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Does it pay to win the Stanley Cup?

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Working paper 15 - 02

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June 9, 2015

Abstract

Yes, it does indeed pay to win the Stanley Cup (SC). Professional sports offer a unique opportunity to examine the relationship between a player's salary and their performance. Salary statistics have become widely available and enable individual performance scrutiny in relation to remuneration level. There is an extensive literature explaining which factors influence the players' salary in the National Hockey League (NHL), using data sets from different seasons and including various performance indicators. Although much is known about salary and performance in professional hockey, there is a lack of understanding and empirical evidence of the pecuniary value of winning the Stanley Cup (SC) - the trophy awarded annually to the NHL playoff champion and the ultimate prize in professional hockey. Our empirical analysis suggests that winning the Stanley cup the season prior to signing a new contract earns players a 19% wage premium on their next contract.

Keywords: National Hockey League, NHL, Salary, Stanley Cup, Hockey Analytics

JEL Classification: J24, J31, J33, J44, L83,

*Department of Economics, University of Windsor. lanoued@uwindsor.ca. A Major Paper submitted to the Faculty of Graduate Studies through the Department of Economics in Partial Fulfillment of the Requirements for the Degree of Master of Arts at the University of Windsor. I first wish to thank Dr. Trudeau giving me the opportunity to pursue a graduate degree in Economics and provided me with ongoing support during the process. Further, I would like to thank Dr. Arbex for his assistance, mentorship and critical analysis that helped bring this paper to fruition. I would like to thank Dr. Li for being the second reader and also offering her technical expertise in the econometrics field. I would also like to thank Dr. Dixon for his time and advice in the domain of salary determinants in the National Hockey League. Also, Kyle Raftis of the Sault St. Marie Greyhounds for his advice in regards to modern on ice statistics. I would also like to thank my friend Zack Kassian of the Vancouver Canucks for sharing his first hand experience in NHL contract negotiations and important factors to be considered. Additionally, I would like to offer a special thanks to Miro Koutaniemi of quanthockey.com for his assistance in historical data assembly.

1 Introduction

Professional sports offer a unique opportunity to examine the relationship between a player's salary and their performance. Salary statistics have become widely available and enable individual performance scrutiny in relation to remuneration level. There is an extensive literature explaining which factors influence the players' salary in the National Hockey League (NHL), using data sets from different seasons and including various performance indicators. Although much is known about salary and performance in professional hockey, there is a lack of understanding and empirical evidence of the pecuniary value of winning the Stanley Cup (SC) - the trophy awarded annually to the NHL playoff champion and the ultimate prize in professional hockey.

At the start of every NHL season, 30 teams are all pursuing one goal: winning the Stanley Cup. The pursuit of this goal requires the team to finish the regular season amongst the top 16 teams in the league allowing them to continue to the playoffs. The playoff format is as follows: teams play a best of seven game series in which the winning team advances and the losing team is eliminated. These hard fought series separate the contenders from the pretenders as key players elevate their game in pursuit of the SC. As teams are eliminated, NHL executives have fewer and fewer games to watch until there only remain two teams in the Stanley Cup final. Both teams making the Stanley Cup final would have fought hard through injury and controversy to get to this point earning the right to be the center of attention in the NHL. General Managers take note as to how these teams have come together and how valuable key players are to an organization. A player with championship experience brings a set of skills built through experiencing the rigors of playoff hockey. It is for this reason that we seek to determine if the additional experience players gain from being part of a championship team are then rewarded financially.

The data for this study come from tracking all new contracts signed since the latest Collective Bargaining Agreement (CBA) in 2013. This eliminates any bias or uncertainty regarding team's salary cap. Additionally, we limit our dataset to free agent signings only in order to eliminate any performance bias concerning players under long contracts. The main goal of this paper is to determine empirically whether or not winning the Stanley Cup impacts a player's salary. In order to do this, we explore various regressions varying player characteristics and performance indicators both previously

established as well as a few novel ones. We accomplish this using salary data available through ESPN.com's free agent signing page and performance statistics obtained from NHL.com.

In any professional sports, there exist a type of player that can bring a team together; there also exists players that can tear a team a part. If you are on a winning team, it signals others that you possess at the least, good team working abilities. This signal has been introduced in previous empirical analyses studying black player salary discrimination in the National Basketball Association (NBA) in the form of a "Champ" variable by Jenkins (1996). They state that the "Champ" variable serves as a proxy for both popularity and experience; a player with championship past is assumed to be quite recognizable to fans in addition to their champion's attitude. We intended to expand on this "Champ" variable, considering not only if a player has won a championship but when. Our results indicate that winning the Stanley cup the season prior to signing a new contract earns players a 19% wage premium on their next contract.

Recently, the there has been ample discussion about the place of hockey analytics in players' evaluations. In the baseball world, analytics are widely used and considered a reliable basis for talent evaluation. Although hockey is considered much more variable than baseball, making analytics less precise, we believe certain analytics can improve our understanding of a player's relative "zone dominance". The major analytic measurement that will be considered in this study is the Corsi statistic. Although this type of statistic seems promising for the future, our results indicate that the value of these statistics has not yet translated into wage premiums. As we show, the Corsi statistics does not have any effect on a players' wages.

Initial research into the relationship between wage and performance characteristics for NHL players was started by Jones and Walsh (1988) and was developed in order to determine if there existed salary discriminations towards French Canadian players. This line of thought continued for some time by Longley (1995), Lavoie (2000) and others yielding somewhat ambiguous results to their central question of whether French Canadian players were being discriminated against during contract negotiations. Although their conclusions may not always have coincided, they did develop a model that relates on ice performances to wage rate.

Certain key takeaways are clustering players into two groups such as "grunts" and "nongrunts", as shown by Jones, Nadeau, and Walsh (1997) who provided rationale for different pay structures

within the NHL. Following this research, Fullard (2012) showed that a hierarchical salary structure type does serve to predict a team's performance. Their ideas were built off Jones and Walsh' (1988) initial paper showing that the number of penalty minutes a player received throughout the year serves as a predictor of players who play with high intensity; the initial justification for the grunt player.

However, following the 2005 lockout in an attempt to increase scoring, officials implemented a zero-tolerance policy on obstruction penalties. The effect of such rule change is that slower players receive more penalties, and not necessarily the more aggressive ones. In an attempt to re-capture the aggressiveness of a player, we use additional playing statistics not previously available to rationalize grunts salaries within the National Hockey League. Our results indicate that player's considered to be Fighters earn a 14% wage premium and that the number of body checks delivered per game offers players a significant positive wage premium as well.

Winning the SC requires a plethora of tangible as well as intangible skills. McNamara and Collins (2013) find that although ideal psycho-behavioural attributes exist, champions do not follow an exact model but rather can compensate for their weaknesses in one area with strength in another. Therefore, evaluating these attributes becomes increasingly difficult. With experience, players can understand how to properly compensate for their personal weaknesses which has been recognized by Eastman and Vincent (2009) to play a significant role in determining player's salaries. We build on this thought by not only considering the "Champ" variable for players gaining experience through winning but also consider the number of playoff games played. We show that playoff experience is positively correlated to a players wage without showing signs of decreasing returns to scale. Similar relationship is observed with respect to regular season games played.

Often, players who possess a champion's set of characteristics are named captains. Deutscher (2010) finds that being the captain of a NHL team warrants a pay premium of 31%. However, because there is only one captain per team, non-captains must demonstrate their champion's attitude either by winning a championship or through a great sports agent capable of advocating and negotiating on a player's behalf. Due to the fact that the relative negotiation strength of sports agents has not yet been established we are limited to focusing on winning as the only signal players can make in contract negotiations.

In professional hockey, there is not a shortage of players, but there is a much higher premium

for individuals who are true game changers; the war for talent is around the absolute top talent, the differentiating talent. This is why elite players earn a much higher percentage of the salary cap then grunts players (Maxcy and Mondello, 2006). A high number of goals per game or All Star appearances allow top talent to differentiate themselves from the pack while grunt players have a much more difficult time distinguishing themselves. For this reason, we could consider winning the Stanley Cup an example of the "Matthew Effect" coined by Merton (1968), which follows the Principle of Cumulative Advantage. Merton's theory suggests that once a social agent gains a small advantage over other similar agents that advantage will compound over time into an increasingly larger advantage. Hence, by being part of a successful team a player develops winning attributes, gains exposure to other general managers, and also signals that a team can win with him on it.

Our findings demonstrate this principle by considering the average number of career games all retired NHL players have played. Since the formation of the NHL in 1917 a total of 865 different retired players have had their names engraved on the Stanley Cup. Data from all retired NHL players as of 2010 to have played at least 41 regular season games in at least one season show that SC winners play on average 60% more games than players who have not won it as shown by Figure 1.

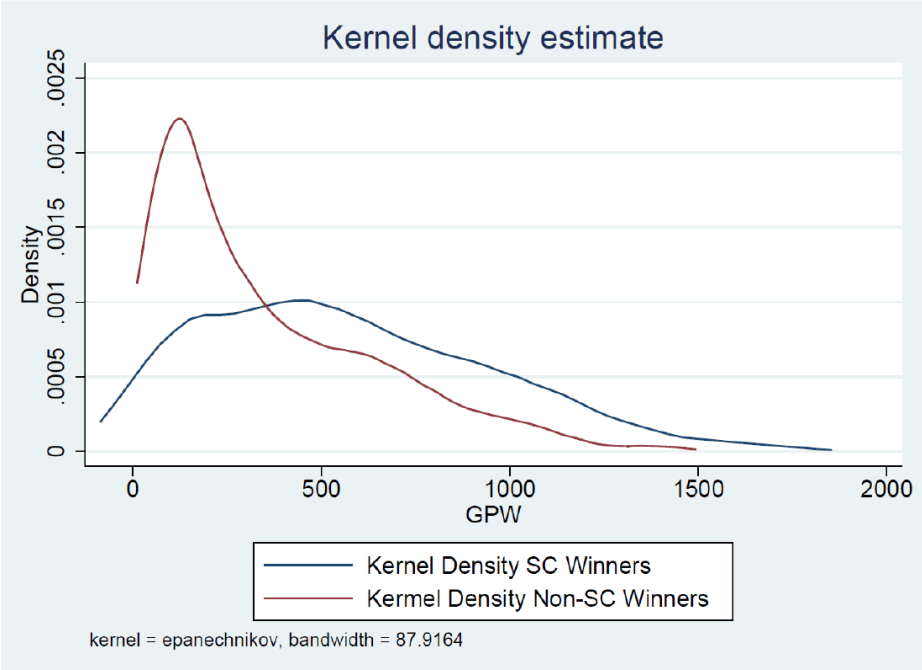

Figure 1: Kdensity of Career Games Played for SC Winners Vs. Non-Winners

The paper proceeds as follows. Section 2 presents the various performance indicators that were

observed as well as their justification. In Section 3 we present the results of the various regressions and the explaination of these results and Section 4 offers concluding comments.

2 Data and descriptive statistics

The Collective Bargaining Agreement signed on January 12th, 2013 determines the salary structure in the National Hockey League throughout the observed period. The agreement between the National Hockey League and the National Hockey League Players Association sets out the terms and conditions of employment including but not limited to minimum and maximum salaries as well as team salary caps as contract restrictions. The finer details regarding the CBA can be found at NHL.com/cba. The agreement expires September 15th, 2022 but either side has the right to terminate the contract after 8 years. It is for this reason that we only consider contracts signed since the implementation of the new CBA as general managers are now under symmetrical information regarding signing players to long-term contracts.

During the observed period the league minimum salary remained constant at $550,000 US dollars while the team salary cap, which is a function of league wide earnings, rose from one period to the next. For the 2013/2014 season the salary cap was set to $64.3 million US dollars and rose for the 2014/2015 season to $69 million US dollars. The average for the per season contract values of those players who signed during the observed period was $1,732,353 US dollars with the highest observed contract being $9,000,000 US dollars annually and the smallest being the league minimum of $550,000 US dollars.

The data used in our study contains individual performance statistics for players who have played a minimum of 50% of the regular season games in the National Hockey League the season prior to signing a new contract. The study focuses on contracts signed between the years 2013 and 2015. Due to the partial NHL lockout of the 2012/2013 season, our data set is limited to 48 regular season games for players signing a new contract in 2013 and 82 games for those who signed in 2014.

During the observed period, the NHL is composed of 30 teams with a total of 690 active players at any given time. Of the 690 active NHL players only 217 signed new contracts and met the criteria of our study. In 2013, the Chicago Blackhawks won the SC and in 2014 the Los Angeles Kings took the

title. Of those Champions, 7 players signed new contracts the off-season after winning. Additionally, 35 of the 217 players who signed new contracts during the observed period had won a Stanley cup at some point in their career prior to signing their most recent contract.

Individual player statistics were drawn from www.nhl.com/stats, the leagues official Web site, whereas advanced analytics were obtained from www.puckalytics.com. It is worthwhile noting that in the midst of the writing of this paper, NHL's official website has added an advanced analytics section that matched the results obtained through the Puckalytics website. Information on Stanley Cup Champions and salary information were obtained through www.quanthockey.com and espn.go.com/nhl, respectively. Our data set excludes goaltenders, as a completely different set of criteria for talent evaluation is needed as demonstrated by Fullard (2012).

We have limited our data set to include players who have signed new, non-entry level contract since the implementation of the most recent Collective Bargaining Agreement (CBA) in 2013. The limited data set should provide a more realistic fit between salary and performance for two reasons. First, following the new CBA, all General Managers have symmetrical information regarding the expected future levels of the salary cap. Symmetrical information creates a level playing field when deciding what value a player has to a team with respect to available salary cap space. It also eliminates players under entry-level contracts, which are restrictive and not based on previous performance. Additionally, only considering new contracts eliminates possible performance bias for players well into multi-year contracts either under or over performing their expected level when previously signed.

We investigate the importance of being part of a successful team using additional variables. By characterizing the performance of each players team the season prior to signing a new contract we can see at which point team success is rewarded financially to players. We isolate players into four groups: all players whose team the season prior to signing a contract did not make the playoffs, players whose team did make the playoffs, players whose team lost in the Stanley Cup final and those who won the SC the season prior to signing. We seek to determine if players on a team who make the playoffs benefit from increased contract negotiations as well as if that value is higher for players who win the SC. Additionally, we will investigate if players having won a Stanley Cup at any point in their careers prior to signing their most recent contract benefit from any type of wage premium.

While investigating the value of winning a Stanley cup, we also plan to expand on the existing

wage rate formula to determine the most appropriate statistical indicators of a players worth. The relative importance of these attributes was established by Dixon (2003) who studied the various player characteristics that numerous interviewed hockey experts believed should contribute to salary. These characteristics included mainly on ice performance characteristics and their influence on player's salary. Many of these characteristics have been previously established such as Experience, All Star, Points Per Game, Draft and Defensemen. Table 1 below presents the variables to be considered and offers an outlook into our sample.

Table 1: Variable Operationalization

Variable	Operationalization	Mean	Min	Max
Sc_1	Player's team won SC* (D; yes =1)	0.03	0	1
Sc_e	Player won SC ever (D; yes =1)	0.16	0	1
Playoff	Player's team playoffs* (D; yes =1)	0.65	0	1
Sc_L	Player's team lost SC final* (D; yes =1)	0.06	0	1
_13	New contract in 2013 (D; yes =1)	0.42	0	1
Toig	Average time on ice/game	15.56	6.22	25.11
Hitsg	Average number of body checks/game	1.26	0.10	3.68
Fighter	Fights per game $\geq$ 0.08 (D; yes =1)	0.12	0	1
Cf	Corsi for percentage	49.55	37.5	61.10
Cfreltm	Corsi for % relative to players team	0.07	-9.1	7.8
Bksg	Number of blocked shots/game	0.69	0.05	2.57
Cpgp	Career playoff games played	33.89	0	202
Crgp2	Squared Cpgp	2485	0	40804
Draft	Drafted first 2 rounds (D; yes =1)	0.46	0	1
DD	Defenseman (D; yes =1)	0.29	0	1
Crgp	Career regular season games	396.40	29	1391
Crgp2	Squared Crgp	255701	841	1934881
Allstar	All-star game apperances	0.13	0	8
Allstar2	Squared Allstar	0.02	0	64
goalsg	Goals per game	0.14	0	0.42
goalsg2	Squared goalsg	0.02	0	0.17
assistsg	Assists per game	0.24	0	0.83
assistsg2	Squared assistsg	0.06	0	0.69
Ptg	Points per game	0.38	0	1.02
Ptg2	Squared Ptg	0.19	0	1.04

* In the season prior to them signing new contract; *D:* dummy.

We believe additional parameters also contribute to a player's wage. These novel statistics include

for instance measures of the aggressiveness of a player. Previously, the number of penalty minutes was used to indicate aggressive play. However, as we have seen, recent rule changes have limited the merit in taking penalties. In an attempt to capture the aggressiveness of players and show the value of grunt players we move away from penalties as a measure of aggressiveness and replacing it with two variables. The first is a relatively new statistics: the number of body checks delivered per game. The second is a variable captures the threat of fighting a player posses'.

We consider a variable for all players who have at least 0.08 fights per game, as we believe the threat of fighting is still an attribute that is compensated in the National Hockey League and thus. This number captures those players who have the ability to fight while at the same time minimizing the importance of players fighting unnecessarily. The number 0.08 fights per game originates from capturing the top 40 players in respect to number of total fights over the course of an 82 game season and determining what the minimum number of fights per game was for that group allowing us to determine the fighter variable in a shortened season as 2012/2013 was. Furthermore, with the recent advances in data collection and analytics we are privy to certain variables previously not available.

The Corsi statistics is the most common hockey analytics measure in the sport today. The Corsi statistic was first conceived by Buffalo Sabers goaltender coach Jim Corsi who used it as a measure of the amount of activity a team's goalie faced. He believed that all shots directed toward the net should be accounted for whether they were on net, went wide or were blocked as the goalie needed to be prepared regardless. The statistic can be expressed in many ways, but we have chosen two: the Corsi for percentage and the Corsi for percentage relative to the team. First, the Corsi for percentage is calculated for an individual player and measures the total amount of shots directed to the opposing teams net divided by the total number of shots directed toward both nets while said player was on the ice.

$$CF\% = \frac{CorsiFor}{CorsiFor + CorsiAgainst} \tag{1}$$

We believe this alternative to the traditional plus minus statistic give a more accurate indicator of zone dominance, which demonstrates a player's ability to sustain pressure in the opposing zone. However, certain team's styles can lead to misinterpretation of the statistic as a player may have a low CF% but this may be the result of being a weak team or vice versa. For this reason we also investigate the Corsi For percentage relative to team. By adjusting the statistic we try to eliminate the bias of similar players playing on different style teams. The adjustment to a players CF% involved simply subtracting the teams overall CF%.

$$CF\%RelTM = CF\% - TMCF\% \tag{2}$$

We also feel that shot blocking is a skill that should be compensated and for this reason we include a shots blocked per game variable in our regressions when considering the Corsi statistics.

One of the major challenges in correlating player performance characteristics to salary is capturing the pay premiums paid to specialty players. There is little empirical evidence supporting the high

pay premiums for the shut down forward or defenseman who plays every shift against the opposing teams top players. These players often have below average Corsi for percentages and minimal goals per game. However, they still play an important role in the success of the team and are also compensated for their work. Therefore, in an effort to justify their value we consider the Time on Ice per Game variable (Toig). This variable benefits the shut down players that plays the hard minutes against the opposing team's top line and kills penalties. These players are considered dependable in the eyes of the coaches and although they often perform below their potential in regards to their goals per game they are still essential to a team's success. Therefore, we consider the time on ice per game variable for all players, which should greatly benefit players who play significant ice time.

Finally, Figure 2 compares the average salaries of SC winners to non-SC winners and provides clear evidence to justify the two types of players in the NHL. This is most clear in the non-winners group, as there exists two clusters of players namely grunts and non-grunts. Although the sample size is small for SC winners (35 players), Figure 2 also suggests that plays who fall into the grunt category and win a Stanley Cup seem to separate themselves from the group. It is for this reason that the cluster of players considered to be grunts is much smaller for SC winners than non-winners.

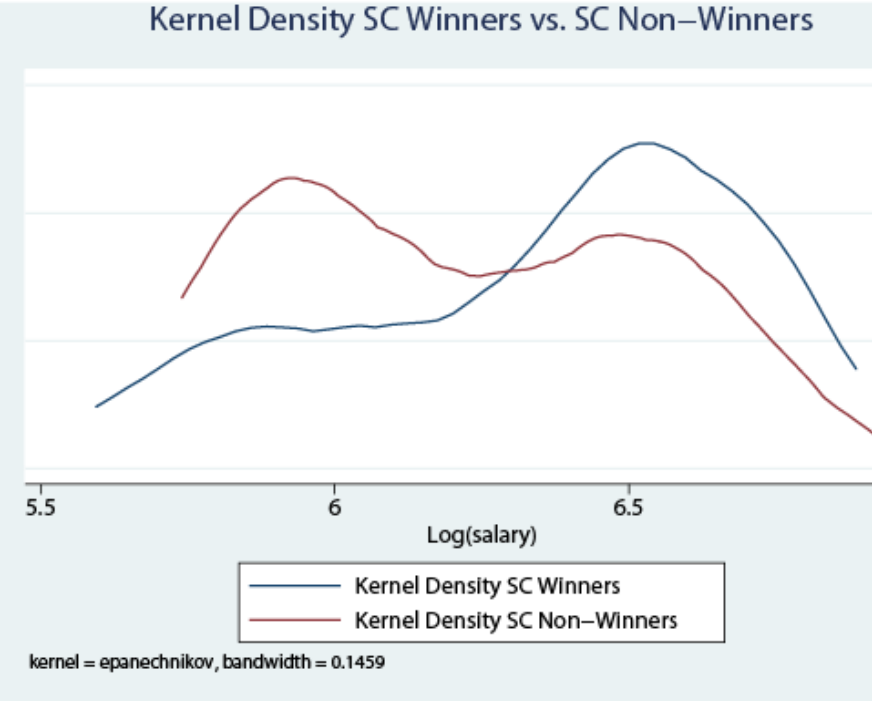

Figure 2: Kdensity Salaries of SC Winners vs Non-Winnners

As we have seen in Figure 2, for SC winners it appears as though a shift from the density of players falling into the grunt category to those players being considered non-grunts as far as salary is concerned. Other takeaways from the sample are that the average salary is \$2,217,218 for Stanley Cup Winners and \$1,652,061 for those who have never hoisted the cup. Additionally, the maximum value for Stanley Cup winners is \$5,500,000 whereas the maximum value for non Stanley Cup Winners is \$9,000,000. This again shows that the greatest beneficiary of winning the Stanley cup comes to

players falling in the grunt category as non-grunt all stars have already differentiated themselves but winning a SC allows grunts to separate themselves from the pack.

3 Empirical Analysis

Our empirical analysis is based on the standard Mincer (1974) wage equation:

$$\begin{aligned} Logsalary &= \alpha_0 + \alpha_1 draft + \alpha_2 goalsgame + \alpha_3 fighter + \alpha_4 toig + \alpha_5 hitsg \\ &\quad + \alpha_6 sc\_1 + \alpha_7 crgp + \alpha_8 crgp2 + \alpha_9 cpgp + \alpha_{10} ast + \varepsilon \end{aligned} \tag{3}$$

To determine the significance of the various indicators we apply the conventional ordinary least squared (OLS) model to our dataset. The results of the OLS regressions are presented in Table 2.

In order to measure empirically the effect of winning a Stanley Cup on a player's salary, we first needed to develop an appropriate wage rate formula. Reviewing the results of the three regressions, in Model 1, we apply previously established variables to our current dataset yielding an R2 value of 0.5445. The reason the R2 value is lower than in other studies using similar variables comes down to the nature of our dataset. First, our dataset eliminates the sample bias by excluding players under entry level contracts who salaries are limited and who also do not have many career games played. Secondly, with the advancement in the availability of on-ice statistics, general managers also have a much broader range of statistics to base their decision off of than simply goals and assists. While many of the previously established variables remained statistically significant in our final Model 3 such as Goalsgame, Allstar, Crgp, Crgp2 and Draft, others become insignificant namely Assistsg and DD as we add more modern statistics.

The second regression we consider, Model 2, we consider all variables both past and present that are believed to contribute to a players wage yielding an R2 value of 0.6564. From this regression many key takeaways can be drawn. The variable we believe to be most significant is the Toig, time on ice per game variable. The addition of this statistic greatly improved the adjusted R2 value but also rendered correlated variables no longer significant. An NHL hockey team is composed of three lines of defence and four lines of forwards; therefore, defence play more minutes per game on average than forwards.

In our sample defence played an average of 18.3 minutes per game while forwards played an average of 14.4 minutes per game; this difference allows the Toig variable to serve as a proxy for the DD variable. The second variable that lost its significance with the introduction of the Toig variable is assists per game. Assists per game is strongly correlated to time on ice per game; much more so than between time on ice and goals as demonstrated by the correlation values in the Appendix. In hockey, on each scoring play there is only one goal scorer but up to two players are awarded an assist making players who play a lot of minutes more likely to be awarded an assists statistically.

One of the possible new contributions to the wage rate formula was our investigation into advanced

analytics as a measure of zone dominance. Although the plus minus statistic has been shown to not be significant in salary determination we experimented with these advanced analytics namely the Corsi statistics in combination with shots blocked per game. However, as with plus minus these statistics were not shown to be significant in salary determination. One possible explanation is that they are still gaining popularity and general managers during our observed time period did not see the value in these statistics.

Table 2: Determinants of Player Salary in the National Hockey League

Variable	Coefficients (OLS)		
	Model 3	Model 2	Model 1
Sc_1	0.1895 (0.013)***	0.1438 (0.100)*	-
Sc_e	-	0.0182 (0.747)	-
Playoff	-	0.0305 (0.330)	-
SC_L	-	0.0594 (0.523)	-
Toig	0.0466 (0.000)***	0.0535 (0.000)***	-
Hitsg	0.0425 (0.026)**	0.0403 (0.043)**	-
Fighter	0.1344 (0.005)***	0.1488 (0.002)***	-
Cfreltm	-	0.0032 (0.510)	-
Bksg	-	-0.0599 (0.329)	-
Cpgp	0.0010 (0.066)*	0.0021 (0.150)	-
Cpgp2	-	-0.0000 (0.342)	-
_13	-	-0.04106 (0.151)	-0.0338 (0.283)
Draft	0.0495 (0.087)*	0.0503 (0.094)*	0.0276 (0.397)
DD	-	-0.0435 (0.490)	0.2153 (0.000)***
Crgp	0.0006 (0.000)***	0.0005 (0.007)***	0.0011 (0.000)***
Crgp2	-6.1e-7 (0.000)***	-5.08e-07 (0.004)***	-9.2e-7 (0.000)***
Allstar	0.0466 (0.075)*	0.1079 (0.095)*	0.1776 (0.006)***
Allstar2	-	-0.0091 (0.363)	-0.0162 (0.069)*
Goalsg	1.4550 (0.000)***	1.0750 (0.046)**	1.8640 (0.001)***
Goalsg2	-	-.01686 (0.892)	-0.4879 (0.729)
Assistsg	-	-0.0389 (0.913)	0.6838(0.063)*
Assistsg2	-	0.2082 (0.666)	-0.1964(0.710)
Cons	5.0651 (0.000)***	5.0660 (0.000)***	5.5640 (0.000)***
Adj R2	0.6513	0.6564	0.5445
# obs.	217	217	217

***,**,*: statistical significance at 0.01, 0.05 and 0.1 levels.

$P > |t|$ values in brackets.

As previously established, experience remains significant and shows decreasing returns to scale demonstrated by the Crgp2 variable in our log linear model. We can justify why regular season

experience shows decreasing returns to scale when we consider the fact that hockey is an extremely fast paced game. As a player ages gaining more experience, there is the possibility that they can no longer keep up to the play, decreasing their value significantly.

An additional experience variable was also added to the study namely Cpgp, career playoff games played. Career playoff games played is correlated with our SC_e variable as players who has won a SC would be expected to play a large number of playoff games. This could explain why the Stanley Cup ever variable was not found to be significant as its value is embedded within the Cpgp variable. When computing the average number of games played winning the SC, which is twenty two, we see that number of playoff games played in terms of Cpgp would earn the player a 2.25% wage premium.

Additionally, we found that the career playoff games played variable did not show deceasing returns to scale. This leads us to the basis of our paper, the value of winning a Stanley Cup the season prior to signing a new contract. In model two we introduced several team success dummy variables in an attempt to observe at which point team success translates into player compensation. With the SC_e variable we award a dummy variable to all players who have won a Stanley cup at any point in their careers and with the SC_1 variable a second dummy variable is assigned to players who won the Stanley cup the season prior to signing their contract.

We observe that winning a Stanley cup at any point in ones career is not significant in salary determination. However, winning the Stanley Cup the season prior to singing their contract was shown to earn players a 14-19% wage premium. This is significant as players on teams who simply made the playoffs were not shown to earn a wage premium as shown by the Playoff variable and even players who lost in the SC final series also did not earn a wage premium demonstrated by SC_L. Our empirical analysis suggests that winning the Stanley cup the season prior to signing a new contract earns players a 19% wage premium on their next contract as in our final wage rate formula, Model 3.

Another important takeaway is that our measures of aggressiveness namely Hitsg and Fighter we found to be significant in both models. We introduce the hits per game variable to capture the aggressiveness of a player without rewarding weak obstructions penalties which was shown to be significant. Additionally, we also show that the threat of fighting is still an attribute that is compensated as demonstrated by the 0.08 fights per game Fighter variable.

One variable that also remains significant even when we eliminated rookie contracts from our sample is the draft variable. When eliminating entry level contracts, where rookies drafted in the first two rounds earn higher salaries than others to begin with, we still see positive significance if the player was drafted in the first two rounds of their respective entry draft. The reason for this comes back to a player's pedigree, meaning that general managers may still believe the player has not yet developed to their full potential.

The All Star variable has been shown in the past to be significant in salary determinations, which is why we included an Allstar variable in our study. However, the variable we implemented was as determined by the Professional Hockey Writer's Association first and second team all-stars. The reason we chose to use this variable rather than simply taking the all-star game rosters is that certain

players may chose not to participate in the all star game while other may be voted in by fans. We believe that the 10 best players in the national hockey league each season were determined by this list and it was shown to be significant in determining salary without showing decreasing returns to scale.

As previously mentioned, the result of the 2012/2013 partial NHL lockouts in addition to the shortened season was establishing the salary cap from year to year based on league wide earnings which during our sample a movement in the salary cap was observed. Although one might expect the _13 dummy variable to be significant and negative as the salary cap was increased for the 2014/2015 season by 4.7 million per team we found the variable not to be significant. One possible explanation is that league wide expectation of the 2014/2015 salary cap was 71 million and general managers had most likely structured prior contracts to reflect that type of increase and when it did not increase to the same extent many teams found themselves in cap difficulties and perhaps did not offer the same type of increase in wage to players who signed contracts in 2014.

Although we have attempted to justify the value paid to shut down players using non-traditional statistical measures, they remain the most difficult player to justify statistically and contribute to a high error term. Our regression also faces certain limitations inherent to the complexity of contract negotiations and free market power. Additionally, one of the biggest determinants of salary is the level difficulty general managers have allocating the league implemented salary cap. The NHL salary cap is considered to be a "hard" cap meaning that no team is allowed to go over the cap at any point. The actual amount of the cap is determined from year to year based on past years league wide earnings making signing players to long term contracts an art in itself.

4 Conclusion

The main goal of this paper is to determine empirically whether or not winning the Stanley Cup impacts a player's salary. Using data from the 2012/2013 and 2013/2014 season as well as contract information from 2013 and 2014 we were able to show that winning a Stanley Cup has a 19% positive impact on players salary the season after winning. Additional takeaways from the study were that time on ice per game was positively correlated to salary and if a player is considered to be a fighter they earn a 15% wage premium over non-fighters. The study would benefit from a larger sample size with more SC winners signing new contracts but we believe that the benefit only considering new contracts and of having players signed under symmetrical information outweighs the cost of the small sample size. We also feel a valid expansion of the wage rate formula would include the level of connection the player's agent has and the effect of this on the players salary.

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