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Competitive Balance in College Hockey:

Analysis of the Nature and Possible Causes of Imbalance

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Abstract

This paper seeks to determine the levels of competitive balance in Division I college hockey using several well known measures of competitive balance. It focuses on the five hockey conferences, specifically on win percentages and concentration of conference and national championships. This paper also seeks to determine any correlation between university actions, specifically athletic spending, and successful hockey programs. Finally, it suggests possible areas of future research and ways to improve on the current research.

Competitive Balance in Sports

To date, the majority of literature on competitive balance focuses on professional sports, in particular professional baseball. Professional sports have qualities that make them ideal for research, including a standardized season schedule and more readily available financial data for teams and the league. Several researchers, including Andrew Zimbalist, Rodney Fort, and James Quirk have done extensive research on the topics of competitive balance in professional and college sports. Today The current research available on competitive balance in college sports is largely limited to college football and college basketball.

Competitive balance is an important concept in sports. In a normal market economy, a monopoly is the ideal position for a firm to hold however the opposite holds true in sports. Sports leagues promote competitive balance because it increases the overall health of the league. Andrew Zimbalist (2003) presumes “the reason sports economists are interested in competitive balance is that our theory and empirical research tell us that fans expect a certain degree of uncertainty in the outcome of games and seasons. Fans also expect fairness in the rules and conditions of competition” (162). Ultimately, if no individual values attending sporting events, there would be little incentive to compete in sports beyond youth athletics. Uncertainty in sport contests provides the interest to fans and therefore the reason to promote balance is to increase fan interest. In college athletics, balance ensures that programs and athletes have equal chances of winning, promoting school spirit, increased public visibility and alumni donations. Without balance, teams that fail will dissolve their programs, or move to lower conferences until there are only a few top tier teams remaining.

Measurements of Competitive Balance

When examining the competitive balance of any sports league, several different measures are relied upon to give a comprehensive picture of the league. Brad Humphreys (2002), in *The Journal of Sports Economics*, discusses several alternative measures of competitive balance, some of which will be discussed in this paper. The most commonly used measures of competitive balance include the range of winning percentages, the relative standard deviation of winning percentages. P. Dorian Owen, Michael Ryan, Clayton R. Weatherston (2008) discuss the Herfindahl-Hirschman Index (HHI); this paper will apply the HHI to both regular season and playoff championships. This paper will examine these measures as applied to NCAA Division I Hockey.

The most often cited measure of competitive balance is the relative standard deviation of winning percentages. This measure is, in general, an excellent means by which to observe competitive balance within a season or across several seasons. The most commonly referred to limitation of the standard deviation is the failure to take into account changes in the relative team standings in a league from year to year. This limitation is accounted for at least in part by analyzing the variation in any given team's winning percentage from year to year.

We compare the standard deviation to an 'idealized' standard deviation, one in which the number of games played is accounted and compensated for in the measurement. The calculations of standard deviations of win percentages are only the first step in a league to league comparison. In calculating the standard deviations it should be noted that the number of games played by each team in the league affects the standard deviation. In order to

compare different leagues which may play different game totals, or even to compare the same league when the number of teams and therefore the number of games changes, we use an idealized ratio. This idealized ratio compensates for the differences in the number of games played. Each idealized ratio represents what should be the expected standard deviation for each league based on the number of games played by each team. The ratio between actual standard deviation and idealized standard deviation allows direct comparisons between leagues that would have been otherwise difficult to compare.

Going beyond the relative standard deviation, another measure of competitive balance is the Herfindahl-Hirschman index, which is more commonly used to examine the market share of companies in a competitive industry. In sports leagues, the HHI is used to examine the distribution of league championships across different teams in the league. This paper focuses on the application of the HHI not only to national championships, but to individual conference regular season and tournament championships.

Economics of College Athletics

Competitive balance plays an important role in the economics of sports, and in particular college athletics. Simon Rottenberg, in his 1956 article "The Baseball Player's Labor Market" described the attendance of professional baseball games as "a negative function of the goodness of leisure-time substitutes for baseball...and of the dispersion of percentages of games won by the teams in the league" (246). This is the beginning of what became the Uncertainty of Outcome hypothesis an explaining that sports teams who held monopolies of wins and championships were harmful to the league and ultimately hurt the monopolist. This

hypothesis supports the idea that as leagues become more closely competitive, fan interest increases and as a result revenues rise. Andrew Zimbalist (2002) notes “fans respond not only to the statistical outcomes but also to the processes and institutional features of competition in the various sports”, indicating that when fans expect a game to be close and the level of play higher, attendance will rise. This creates incentives for sports leagues to promote balance. El-Hodiri and Quirk (1971), in their presentation of their economic model of a sports league, explain that the profit maximization of a single team comes at the expense of competitive balance. This again points to competitive balance as a means to balance revenues for all teams, giving each team the same opportunity to employ the same players. As we can see competitive balance serves an important role in the economics of professional sports leagues, but what about amateur competition?

The discussion of professional sports leagues leads to the assumption that competitive college sports teams would also experience higher attendance and as a result, higher revenues. The NCAA has paid close attention to the issues of competitive balance and made it one of their core principles to protect competitive equality. The NCAA lists in its Division 1 manual a core principle concerning the competitive equity in college athletics. That principle, Principle 2.10, states:

“The structure and programs of the Association and the activities of its members shall promote opportunity for equity in competition to assure that individual student-athletes and institutions will not be prevented unfairly from achieving the benefits inherent in participation in intercollegiate athletics.”

This core principle points to the NCAA's interest in protecting the student athletes and promoting their welfare over maximizing the profits of its member institutions or the NCAA itself. However, Goff, Fleisher, and Tollison (1992) describe the NCAA's cartel-like behavior in their restriction in the number of games played, player movement, and wages. This cartel behavior shows a different motive for the protection of competitive balance.

The NCAA's cartel-like behavior points to an interest in pursuing profits for its member institutions, but this is generally dismissed because most athletic departments report losses, while only a few report modest profits. This too however, may be unreliable. Brian Goff (2004) cites two separate studies of athletic profit/loss reporting. In a study of Western Kentucky University, Goff, Borland, and Pulsinelli (1992) noted that university specific accounting conventions results in misstated revenues and profits; a large portion of this revenue being generated by two sports, football and basketball. This study concluded that "Western Kentucky's program, publicly reported to be experiencing a \$1.2 million loss, was losing money, but just over \$300,000 per year" (68). In a separate study Skousen and Condie (1988) concluded that Utah State's program "publicly reported to be experiencing a loss of almost \$700,000, actually turned a \$366,000 profit" (67). These studies show that universities will use unconventional accounting practices, including appropriating merchandise sales to non-athletic accounts to show little or no profit. While this shows that athletic programs do in fact generate substantial revenue and universities will manipulate revenue streams to hide that revenue, the economics of college hockey remain widely understudied.

The limited available research into the economics of college hockey may be due to the limited number of universities which currently field a Division 1 hockey club. College hockey is generally not considered a revenue generating sport and therefore may not be as attractive sport to study. To date, nobody has studied the competitive balance as it relates to college hockey. Because of the limited nature of the available research, it is possible to take the available research and existing competitive balance studies and make conclusions about the incentives for schools to promote competitive hockey clubs.

There can be significant financial incentives for universities to have successful athletic programs, but in order to understand how much financial incentive much a top level prospect may be worth to a university, we need to look at the economic rents generated by their playing at a particular school. Leo Kahane (2012) estimated “the MRP of an elite college hockey player to be in the range of approximately \$131,000 to \$165,000” (9), and were much greater than the estimated cost of a scholarship. In this instance an “elite college hockey player” was one who would eventually be drafted to the NHL. Kahane also notes “an increase in one future NHL draftee increased team revenues per game by an estimated 7%...translated to an additional \$7,285 per game, or approximately \$131,000 over a typical season” (8). One important feature of college hockey to be noted is that some players are drafted before they enter college. The NCAA does not force players to leave once they have been drafted and therefore Kahane’s study may miss rents generated by those players who are drafted before entering college. This is important because seeing a player who has already been determined to have NHL quality may have some drawing power among fans and result in higher revenues as a result of their playing. In general, however Kahane shows that the benefit to a university from recruiting an

elite level player can result in substantial economic rents for the university, providing another incentive for the university to pursue the best players and field the best team possible.

Brian Goff (2004) explored the financial impact of athletic programs on university finances and made several conclusions. Of these, Goff notes “achievements in athletics...appear to substantially increase general giving to universities” and “major achievements in athletics appear to spark additional interest from prospective students” (82). Goff’s evidence shows that there is substantial reason for universities to support successful athletic programs aside from traditional profit from ticket and merchandise sales. Goff’s study shows that increased positive public relations, including athletic success, could increase the visibility of a school and attract potential students who may not have considered that school in the past. If schools accept these students, presumably at low marginal cost, they can increase the revenue generated by non-athlete students paying to attend that school. In addition, it seems to be conventional wisdom that casual fans tend to purchase more merchandise from winning franchises than losing ones. An increase in success on the field may result in higher merchandise sales for the university.

Teams also receive compensation for Frozen Four appearances, and because conference champions receive automatic playoff bids, there is additional financial incentive for schools to produce winning programs.

Overview of Data

The sample data used for research extends from 2002-2011 and includes conference records and championship data, as well as national championship data. This data set allows for

the recruitment and graduation of two complete recruiting classes for each university that fielded a team during this time period. This time period is also the period in which the greatest amount of relevant data on team expenses, revenues, and other information is available. The data used come from the five Division 1 college hockey conferences. Those conferences are the Atlantic Hockey Association (AHA), Central Collegiate Hockey Association (CCHA), East Coast Athletic Conference (ECAC), Hockey East, and the Western Collegiate Hockey Association (WCHA). Of these conferences only the CCHA, Hockey East, and the WCHA have had national champions during this time period. In fact, the last year in which a team from a conference other than these won the national championship was in 1989 when Harvard of the ECAC won. The table below shows the teams comprising each conference. Some teams have changed their conference affiliation during the ten year period examined, which included the dissolution of the Central Hockey Association (CHA) and the formation of the AHA.

Of the data available, this paper focuses on the conference record of each team playing in a given year. Each conference is treated independent of one another, and non-conference games are not considered for the purposes of analyzing winning percentages. This is due to the fact that the NCAA does not have a standard number of games that each team must play. There are limits that each team must adhere to regarding the maximum number of games a team is allowed to play in a given season¹. Each conference may impose further limits on their member teams and sets their own conference schedule accordingly. Other data in this report includes, the number of athletes per team, university student-athlete financial aid, operating

¹ According to NCAA bylaw 17.12.5, Division 1 hockey teams are limited to 34 games in a 132 day period, except for conference and national postseason play and other exceptions as per NCAA regulations 17.12.5.3 and 17.12.5.4.

expenses per team and per player, team revenues and expenses, average university head coach's salary, and university recruiting expenses.

Atlantic Hockey	CCHA	ECAC	HEA	WCHA
Air Force	Alaska Fairbanks	Brown	Boston College	Alaska Anchorage
American International	Bowling Green	Clarkson	Boston U.	Bemidji State
Army	Ferris State	Colgate	Maine	Colorado College
Bentley	Lake Superior State	Cornell	U-Mass Amherst	Denver
Canisius	Miami (OH)	Dartmouth	U-Mass Lowell	Michigan Tech
Connecticut	Michigan	Harvard	Merrimack	Minnesota
Holy Cross	Michigan State	Princeton	UNH	Minnesota Duluth
Mercyhurst	Northern Michigan	Quinnipiac	Northeastern	Minnesota St.
Niagara	Notre Dame	RPI	Providence	Nebraska-Omaha
Robert Morris	Ohio State	St. Lawrence	Vermont	North Dakota
RIT	Western Michigan	Union		St. Cloud St.
Sacred Heart		Yale		Wisconsin

TABLE 1

Methodology

Each team is sorted into its respective conference for the 2002-2003 to 2011-2012 seasons. Each conference is then sorted by year and the teams are ordered according to winning percentages from highest to lowest win percentage. This allows us to see the range of winning percentages for any given year and allows the most understandable interpretation of the data observed.

To calculate the standard deviation of win percentages for any given season we must first determine how much each team's win percentage differs from a .500 winning percentage. We then square these individual differences and sum them. We then divide this sum by the number of teams and take the square root of this result. This gives us the standard deviation for each season. We then divide this standard deviation by the standard deviation of a perfectly competitive conference, calculated by dividing .500 by the square root of the number of games played. This gives the idealized ratio by which we can compare the actual standard deviation to that of a perfectly competitively balanced league. In order to analyze the turnover in league standings from season to season, we calculate each team's standard deviation from the team's average win percentage over the ten year period covered by the data set.

Each HHI is calculated by dividing the number of championships a team has won by the number of years played, squaring this number and summing the results for the entire conference. The HHI is calculated for each regular season, conference tournament, and national championship tournament.

Results

The standard deviations and idealized ratios for each conference are shown in TABLE 2.A and TABLE 2.B. The standard deviation ratios represent a measure of in- season variation as we are not looking at the standard deviations of win percentages over the entire ten year period, rather we observe each season independently of the others. The results are separated into two tables, the first containing the CCHA, Hockey East, and the WCHA; the only three conferences

that have won national championships since 1989. This provides some comparison between conferences that appear to have equal strength on a national scale.

As we can see from the above tables, each conference suffers from at least some relative imbalance; in any given year some conferences may experience more imbalance than others. Each conference has seen close to double the imbalance desired, but only once has a conference (AHA) suffered from three times the amount of desired standard deviation; there has only been one instance a conference, the now defunct CHA, having ‘too much’ balance. This shows that despite the best efforts of the NCAA to promote competitive balance, including restrictions on the amount of scholarship aid which can be offered to prospective players, there is still a disparity that can be found in winning percentages.

	CCHA			Hockey East			WCHA		
Season	Actual	Idealized	R	Actual	Idealized	R	Actual	Idealized	R
11-12	0.111	0.094	1.174	0.164	0.096	1.712	0.141	0.094	1.495
10-11	0.148	0.094	1.563	0.196	0.096	2.038	0.166	0.094	1.765
09-10	0.149	0.094	1.578	0.107	0.096	1.113	0.169	0.094	1.798
08-09	0.155	0.094	1.635	0.178	0.096	1.858	0.127	0.094	1.348
07-08	0.184	0.094	1.942	0.125	0.096	1.304	0.149	0.094	1.587
06-07	0.157	0.094	1.664	0.167	0.096	1.735	0.110	0.094	1.170
05-06	0.111	0.094	1.174	0.167	0.096	1.741	0.177	0.094	1.880
04-05	0.186	0.094	1.969	0.217	0.102	2.127	0.155	0.094	1.650
03-04	0.128	0.094	1.353	0.157	0.102	1.542	0.168	0.094	1.787
02-03	0.183	0.094	1.935	0.173	0.102	1.697	0.190	0.094	2.024

TABLE 2.A

	CHA			ECAC			Atlantic Hockey		
Season	Actual	Idealized	R	Actual	Idealized	R	Actual	Idealized	R
11-12				0.116	0.107	1.080	0.170	0.096	1.775
10-11				0.171	0.107	1.596	0.122	0.096	1.273
09-10	0.177	0.118	1.499	0.140	0.107	1.312	0.304	0.094	3.234
08-09	0.163	0.118	1.380	0.142	0.107	1.327	0.175	0.094	1.859
07-08	0.190	0.112	1.700	0.128	0.107	1.201	0.100	0.094	1.069
06-07	0.076	0.112	0.677	0.128	0.107	1.193	0.145	0.094	1.541
05-06	0.149	0.112	1.327	0.139	0.107	1.302	0.164	0.094	1.741
04-05	0.207	0.112	1.845	0.204	0.107	1.907	0.163	0.102	1.596
03-04	0.209	0.112	1.868	0.132	0.107	1.229	0.173	0.102	1.697
02-03	0.208	0.112	1.854	0.201	0.107	1.874			

TABLE 2.B

When comparing the three conferences with national champions, we see that the CCHA has more competitive balance than the other two conferences. Of the ten years observed, the CCHA had a lower standard deviation ratio seven times when compared to Hockey East and six times compared to the WCHA. However this is not enough evidence to say that the CCHA over a longer period of time would experience more competitive balance than any other conference and it may be the case that in different time periods, other conferences experienced higher levels of competitive balance. In order to have a better understanding of the nature of each conference's competitive balance, it is necessary to observe the between-season variation in standard deviation ratios for each conference over the ten year period.

The idealized ratios for the five current conferences as well as the CHA in Table 3 show no clear difference between the conferences in general. It should not be expected to see significantly higher or lower standard deviation ratios and therefore competitive balance in those conferences which have national champions. This is not to say however, that there is no

Conf.	Avg. R
CHA	1.519
ECAC	1.402
AHA	1.754
CCHA	1.599
HEA	1.687
WCHA	1.650

TABLE 3

difference in relative amounts of competitive balances across conferences. Some conferences may experience greater turnover in league standings which would be indicative of a balanced conference, despite having undesirable idealized standard deviation ratios.

Looking at each individual conference we can see that some teams tend to dominate their conference standings and tournaments, or at least contend for the conference championship on an annual basis. The between-season variation is used to analyze the turnover in conference standings to determine if there is competitive balance in each conference

over time. In order to determine if some conferences experience more turnover relative to the others, we look to the standard deviation of each individual team's winning percentage.

Each team's winning percentage may vary from year to year gives insight into how conference standings may change from season to season. A separate way to compare the between-season variation for the conference is to find the average standard deviation for each conference over the ten year period. Table 4 shows the average conference standard

Conf.	SD
AHA	0.164
CCHA	0.107
ECAC	0.145
HEA	0.111
WCHA	0.097

TABLE 4

deviations. This type of comparison is different from the in-season variation of the standard deviation ratio in that it is unimportant to compare by how much each conference varies from an ideal, but rather it is important to see how league standings can be expected to vary from year to year. These observations show that of the five current hockey conferences the WCHA has on average the least amount of variation in team win percentages. This demonstrates the WCHA has the least between-season variations of the five

conferences, because in any season we can anticipate more accurately where teams will end up in the final standings in the regular season. An expected result of this is that schools that annually finish in the bottom of the standings will see a negative financial impact on the athletic departments. This may also be the case in other conferences, when teams are expected to finish in the bottom of their regular season rankings. This lack of turnover in regular season championships indicates that the conferences with the least amount of turnover may want to pursue initiatives to improve their competitive balance.

Another important measure of between-season variation is the HHI of conference regular season and tournament championships. Looking at the HHI for each conference in Table 5 shows the concentration of championships. Each conference has a higher concentration of championships than is desired but the HEA has the highest concentration of both regular season and tournament championships. Looking further into the data we find that in the past ten seasons in the HEA, Boston College has won the regular season championship five times and the tournament championship six times. The AHA also had a high concentration

Conf.	HHI		
	Reg. Season	Tournament	Min.
CCHA	0.280	0.240	0.091
ECAC	0.180	0.200	0.083
HEA	0.380	0.420	0.100
WCHA	0.256	0.289	0.083
AHA	0.190	0.340	0.083

TABLE 5

with Air Force winning the tournament championship five times. Considering Air Force has only played in the AHA for six seasons, over the entire ten year period it may have won additional championships, further increasing the HHI. Evaluating the AHA over just the six years

Air Force has been a member, the HHI is .720, showing just how much of a negative impact admitting Air Force has had on competitive balance in the AHA. This is not an issue limited to

the AHA however. In the CCHA, Michigan has won four championships over the past ten seasons and in the HEA, Boston College has won six tournament championships.

It may be the case that a lower between-season variation in win percentages and higher concentrations of conference championships can be a benefit to the conference in terms of winning national championships. Conference championships automatically qualify for the post-season, guaranteeing them at least one contest. It is often assumed that a team with a greater experience in post-season play will often defeat those teams with little to no experience. This conventional wisdom would lead us to believe that a team with a high number of post-season appearances would tend to win more championships. In terms of national championship games there appears to be some balance among the HEA, CCHA, and WCHA. The HEA and WCHA have had teams appear eight and seven times respectively, while the CCHA has had teams appear five times. Of course the CCHA has fared worse than the other two conferences when looking at national championships, winning only once; the WCHA has won five times and the HEA four. Of course having a high number of appearances in championship games is a positive thing for the conference as a whole, but when the same team consistently represents that conference it would seem that it would begin to have a negative effect on the conference's other teams. It is important to determine if certain teams within those conferences are the most frequent or consistent representatives in terms of national championship appearances.

Of the eight appearances from the HEA to appear in the national championship games, Boston College has appeared five times. In the WCHA, there appears to be more balance, with no team appearing more than twice; and in the CCHA, no team has appeared more than once.

These results are consistent with the observations of the conference HHIs, which point to increased imbalance in the HEA.

Discussion

The preceding results show that there is a deficiency in competitive balance in college hockey, despite efforts by the NCAA to restrict teams from obtaining a high concentration of conference and national championships. It has been demonstrated that teams who remain competitive or increase their competitiveness should see increases in attendance and revenue, so there is financial incentive to field a competitive team. The NCAA, in making one of its priorities fostering competitive balance, has instituted several policies that are designed to promote competitive balance.

The NCAA restricts the amount of aid that can be given to an athlete in the form of athletic scholarships. Hockey is classified as an equivalency sport, meaning that the total of scholarship aid awarded cannot exceed the total aid of 18 full athletic scholarships². In a separate action, the NCAA restricts the movement of players by stripping them of a year of eligibility if the student transfers to a different school. Despite these efforts competitive imbalance remains. The question now remains what schools are doing that enables them to hold a higher concentration of championships over other teams.

One reason the ECAC, or “academically oriented” schools may struggle is because of the increased focus on academic success over athletic success. Since 1989, the ECAC has failed to

² NCAA bylaw 15.5.7 Ice Hockey Limitations states that the annual limit of the value of financial aid awards must not exceed 18 to students who count against the limit (counters), with an annual limit of 30 counters.

win a national championship and only appeared in one other championships game since³. One important feature of schools in the Ivy League who play in the ECAC⁴ is they do not offer any form of athletic scholarship to their athletes. Their athletes receive need-based financial aid; these athletes receive the same treatment as any other student. This is important because one of the potential draws for athletes is having an athletic scholarship. It is not only the ECAC that has struggled in recent years, the AHA and former CHA also struggled to gain national recognition as competitive conferences. The reasons for this lack of competitiveness may come from the willingness of those programs to spend money in order to obtain the best coaches and players available.

Table 6 gives the expenses that each conference averages from 2002-2011. The CCHA has the highest expenses in three out of the six categories, Student Aid, Average Coach's Salary, and Recruiting Expenses, while the WCHA had the highest totals in Operating Expenses Per Player, Team Operating Expenses, and total Expenses. The AHA and ECAC however, failed to match the other conferences except when observing Recruiting Expenses. The three conferences with national champions on average spent over \$10,000 in operating expenses per player. Operating expenses may include hotel, meals, travel, etc. because teams are not able to offer additional aid in exchange for their playing for the program. This type of non-price competition can result in schools providing better amenities for their players, including weightlifting equipment and locker rooms, which some schools with small athletic budgets may be unable to provide. In addition, the CCHA, HEA, and WCHA all offered significantly higher

³ Colgate University appeared in the 1990 NCAA Championship game, losing to Wisconsin.

⁴ The Ivy League schools that currently field Div. 1 hockey programs include, Brown, Cornell, Dartmouth, Harvard, Princeton, and Yale.

levels of financial aid to prospective athletes. Of course spending money on players does not guarantee success if teams are not recruiting top level players, but there does appear to be a link between athletic spending and success.

Conf.	Men's Student Aid	Op. Exp. per Player	Team Op. Exp.	Expense s	Avg. Coach Salary	Recruiting Exp
AHA	2092861	6565	193493	630664	173465	258979
ECAC	780037	8301	229437	964661	126249	306260
CCHA	3247987	14764	401157	1587972	238548	386192
HEA	2969771	10199	283406	1662920	155072	209161
WCHA	1680327	16074	432826	1723009	159952	199060

TABLE 6

Breaking down each conference gives more evidence for a correlation between spending and championships. In the CCHA, Michigan tops all other schools in nearly every spending category, and has won four conference championships while Notre Dame who has won two conference championships outspends other schools in recruiting and student aid. In the HEA, Boston College outspent every other school in all categories, and Boston University, who has won two conference championships, was in the top third of spending in student aid, team expenses, and recruiting expenses. The WCHA may seem to disprove this correlation as North Dakota, which has won four WCHA championships, only finished in the top third in recruitment expenses. This provides additional evidence that it may not necessarily be overall spending, but spending on recruitment that makes the biggest difference between championship contenders and teams that fail to win. Looking at the number of top recruiting classes and draft picks may give additional insight into the connection between recruitment spending and championships.

Every team that has competed in the national championship game has had multiple top 15 recruiting classes between 2003-2004 and 2010-2011; teams with repeat appearances have had no fewer than eight. Boston College had eight top recruitment classes and appeared in the national championship game five times over ten years. The only two teams to finish with fewer than four top 15 recruitment classes and play for a national championship are Miami (2) and Ferris State (3). Over the ten year period, teams that appeared in the national championship game accounted for 68%, 79 out of 117, of top recruiting classes.

As noted earlier, Kahane (2012) showed that there is substantial financial benefit to universities when they recruit a top flight player. In this case top flight player was defined as a future NHL draft pick. Of the 132 NHL draft picks from 2002-2012, teams that played in national championship games accounted for 69 or 52% of the draft picks. When examining the number of NHL draft picks who are currently playing college hockey, we see an even greater concentration of talent. Of the 202 draft picks playing college hockey, 117 or 58% played for teams who have competed for national championships in the past ten years. This concentration of talent shows that some schools are able to attract a higher level of player and therefore are more likely to have success, in addition to extra revenue.

What this paper has shown is that there is extensive research that schools who field Division I hockey programs have significant financial and non-financial incentives to make those programs successful. Additionally, over the past ten years there has been varying levels of competitive balance among the five hockey conferences, and within those conferences there appears to be even more imbalance, as some teams tend to dominate those conferences. This paper has also shown that there appears to be a correlation between spending and athletic

success, although teams are not able to compete with one another in wages paid. This gives a good general picture of the status of competitive balance in college hockey today, and points to inefficiencies in the NCAA's efforts to promote competitive balance.

Future Research

Areas for future research on the subject of competitive balance in college hockey would include a statistical analysis of the data collected. This analysis could be used to determine if spending on hockey programs is correlated to success on the ice, and if spending has a direct affect on the team's success. If there is a positive correlation between spending and win percentage, specifically recruitment spending and operating expenses per player; this information would give teams insight into how their spending could be better directed to give their team the best chance to win.

In addition to a more detailed statistical analysis, a reexamination of Kahane's study on the MRP of top level hockey players to include draft picks who are already playing college hockey. This course of research should look to reveal whether players who are drafted and continue to play hockey are more financially productive for schools than those students who are drafted after leaving that particular school. If there is a financial incentive schools may want to consider recruiting and offering scholarships only to those athletes who enter school as probable or previously drafted players, in order to gain the greatest financial benefit from those athletes.

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