Does Order Matter? An Empirical Analysis of NHL Draft Decisions

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Structured Abstract

Purpose - This paper examines the effect of order on the quality of outcomes when making sequential decisions and tests the widely held belief that choosing earlier is preferable and results in better outcomes than choosing later.

Design / Methodology / Approach - Quantitative performance from the sequence of athletic decisions made by the teams of the National Hockey League (NHL) at the annual amateur entry draft is longitudinally analyzed using a participation threshold of 160 games.

Findings - Analysis indicates that earlier choice does result in outcomes that are significantly and substantially better but that this effect is muted beyond approximately the first 100 decisions, after which there is no discernable advantage.

Research Limitations / Implications - The dichotomous performance measure excludes more qualitative or stratified assessments of performance and does not include context of the individual decision choices. The results may not generalize beyond the National Hockey League or other human resource situations.

Practical and Social Implications - The research suggests that sequential decision processes are suboptimal in the presence of large amounts of information and choice. Recommendations include reallocating the amount of confirmatory attention spent on highly ranked candidates.

Originality - The research exposes limitations to the widely held belief that choosing earlier is preferable to choosing later.

Keywords: Athletic Draft, Moneyball, Scouting, Decision Making, NHL, National Hockey League.

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INTRODUCTION

Processes for selection of amateur athletes are important regulatory aspects of professional sports. Commonly referred to as "the draft", such processes are practiced by all North American professional leagues including the National Hockey League (NHL), Major League Baseball (MLB), National Football League (NFL), and the National Basketball Association (NBA) (Boyle and Haynes 2009). Because a major objective of the draft is to increase overall competition, common to all draft processes are mechanisms to increase the strength of weaker teams and to diminish higher performing teams (Booth 2004). Although each professional association has idiosyncratic characteristics and rules, the most common manifestation of this mechanism is the assignment of earlier choices to teams who have lower levels of winning performance and later choices to those who have higher winning performances (Siegfried 1995). This schema however is predicated upon the assumptions that the ordering has value such that earlier choices are preferable to later ones and that teams are able to exploit the benefits from earlier choices and in doing so improve their performance.

The purpose of this paper is to empirically test the first premise. Using data from the NHL we examine the commonly held belief that the quality of draft decisions successively diminishes. The results have implications for overall draft governance, management of individual teams, and economic negotiations with athletes.

We proceed as follows. The next section provides an overview of the NHL Entry Draft, salary cap, and processes used to evaluate athletes. We then describe the various data and

analysis. We continue with discussion of the findings and conclude with implications and future research.

ATHLETE SELECTION

Entry Draft

The mechanism by which amateur athletes become associated with North American national hockey teams was initially known as the Amateur Draft. Created to enable member clubs to eliminate sponsored or captive amateur teams (Diamond, Duplacey et al. 2000), the draft began in 1963 as an informal meeting among the original six teams of the NHL and was renamed the "Entry Draft" following amalgamation of the defunct World Hockey Association (WHA) in 1979. Proceeding as a series of rounds where the thirty teams consecutively choose from a diminishing pool of eligible players, the draft is held at the end of each season and is a widely anticipated two-day event that draws thousands of fans and a great deal of speculation and interest where teams carefully guard their choices (Kurtzberg 2009).

Draft order is determined in two stages: the first involves the bottom fourteen teams that failed to make the playoffs and incorporates a lottery element designed to reduce the intentional losing of games by teams seeking to improve their draft order. In the second stage, the remaining sixteen teams are assigned selection orders based on their regular season and playoff performance.

Selection begins with the team that holds the right to choose first and continues sequentially until all teams have completed their choices when the next round begins. Generally each round proceeds in the same fashion although this is not always the case. For example, in 2005 the second round operated in "zipper style" or reverse order such that the holder of the first

pick did not choose again until the sixtieth pick and the team with the thirtieth pick made the sequential thirty-first pick, a change that continued for each alternating round. The specific number of draft rounds has also varied. Beginning with four rounds, the number of rounds increased to twenty-five in 1974 but was fixed at seven in 2005. Normally a round consists of one assigned choice per team and a current total of thirty selections but the specific number can vary. Teams may forfeit their choices because of prior infractions or may be assigned extra selections as compensation for abnormal events such as the inability to sign a previously selected player.

While the right of a team to make a particular choice officially remains with the team to which it was originally assigned, early choices are highly valued (Gerchak, Mausser et al. 1995). Teams often trade, sell, or otherwise assign their pick order. Many of these reassignments occur during the draft or as part of multi-player trades. General Managers who anticipate that a desired player will be selected early frequently "trade up" in order to increase the likelihood that the desired player will be available while those whose selections are expected to be less desirable may "trade down" to maximize the utility of their choices.

Salary Cap

Salary or wage caps are mechanisms designed to increase profitability and decrease the performance gap between teams by reducing the ability of affluent (large market) teams to purchase or capture a disproportionate amount of talent (Booth 2005). In conjunction with the salary cap, North American sports often include a floor, which operates as a minimum payroll. Although the NHL did operate with a salary cap for a brief period during the 1930s, salary controls were strongly resisted by the NHL Players Association and were not re-implemented

until two highly acrimonious player lockouts in 1994 (Cimini and Muhl 1995) and 2004 (Staudohar 2005) which ultimately resulted in the NHL becoming the last major North American professional sports league to adopt a cap or luxury tax (Edge 2004).

In 2009 the NHL salary cap was $56.7 million (figures in USD), the floor was $40.7 million, and the maximum that could be paid to any individual player $11.34 million. The NHL salary cap is a fixed or hard cap because compensation is averaged over the length of the contract and a team's ability to allocate salary to the years where they have more room is limited. At the end of the 2008/2009 season, four teams were at the cap or had less than $100,000 in eligible compensation room. One team had insufficient capacity to complete its full rooster of players in the last few games of the season. No team was at the floor although five had $10 million or more available compensation room.

Athlete Evaluation

Monitoring and the evaluation of amateur athletes is done in three ways.

First, each NHL team operates a captive scouting function of full and part-time scouts that attend games and provide private information to team management. The commitment to scouting varies (Shoalts 2010) and the nature of private ownership makes it difficult to assess the extent and size of each scouting department but an annual scouting expenditure of an average NHL team was estimated at several million dollars (Joyce 2007).

Second, Central Scouting, a common scouting service, was established by the NHL in 1976 to serve its member clubs. Central Scouting consists of a director and twenty-three full and part-time scouts that focus exclusively on amateur athletes. It provides clubs with weekly injury and player movement, video footage, and player rankings to aid teams in draft decisions. Central

Scouting also administers the Combine, an annual event that brings their top one hundred prospects for a formal evaluation and review. The Combine provides medical and fitness tests for each of the athletes and allows team management to conduct individual interview and orientation sessions. Eagerly anticipated by the athletes, teams, and the general public, Central Scouting creates two lists of their 210 North American amateur skaters and top thirty goalies that are advertised as a *"second opinion"* and an *"aid* [to teams] *in making their own evaluations*" (Kimmelman 2009). Central Scouting focuses on North American athletes but operates in partnership with a third party agency that provides a similar service for European athletes.

Third, a variety of professional firms and consultants join thousands of amateurs who add their opinions on who are the highest performing players and their relative ranking. This may be viewed as direct competition with and a complement to a team's individual scouting efforts and Central Scouting.

Although managers are expected to use traditionally rational analytic methods to make decisions (March and Heath 1994), there is no single theory for decision making (March 1988) and there can be a wide dispersion in the managerial abilities available to each team (Fizel and D'itri 1996). The well-known and often cited success in the analytic approaches used by baseball's Oakland Athletics' general manager Billy Beane, described under the rubric of "Moneyball" (Lewis 2003; Wolfe, Babiak et al. 2007), has had little impact on other sports organizations which have been slow to change (Kikulus, Slack et al. 1995; Kikulus 2000). Analytics, now well established in baseball, have recently been applied to basketball (Lewis 2009) but adoption in hockey has been much slower (Mason and Foster 2007). Empirically, there have been few published studies that validate the performance of drafted NHL players (C.F. Dawson and Magee 2001 for a study on the value of European players) although an in-depth

journalistic evaluation of the scouting processes in place at one of the lower performing franchises described them as a "coffee and caffeine fuelled crap shoot" (Joyce 2007; Mackinnon 2007) and hockey insiders have referred to the processes as "guesswork" (Dowbiggin 2003: 182).

RESEARCH HYPOTHESES

The NHL Entry Draft is the main avenue for recruitment of new talent into the league. Teams invest considerable resources to identify players that they expect will become successful. The challenge for this research is the definition of a "successful" draft pick. Three possibilities exist: 1) on-ice performance, 2) financial measures such as compensation, 3) games played.

On-ice performance typically includes attributes such as scoring (goals, assists, and points) or per game scoring averages. However, disadvantages of scoring totals are they may not account for the variety of team roles and they may preclude direct comparison. Centre positions for example typically contribute more points to a game than other positions. Similarly, other players could play highly defensive roles with a focus on reducing the opponent's offensive capabilities. Accordingly, such players could be considered valuable despite their lack of points. Various metrics have been developed that attempt to address these deficiencies. Aggregated measures such as "Ice time", "Goals while on Ice", "Plus-minus", "Shots on Goals", "Corsi" (Named after goalie coach Jim Corsi, this tracks the net combination -plus and minus- of the shots on goal) and "Penalties in Minutes" (Desjardins 2009), are frequently promulgated as variables that capture the essence of a player's ability in a single comparable measure. However, such measures have yet to be proven across a broad sample. The relative newness of these proposals precludes their use in longitudinal research due to lack of data. Missed shots, for

example, are only available for more recent games. Changes in the game itself have also reduced the efficacy of complex measures in longitudinal analysis. For example, not only have rule changes in areas such as the size and weight of goaltender equipment affected the game but the style of play has become more defensive with teams focusing on reducing the opposing team's scoring opportunities (Kreiser 2004) and the average goals per games between 1981 and 2004 declined from 4.0 to 2.7 (Desjardins 2009).

Financial measures such as compensation similarly present challenges to longitudinal analysis. Free agent salaries may represent a single objective and uniformly comparative measure of a player's contribution to a team; however, its use is complicated by the variability in a team's ability to pay and overall changes in the economics of the sport. Until the imposition of a salary cap, large market teams were able to buy up talent even if it did not result in overall team success (Devine and Foster 2006). Similarly, salaries escalated from $200 million to $1 billion in the decade prior to the implementation of the salary cap with more than 350 players earning $1 million or more (Dowbiggin 2003). A relationship between compensation and performance may be argued but it is far from a perfect measure as it does not compare well across teams or over an extended period of time and there has been a number of high profile expensive draft decisions that failed to achieve their expected performance (Joyce 2007).

Given the disadvantages of using performance based and financial analysis to compare the success of draft picks, the remaining choice is the number of games played. This is not without criticism (because it is a binary measure, having only one second of play will result in an athlete receiving credit for a full game) but it is an attractive measure for four reasons. 1) It is simple, verifiable, hard to manipulate, and the presence of consistent information lends itself to longitudinal analysis. 2) It is more directly comparable across position and teams. 3) Players that

do not contribution to a team are unlikely to accumulate a high number of games. 4) The NHL and NHL Players' Association (NHLPA) consider the number of games played to be a key metric. For example, participation in 160 games is required to earn a full NHL pension (NHL 2005) and is the number of games that a successful player could participate during the 82 game season of a three year average contract.

The simplest form of this measure, playing in a single NHL game, leads to our first hypothesis:

> H1: Players drafted in an earlier round will have higher success rates (percentage of picks playing in at least one NHL game) than players drafted in later rounds.

This hypothesis implies that players selected during the first round are expected to have higher success rates than those players drafted during the second or later rounds. The implication continues for all rounds such that players selected in the penultimate round will have higher success rates than those selected during the last round.

Playing in a single NHL game is the measure that Central Scouting uses to measure its own success and is no doubt a high level of achievement; however it is not a realistic indication of success. Managers may face internal pressures to provide tryouts for draft picks and draft picks may be subject to sunk cost bias (Staw and Hoang 1995). Furthermore, many draft picks could reach the one game threshold because of ease of substitution, for example, on a limited basis to replace an injured regular player in the early part of the season. This is evident from a comparison of average career lengths for drafted players participating in at least one NHL game (41.7%) versus those players competing in at least 160 games (20.1%) as shown in Table 1. Raising the threshold to 160 games leads to our second hypothesis:

H2: Players drafted in an earlier round will have higher success rates (percentage of picks playing in at least 160 NHL games) than players drafted in later rounds.

Insert Table 1 around here

Both H1 and H2 compare success rates of draft picks per round. However, beyond the variance in the decision choices between rounds, General Managers trading within rounds suggest that quality of a draft pick is subject to intra round variance. A test for each decision within each round would require substantially more data than is available to the researchers. Nevertheless sufficient data exists to conduct a power test for half round tranches (decision increments of fifteen athletes) and one-third round tranches (decision increments of ten athletes). This leads to the two variants of the third hypothesis applied to draft rounds that show variance to their preceding round.

H3a: Players drafted in an earlier half round will have higher success rates (percentage of picks playing in at least 160 NHL games) than players drafted in later half round increments.

H3b: Players drafted in an earlier one third round will have higher success rates (percentage of picks playing in at least 160 NHL games) than players drafted in later one-third rounds.

METHOD

Data

Data for this study were acquired from publicly available statistics and information provided by the NHL. A list of players who participated in each draft between 1978 and 2008 were assembled and cross-referenced. Data were manually groomed to correct for duplicate entries and incomplete information. The total data collection amounted to 7,707 records

consisting of players names, draft year(s) in which they participated (un-signed athletes are eligible for re-entry), the absolute order in which they were drafted, the round of the draft in which they were selected, and the team and general manager who made the selection. This data were merged with information from the NHL Player database to determine number of games each player has played in the NHL and the season of their first and final games, if applicable.

The data set was truncated to increase reliability. Data were excluded in order to obviate major changes in the entry draft rules, inclusion of professional players from a competing professional hockey league such as the WHA, and insufficient time to accurately measure the dependent variable (number of games played) for recent draft years.

Data earlier than 1981 were removed because of the collapse of the WHA and the amalgamation of some of its teams into the NHL. The draft rules were changed to allow teams to draft players who previously played professionally in the WHA. Therefore, the 1979 and 1980 drafts would have included a higher proportion of proven professional players expected to have prolonged NHL careers than in subsequent draft years. In addition, the entry draft rules were changed in 1980 that set a minimum age of 18 for players to be draft eligible. Data from 2004, the year of the labour dispute, were excluded as were draft data from 2005 to 2008 because players would not have had the opportunity to accumulate played games. However, performance data for these years were retained for all players drafted prior to 2004. Draft rounds were standardized to thirty choices per round to match the current number of NHL teams and draft rounds nine and ten were excluded because they did not have sufficient power for the statistical tests. Coincidentally, the NHL reduced the draft to seven rounds in 2005. Highlights of the data used in this study are described in Table 2.

Insert Table 2 around here

Analysis

Draftees who fail to play a single NHL game represent 58.3% of the 1981 to 2003 data (3,486 players) and clearly represent selection failures. Players who participated in at least one game of the NHL regular season for each round were calculated as were those who participated in 160 or more games. This is illustrated in Table 3, **Error! Reference source not found.**, and **Error! Reference source not found.**. Table 4 and Table 5 display success means for draft picks grouped by half rounds (fifteen selections) and one-third rounds (ten picks) respectively for the purposes of comparing within round variations.

Insert Tables 3, 4, & 5 and Figures 1 and 2 around here

Results

Draft success means by round were analyzed using SPSS univariate statistical analysis. The analysis was used to compare draft success means across rounds for picks participating in at least one NHL game to test H1. The results are displayed in Table 6. The table lists the p-values analysis matrix using the Scheffe post hoc test for comparing rounds. The results provide partial support for H1. Success rates of each of rounds one through four are statistically different from other rounds ($p = 0.00$); however, success rates between rounds five through eight are not statistically different (p-values range from 0.1 to 1.00).

Insert Table 6 around here

Table 7 displays univariate analysis results for draft picks having played more than 160 games. Results do not fully support H2. For example, round 1, as expected, has significantly higher success rates than other rounds ($p = 0.00$ across all rounds). Interestingly, round 2 and 3 are not different ($p = 0.49$) whereas round 3 is significantly different than round 4 ($p = 0.01$). The

data illustrates that beginning with the fourth round, no rounds have statistically different success rates (p-values range from 0.61 to 1.00).

Insert Table 7 around Here

Having established lack of differing success rates between rounds 5 through 8, intra round analysis focused on the first four rounds only. Table 8 illustrates the results for half round comparisons while Table 9 displays one-third round comparisons. Results show a further concentration of significant differences in success rates. Half round analysis indicate significant success rate differences up to the first half of the second round ($p = 0.00$) whereas the one-third round comparisons only show significant differences in the top two-thirds of the first round ($p = 0.00$). Therefore, H3a and H3b are not supported.

Insert Tables 8 and 9 around here

DISCUSSION

Consistent with expectations, the data show success rates of players drafted in the first round are significantly different from those players drafted in each of the successive rounds. 90.6% of the players who are drafted in the first round play at least one game in the NHL and 64.1% have a career lasting 160 or more games. This is substantially greater than the 65.1% of players drafted in the second round who play at least one game and 28.6% who have a career of 160 or more games. This aspect of the research is consistent with the underlying premise of the draft – that earlier choices are preferred to later ones.

Despite the occurrence of few high profile disappointments, the over-whelming majority of elite athletes drafted in the first round rarely present surprises. The level of scrutiny that they have received is extremely high. Players who are likely to be selected first are usually in

attendance at the draft and decisions are broadcast live and repeated in various telecasts. All of the first round draft picks have received copious amounts of media attention and provided scouts with numerous opportunities to confirm their earned position as high performance athletes. Players in the second and third rounds show a marked decrease in the percentage of those who play at least one game (65.1% and 51.4%) but it is in the percentage who play 160 or more games where the attrition is more fierce, dropping to 28.6% and 23.5% respectively.

These results suggest the appearance of a "draft round effect" where early round players receive greater and disproportionate opportunities to play in the NHL. The success percentage for both a minimum one and 160 games played declines until the fifth round where it remains constant for rounds five and six at 29% for a minimum of one game played and 12% for minimum 160 games played and then drops again for the final two rounds. This is consistent with the "sunk cost" effect observed in NBA decisions where NBA players are given game time that correlates with draft order rather than performance (Staw and Hoang 1995).

The sunk cost effect, however, has been shown to be smaller than initially hypothesized (Camerer and Weber 1999) and may be less salient in hockey given the higher number of draft rounds and the fact that NHL managers can develop and occupy their draft picks in affiliated teams, an option that is not available in the NBA.

As illustrated in Table 7, the mean number of the thirty athletes drafted in each round having played more than 160 games, declines from a high of 19.23 players in the first round to a low of 2.16 players in the seventh round. The fact that the number rises in the last and final round, while not statistically significant, is consistent with research which shows that athletes awarded last are often more satisfied than those selected or awarded earlier (Medvec, Madey et

al. 1995) and may reflect this with increased effort. The recent reduction of the draft to seven rounds implies that future research will be required to determine if seventh rounds picks outperform sixth round choices.

The notion of players belonging to a particular draft round has a certain cachet even though the demarcation of each round is somewhat arbitrary and there is little reason to believe that the thirtieth player is significantly better than the thirty-first. Table 8 and Table 9 illustrate that intra-round variance only exists within the first round and the first half of the second round. This finding is inconsistent with the underlying and widely held premise of the draft in which earlier choices are universally preferred over later ones. While the perception is that earlier decisions are better than later ones with the exception of the first round (and noting that within this round that there is significant inter-round variance), the data suggests that decision makers who choose earlier are not necessarily more successful with their choices than those who select later.

There are a number of explanations for these findings: the first is that decision makers are only able to focus their attention on a subset of the few hundred athletes who make up each annual cohort. This is consistent with s studies that have shown finite limits on cognition and the ability to concurrently maintain more than approximately 150 relationships (Dunbar 1992). Scouts observing the highly dynamic and complex game of hockey must evaluate players on a matrix of more than 30 varying criteria, a process that can be cognitively taxing especially when combined with the high number of players and observed games. For example, Central Scouting's twenty-three scouts collectively observe more than 3,000 games per year, many of which involve travel to remote and distant arenas. Over a four-year period (2004 to 2008), each of the ten

scouts for one NHL team annually created over 1,000 scouting reports and evaluated more than 350 unique players.

As such, it is understandable that teams focus their attention on a subset of players with whom they develop a closer association. The first thirty players who have a consensus view of being "first rounders" followed to a lesser degree by another sixty or seventy secondary players and leave the rest of the prospects largely on their periphery. This attention deficient is exacerbated by a natural desire to overly focus on the most elite athletes enabling a situation where scouts are creating future memories where they can recount each time they see the elite athletes play before turning professional.

Conversations with NHL General Managers support these findings. We provided preliminary copies to a convenience sample of ten NHL teams with whom we came into contact as a result of this research and a common response was that except for the high profile athletes likely to be selected in the first round they lacked first-hand knowledge of most of the players and instead relied upon the input of their scouts and support staff. Conversations with team scouts, scouting services, and NHL management confirmed a tendency to repeatedly observe the same players. Team executives expressed common difficulty in determining the marginal utility of information gathered from additional observations of highly ranked players compared to the value of new information about lesser-known athletes, a problem exacerbated by the identification of the "elite 100" at the annual combine exposition.

E. J. McGuire, NHL director of scouting, suggested a further explanation for the relatively low overall rate of drafting success (private communication, June 3, 2009). He noted that rather than working forwards from the number of drafted players who "make it" to the NHL

(43.5% or ninety-one players based on a minimum of one game played), a similar value could be determined by working backwards from the number of athletes required to maintain the natural replacement rate. Dividing the total number of players in the NHL (690 based on a thirty team twenty-three player roster) by the average length of a player's career (5.49 seasons) yields an average number of new players needed each season – approximately 125 players (QuantHockey 2009).

This form of analysis suggests that the only way to increase the percentage of drafted players who succeed in the NHL is to reduce the number of players who participate in the draft. This would not necessarily have any effect upon the success rate of the draft order, but suggests that there is little advantage to maintaining seven rounds. Viewed from this perspective, the overall success rate cannot be used as an indicator of overall quality. Instead, stronger indicators of overall draft failure are the number of undrafted players who later achieve success and the number of early selections that fail to achieve the results suggested by their draft order. Conversely, consistently discordant draft picks with desirable results – neglecting to draft high order players that subsequently fail to achieve or drafting late players that achieve success are indications that a team may have better processes for the identification of talent and decision making.

LIMITATIONS & FUTURE RESEACH

Two limitations of this research are the selection of the dependant variable and the time period under study.

The use of the number of games played as a proxy for draft success may be criticized for a number of reasons. Beyond those previously discussed are assumptions that players are a

fungible commodity such that drafted players are numerically comparable, that the percentage of drafted players can be compared across teams, or that they are comparable each year. While these criticisms are valid it is also true that the benefits of increased sophistication such as measuring draft success by round or by type of drafted players have not yet been established. A single objective measure remains elusive and will no doubt generate controversy and raise additional questions (Oliver 2004).

Second, the use of such longitudinal data can be problematic when the time frame is subject to change and raises the use and appropriateness of censored data. This concern is mitigated by the fact that comparative statistical tests were conducted before excluding data. For example, analysis was completed with and without the years involving the WHA merger (1979 and 1980). In all cases, the results were essentially unchanged. The only instance where the multiple analyses were not done was in the decision to end the inclusion of draft data at the most recent labour dispute (2004-05). However, this time period allowed sufficient time for players to achieve the 160 game performance measure while simultaneously avoiding the confounding effects and complexity of a missed season.

Future research could examine the extent to which these results can be replicated when using measures other than the number of games played and the extent to which the effects are found in other sports (and other businesses in general). The fact that all teams operate scouting departments (albeit at varying levels) suggests that General Managers believe that they can outperform Central Scouting. Yet among the more than twenty-four of the thirty teams with whom we have spoken none have measured their effectiveness. If a team's scouting division does not yield better results than the Central Scouting recommendations the question as to why they exist remains. Furthermore, while some teams may consistently draft good players, the more

important question for General Managers is the extent to which they can incite the athletes to perform at a high level, and to either retain or trade them at the correct value.

CONTRIBUTION AND CONCLUSION

The unexpected findings that decision order matters but only primarily in the first round is important to research and practice. For research, while it is acknowledged that decision makers are not economic automatons (Bell, Raiffa et al. 1988), the study suggests that sport decision makers may be less analytic and traditionally rational than expected. A preference for early rather than late decisions in drafting is taken to be self-evident and the fact that general managers frequently swap, sell, or otherwise assign value to these decisions confirms their perception of their importance. The data, however, suggests that this value might be misplaced for decisions beyond the second round for the league in aggregate. This also suggests that evaluation and selection processes as well as trading strategies have substantial room for improvement with implications affecting team management, players, and governing bodies.

For team management, the results confirm the importance of the first round of the draft and the overall value of choosing earlier rather than later for this round. However, the lack of a statistically significant difference between the second and third rounds or between the fourth through eighth suggests that teams may have the same probability of getting a "successful" player in the third round as they do in the second half of the second round or between the later rounds. This has significant implications to draft trading strategies and valuation of non-first round choices. Teams may realize significant benefits from having private information if they are able to focus additional attention on later round choices and are able to extract value from choices that appear to be interchangeable. The high level of inter-round variance in the first three

tranches of the first round also suggest significant and stratified valuations that can be placed upon decision orders.

For players, the research suggests that although being chosen early in the first round is a strong indicator of capability, the reverse may not be true. Expectations of future success do not uniformly diminish through draft progression. This has implications for contract negotiations and agents that are able to understand the draft history of a team or general manager. The team that selects a player may be more important than the round in which the player is selected if this is subject to variation across teams or general managers.

For governing bodies, the research suggests that if the objective continues to be the redistribution of talent then organizations such as Central Scouting are of particular importance because some teams are often unable to match the scouting infrastructure of high value franchises even if such investments are misplaced. The research also highlights the importance of focusing attention deeper in the draft. Scouts and teams should consider that the marginal utility of additional confirmatory information on the top thirty or fifty players is less than the value of new information on the players ranked lower in the draft. This will be of particular importance to mid performing teams since they will generally not be assigned the early picks while at the same time they may lack the developmental infrastructure, financial resources, or attractiveness of high performing teams. One option that the league may consider is to return the number of rounds of the draft to four given that the later rounds of the draft have not been able to identify and isolate hockey talent. This limitation is similar to that which exists in basketball (where the draft consists of two rounds). This will reduce administrative costs and lower the number of players under consideration to a much more manageable number. Reducing the number of rounds could also increase competition by creating a secondary market of undrafted players,

which may lead to lower salaries. This change of course may not appeal to the athletes; their strategy should be to resist any reduction in the number of rounds.

The performance of any given player is idiosyncratic and dependent upon a complex interaction between the team, management, and coaches. The draft provides a unique opportunity to compare counterfactual performance because player selection is transparent and forgone players are highly visible. Each year significant resources are expended evaluating the 210 drafted athletes with less than 100 of which will ever play a single NHL game. Improving this aspect of management will tie research to practice (Weese 1995) and is relevant to all organizations. Decision making is the essence of management but is known to be complex and subject to numerous biases (Arnott 2006) that are often worsened when decisions are made by groups (Lim, Ward et al. 1997). Accordingly, understanding the characteristics of good decision-making is critically important.

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REFERENCES

Arnott, D. (2006). "Cognitive biases and decision support systems development: a design science approach." Information Systems Journal 16(1): 55-78.

Bell, D. E., H. Raiffa and A. Tversky (1988). Decision Making: Descriptive, Normative and Prescriptive Interactions. Decision Making: Descriptive, Normative and Prescriptive Interactions. D. E. Bell, H. Raiffa and A. Tversky. Cambridge, Cambridge University Press: 9-30.

Booth, R. (2004). "The Economics of Achieving Competitive Balance in the Australian Football League, 1897-2004." Economic Papers 23(4): 325-344.

Booth, R. (2005). "Comparing Competitive Balance in Australian Sports Leagues: Does a Salary Cap and Player Draft Measure Up?" Sport Management Review 8(2): 119-143.

Boyle, R. and R. Haynes (2009). Power Play: Sport, the Media and Popular Culture. Edinburgh, Edinburgh University Press.

Camerer, C. F. and R. A. Weber (1999). "The econometrics and behavioral economics of escalation of commitment: a re-examination of Staw and Hoang's NBA data " Journal of Economic Behaviour and Organization 39(1): 59-82.

Campbell, K. (2006). Moneyball meets hockey. HockeyNews. 60: 8

Cimini, M. H. and C. J. Muhl (1995). "Pact Ends NHL Lockout." Monthly Labor Review 118(4): 76-77.

Dawson, D. and L. Magee (2001). "The National Hockey League Entry Draft, 1969-1995: An application of a Weighted Pool-Adjacent-Violators Algorithm." The American Statistician 55(3): 194-199.

Desjardins, G. (2009). "www.behindthenet.ca." Accessed September 30, 2009, from http://www.behindthenet.ca/hist_offense.html.

Devine, K. and W. M. Foster (2006). "Off-the-Ice Action in the National Hockey League: An Interview With Scott Howson of the Edmonton Oilers." Journal of Management Inquiry 15(3): 290-298.

Diamond, D., J. Duplacey, E. Zweig and E. Fitzsimmons, Eds. (2000). Total Hockey: The Official Encyclopedia of the National Hockey League. Scarborough, Ontario, Total Sports Publishing.

Dowbiggin, B. (2003). Money Players. How Hockey's Greatest Stars Beat The NHL At It's Own Game, Macfarlane Walter & Ross.

Dunbar, R. (1992). "Neocortex size as a constraint on group size in primates." Journal of Human Evolution 22(6): 469-493. .

Edge, M. (2004). Red Line, Blue Line, Bottom Line: How Push Came to Shove Between the National Hockey League and Its Players. Vancouver, BC, New Star Books.

Fizel, J. L. and M. D'itri (1996). "Estimating Managerial Efficiency: The Case of College Basketball Coaches." Journal of Sport Management 10(4): 435-445.

Gerchak, Y., H. E. Mausser and M. J. Magazine (1995). "The Evolution of Draft Lotteries in Professional Sports: Back to the Moral Hazard?" Interfaces 25(6): 30-38.

Joyce, G. (2007). Future Greats and Heartbreaks: A Year Undercover in the Secret World of NHL Scouts Canada, Doubleday.

Kikulus, L. M. (2000). "Continuity and Change in Governance and Decision Making in National Sport Organizations: Institutional Explanations." Journal of Sport Management 14(4): 293-321.

Kikulus, L. M., T. Slack and B. Hinings (1995). "Does Decision Making Make a Difference? Patterns of Change Within Canadian National Sport Organizations." Journal of Sport Management 9(3): 273-299.

Kimmelman, A. (2009). "Central Scouting ready to make final rankings." Accessed Aoril 4, 2009, from http://www.nhl.com/ice/news.htm?id=416338.

Kreiser, J. (2004) "Caught in a trap: almost every team in the NHL has implemented a "system," but what exactly does that mean?" Hockey Digest Jan - Feb http://findarticles.com/p/articles/mi_m0FCM/is_3_32/ai_112087316/?tag=content;col1 Accessed September 15 2009

Kurtzberg, B. (2009). "Draft Holds Key To Isles' Future." Accessed June 24 2009, from http://www.insidehockey.com/columns/3902.

Lewis, M. (2003). Moneyball. New York, WW Norton.

Lewis, M. (2009). The No-Stats All-Star. The New York Times Magazine. February 15: 26-64

Lim, K. H., L. M. Ward and I. Benbasat (1997). "An Empirical Study of Computer System Learning: Comparison of Co-Discovery and Self-Discovery Methods." Information Systems Research 8(3): 254-272.

Mackinnon, J. (2007). "Future Greats reviewed in the Edmonton Journal " Accessed January 18, 2010, from http://scoutshonourbygarejoyce.blogspot.com/2007/12/future-greats-reviewed-in-edmonton.html.

March, J. G. (1988). Bounded Rationality, Ambiguity and the Engineering of Choice. Decision Making: Descriptive, Normative and Prescriptive Interactions. D. E. Bell, H. Raiffa and A. Tversky. Cambridge, Cambridge University Press: 33-57.

March, J. G. and C. Heath (1994). A Primer on Decision Making: How Decisions Happen. New York, The Free Press.

Mason, D. S. and W. M. Foster (2007). "Putting Moneyball on Ice?" International Journal of Sport Finance 2(4): 206 - 213.

Medvec, V., S. F. Madey and D. Gilovich Thomas (1995). "When less is more: Counterfactual thinking among Olympic medalists " Journal of Personality and Social Psychology. 69(469): 603-610.

NHL. (2005). "Collective Bargaining Agreement between National Hockey League and National Hockey League Players Association." Accessed October 21, 2009, from http://www.nhl.com/cba/2005-CBA.pdf.

Oliver, D. (2004). Basketball on Paper: Rules and Tolls for Performance Analysis. Dulles, Virginia, Brassey's.

QuantHockey. (2009, January 2). "NHL Career Length Distribution (Seasons) between 1917/18 - 2003/04." Accessed October 10, 2009, from http://quanthockey.com/Distributions/CareerLengthSeasons.php.

Shoalts, D. (2010). The haves and have-nots in scouting Globe and Mail. September 23, 2010Toronto. : S5 Accessed http://www.theglobeandmail.com/sports/the-haves-and-have-nots-in-scouting/article1441508/

Siegfried, J. J. (1995). "Sports Player Drafts and Reserve Systems." CATO Journal 14(3): 443-452.

Staudohar, P. D. (2005). "The hockey lockout of 2004 -- 05." Monthly Labor Review 128(12): 23-29.

Staw, B. M. and H. Hoang (1995). "Sunk Costs in the NBA: Why Draft Order Affects Playing Time and Survival in Professional Basketball." Administrative Science Quarterly 40(3): 474-494.

Weese, W. J. (1995). "If We're Not Serving Practitioners, Then We're Not Serving Sport Management." Journal of Sport Management 9(3): 237-243.

Wolfe, R., K. Babiak, K. Cameron, R. E. Quinn, D. L. Smart, J. R. Teborg and P. M. Wright (2007). "Moneyball: A Business Perspective." International Journal of Sport Finance 2(4): 249-263.

Table 1: Average NHL Career Length in years for Drafted Players (1978-2002)

Games Played	# of Players	Avg. All Rounds	Round Number (30 selections per round)								
			1	2	3	4	5	6	7	8	9
>=1	1603	8.2	11.5	8.0	8.1	6.8	6.2	6.4	6.1	5.0	3.6
>=160	842	12.5	13.9	12.1	12.2	11.2	11.2	12.0	11.4	9.1	10.0

Table 2: Draft data

NHL Draft Statistics 1981to2003	
Total number of players drafted	5981
Percentage of draft picks who never played in the NHL	58.3%
Percentage of draft picks who played at least one NHL game	41.7%
Number of draft picks having played only one NHL game	86
Percentage of draft picks who played less than 10 NHL games	64.9%
Percentage of draft picks who played more than 160 games (full NHL Pension)	20.1%
Average number of games played by all players having played more than 1 game	290
Average number of games played by all players having played more than 160 games	556
Most games played by one player (Ron Francis)	1,731
Average time for a 1st round pick to play first NHL game	1.2 years
Average time for a 4th round pick to play first NHL game	3 years
Average career length of a 1st round pick having played at least one game (1978-1992)	11.5 years
Average career length of a 1st round pick having played at least 160 games (1978-1992)	13.9 years

Table 3: Success by draft round

Round	Minimum 160 Games Played		Minimum 1 Game Played	
	Picks	Success %	Picks	Success %
1	442	64.1%	625	90.6%
2	197	28.6%	449	65.1%
3	162	23.5%	355	51.4%
4	103	14.9%	258	37.4%
5	82	11.9%	201	29.1%
6	82	11.9%	195	28.3%
7	50	7.2%	160	23.2%
8	59	9.0%	156	23.8%
Total	**1177**	**21.3%**	**2399**	**43.5%**

Table 4: Success by half a draft round for the first four rounds

Minimum 160 Games Played			
Round		**Picks**	**Success %**
1	1st half	266	77.1%
	2nd half	176	51.0%
2	1st half	111	32.2%
	2nd half	86	24.9%
3	1st half	86	24.9%
	2nd half	76	22.0%
4	1st half	47	13.6%
	2nd half	56	16.2%
Total		**904**	**32.8%**

Table 5: Success by third of a draft round for the first four rounds

Minimum 160 Games Played			
Round		**Picks**	**Success %**
1	top third	194	84.3%
	middle third	132	57.4%
	bottom third	116	50.5%
2	top third	77	33.5%
	middle third	64	27.8%
	bottom third	56	24.3%
3	top third	54	23.5%
	middle third	56	24.3%
	bottom third	52	22.6%
4	top third	36	15.7%
	middle third	34	14.8%
	bottom third	33	14.3%
Total		**904**	**32.8%**

Table 6: Univariate analysis with post hoc results matrix for Draft picks having played at least one game.

	Draft Success Rates	P-values for full round comparisons 0.05 significance level (using the Scheffe post hoc analysis test)							
Round		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	90.6%		0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	65.1%			0.00	0.00	0.00	0.00	0.00	0.00
3	51.4%				0.00	0.00	0.00	0.00	0.00
4	37.4%					0.1	0.04	0.00	0.00
5	29.1%						1.00	0.52	0.72
6	28.3%							0.72	0.85
7	23.2%								1.00
8	23.8%								

Table 7: Univariate analysis with post hoc results matrix for Draft picks having played more than 160 games.

	Draft Success Rates	P-values for full round comparisons 0.05 significance level (using the Scheffe post hoc analysis test)							
Round		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	64.1%		0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	28.6%			0.49	0.00	0.00	0.00	0.00	0.00
3	23.5%				0.01	0.00	0.00	0.00	0.00
4	14.9%					0.94	0.94	0.04	0.29
5	11.9%						1.00	0.61	0.96
6	11.9%							0.61	0.96
7	7.2%								1.00
8	9.0%								

Table 8: Univariate analysis with post hoc results matrix for Draft picks having played more than 160 games by half round (first four rounds).

		Draft Success Rates	P-values for half round comparisons 0.05 significance level (using the Scheffe post hoc analysis test)							
Round			**1**		**2**		**3**		**4**	
			1st half	2nd half	1st half	2nd half	1st half	2nd half	1st half	2nd half
1	1st half	77.1%		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2nd half	51.0%			0.00	0.00	0.00	0.00	0.00	0.00
2	1st half	32.2%				0.66	0.66	0.2	0.00	0.00
	2nd half	24.9%					1.00	1.00	0.1	0.41
3	1st half	24.9%						1.00	0.1	0.41
	2nd half	22.0%							0.46	0.87
4	1st half	13.6%								1.00
	2nd half	16.2%								

Table 9: Univariate analysis with post hoc results matrix for Draft picks having played more than 160 games by third of a round (first four rounds).

		Draft Success Rates	P-values for third of a round comparisons 0.05 significance level (using the Scheffe post hoc analysis test)											
Round			1			2			3			4		
			top third	mid third	last third	top third	mid third	last third	top third	mid third	last third	top third	mid third	last third
1	top third	84.3%		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	mid third	57.4%			0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	last third	50.5%				0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	top third	33.5%					1.00	0.92	0.85	0.92	0.75	0.04	0.02	0.17
	mid third	27.8%						1.00	1.00	1.00	1.00	0.58	0.46	0.4
	last third	24.3%							1.00	1.00	1.00	0.94	0.88	0.85
3	top third	23.5%								1.00	1.00	0.97	0.94	0.92
	mid third	24.3%									1.00	0.94	0.88	0.85
	last third	22.6%										0.99	0.97	0.96
4	top third	15.7%											1.00	1.00
	mid third	14.8%												1.00
	last third	14.3%												

Figure 1: Picks from the 1981to2003 NHL Entry Draft that Played over 160 Games

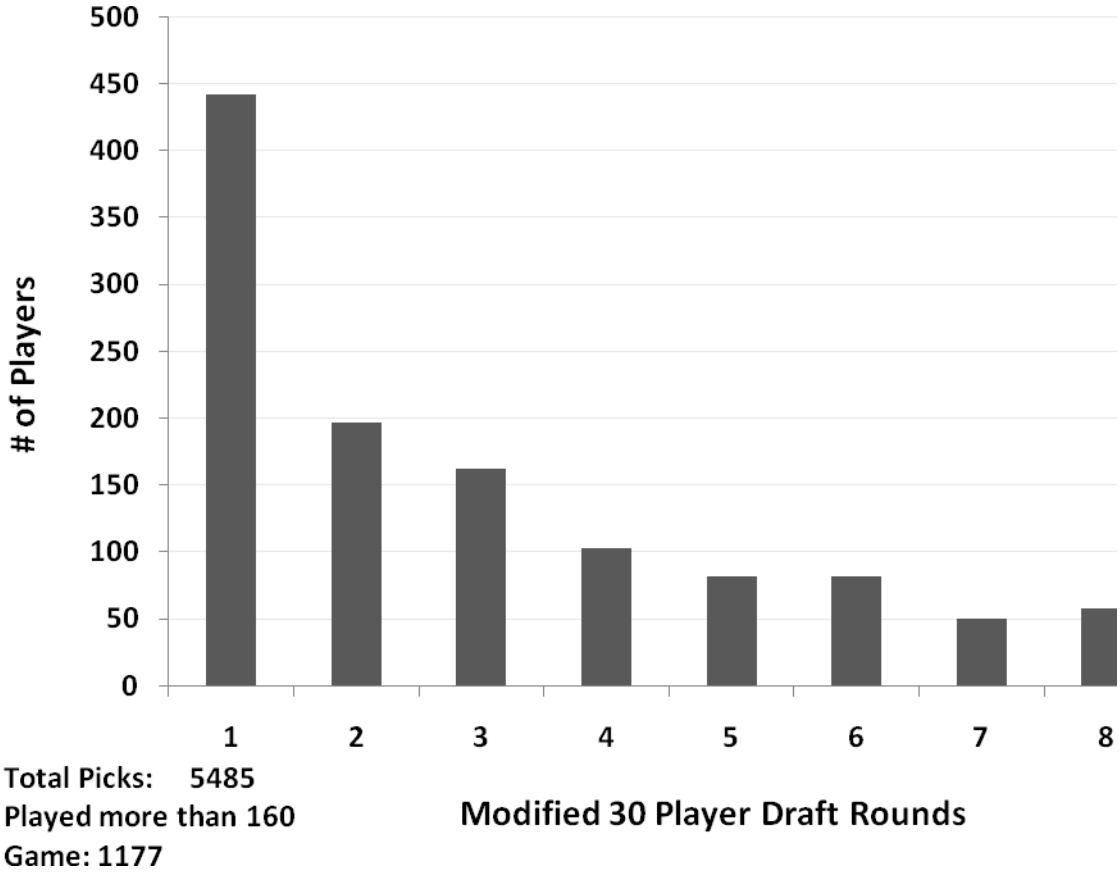
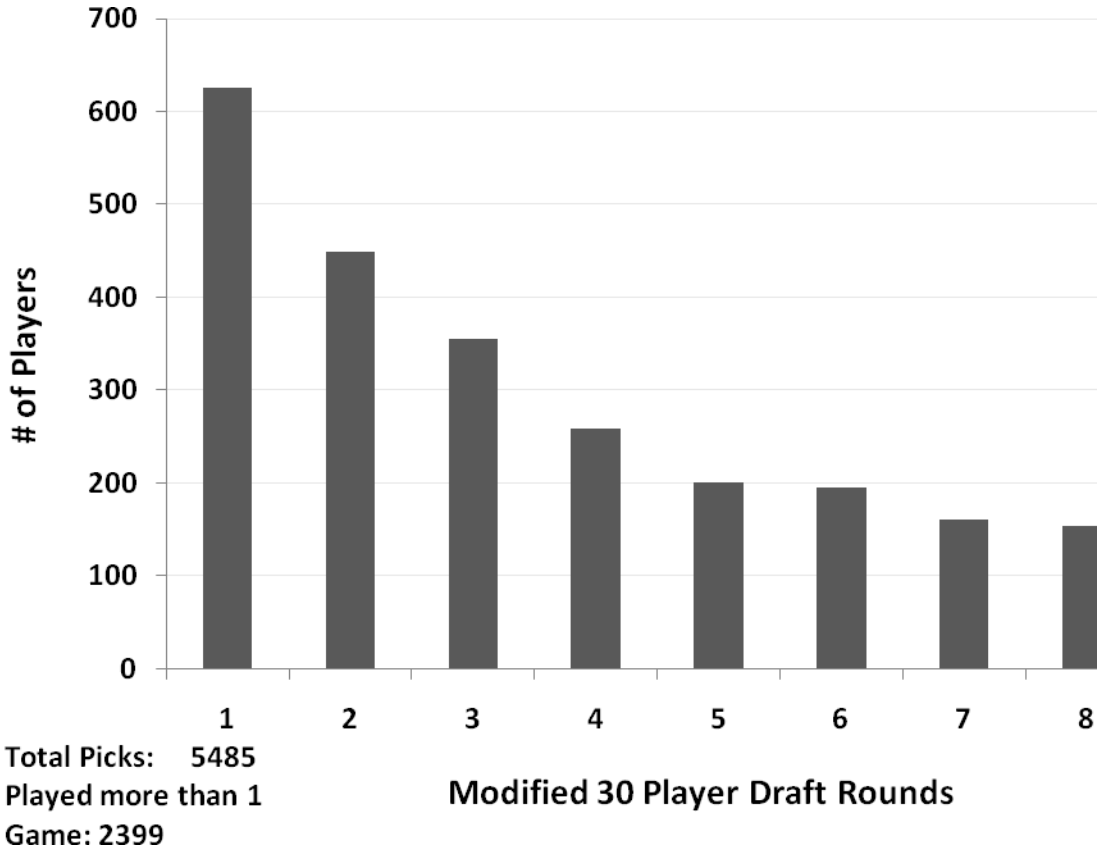


Figure 2: Picks from the 1981 to2003 NHL Entry Draft that Played at least one Game



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