138*** (0.0199)	-0.133*** (0.0196)
Defensive Play	-0.0166 (0.0192)	-0.00880 (0.0192)	-0.00567 (0.0190)
Height	-0.0171***	-0.0194***	-0.0182***

	(0.00582)	(0.00580)	(0.00573)
Weight	0.000310	0.000333	0.000105
	(0.000696)	(0.000694)	(0.000686)
Penalties	-0.0789***	-0.0726***	-0.0712***
	(0.0177)	(0.0177)	(0.0176)
French Canadian Drafted	xxxx	-0.121	0.0365
	xxxx	(0.0878)	(0.0450)
English Canadian Drafted	0.0155	xxxx	-0.0171
	(0.121)	xxxx	(0.0257)
Non-Russian European Drafted	0.317**	0.129***	0.0416
	(0.132)	(0.0490)	(0.0300)
American Drafted	0.0532	-0.0295	xxxx
	(0.131)	(0.0536)	xxxx
Russian Drafted	0.200	0.0961	0.195***
	(0.155)	(0.122)	(0.0512)
Others Drafted	0.0712	0.00527	0.0358
	(0.102)	(0.0302)	(0.0274)

Standard errors are in parentheses. Asterisks indicate one-tail statistical significance at the:
***1% level, ** 5% level, *10% level.

Let us look first at the variable at the heart of the matter, 'French Canadian Drafted'. Neither of the results are significant but because there were so few French Canadians drafted to these specific areas that is not surprising. It appears that French Canadian players are *overrated* in English Canada (co-efficient of -0.121, t-statistic of 1.38) – a rather strange and surprising result.

In terms of players drafted to Quebec, French Canadians do not appear to be overrated here. This is deduced from the lack of discrimination against English Canadians, who's representative variable has a coefficient of 0.0155 which is small and it is not significant at any level. English Canadians and French Canadians play in the same junior leagues so to overrate

one you would have to be underrating the other. Therefore there is no evidence of any pro-French Canadian drafting strategy in Quebec.

Let's now turn to evidence of the "KHL effect" in this location specific framework. It must be noted that these results are likely to be just as fragile as those obtained for French Canadian players, since the latter only represented 6.4% of the sample while Russians represent only 4.5%. That being said, there is still powerful evidence of discrimination against Russian and European players in Table 5.

French Canadian hockey brass does not appear to like Europeans or Russians because they undervalue them by 26 points and 16 points per season respectively. Although the 'Russian Drafted' variable in regression A does not appear to be statistically significant, it has a t-statistic of 1.29 which is high considering the small number of Russians drafted to these areas and the fragility of a regression this complicated. It seems that French Canadian players do not face prejudice because of the discriminatory rants by Don Cherry, but French Canadian front-office men subscribe to his beliefs.

English Canada, despite its reputation as close-minded and intolerant thanks in part to Mr. Cherry, is very friendly to the French and the Russians, yet still seem to underrate Europeans by 11 points per season at the time of the draft. This is discouraging but still less than the 13 points they faced in 1994. I expect this number will continue to come down as European Central Scouting becomes more efficient, but it may reach a floor as the physical distance barrier will always exist.

The "small-market" problem exists more prevalently in the United States so it is counter-intuitive that Europeans face almost no discrimination when drafted there. Perhaps the multicultural nature of the United States has put it on the forefront of draft ranking equality when

it comes to European players. Russians, however, face being underrated by 16 points per season at the time of the draft in the United States. This provides a shining example of the "KHL effect" as American general managers are hesitant to invest in Russian talent but have no issue with other European players.

5.0 Conclusion

After repeating previous experiments to determine if discrimination in the NHL has been evolving over time, it is quite apparent that it has. Europeans and Russians are still victims of their distance and cultural differences, but the "KHL effect" is now present. It plagues Russian NHL hopefuls and, because the KHL is composed of many nationalities, other KHL players with NHL aspirations as well. On the other side of the coin, there is the group previously victimized by America and English Canada, the French Canadians. After repeating the tests, not only do the French Canadian players face no discrimination, they may actually have a positive bias working in their favour within English Canada[5]. Quebec is also the region that seems to hesitate more than anyone else when it comes to drafting players from Europe and Russia.

It is my hope that as technology's role in scouting becomes more generalized, as the European Central Scouting body matches the NHL Central Scouting body in terms of thoroughness, and as the distance between the two hemispheres is shortened by cheaper travel and new technology we will see all of this bias melt away. In terms of the "KHL effect," hopefully the cease-fire signed in October of 2010 will see French Canadian and American general managers becoming more trusting of Russian players honouring their contracts.

[5] This result was approaching significance but only achieved a t-statistic of 1.48.

I am interested to continue with this topic by following the progress of the NHL vs. KHL turf war and seeing if any anti-Russian bias lingers when the dust settles. It would be interesting to see how many North Americans play in Russian junior leagues and vice versa and to see how it affects their draft status. In the short term, I would like to break Europe down into more sections to try and isolate more specifically the origins of entry draft discrimination. I would like to add goaltenders to the sample and find a way to incorporate undrafted players. Also, in the vein of Peter Tingling's work on team wealth and draft efficacy, I would like to see how entry draft discrimination is affected by team wealth and scouting budgets.

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