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Determinants of college hockey attendance

Max Martino
University of Northern Iowa

DETERMINANTS OF COLLEGE HOCKEY ATTENDANCE

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Max Martino

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Abstract

The determinants of Division I men's college hockey attendance are examined. Data includes 58 schools over the past 10 years. Based on previous studies of sports attendance potential determinants include a team's success in current and past seasons, demographic variables such as enrollment and the percentage of students who are women, and potential competition from other sports. Higher winning percentages and winning the NCAA championship in the previous season increased attendance, while having a basketball team in the AP Top 25 reduced attendance. There is some evidence that being within 75 miles of an NHL team reduced attendance, while the percentage of undergraduate students who were women had no effect.

Introduction

I examine the determinants of attendance for men's division I college hockey programs from 2002-2012. I want to know the factors that determine a fan's decision to attend a college hockey game. Do successful teams attract more fans? Does past success matter? Are college basketball and professional hockey substitutes for or complements to college hockey? To my knowledge, college hockey has not been the basis for an attendance study to date, making this research and analysis unique. Rodney Paul (2003) and Coates and Humphreys (2012), both studied factors that influence game attendance in the National Hockey League. A handful of other papers examine attendance at other professional or collegiate sports. These studies provide some guidance on methods and variables for my study.

This paper is designed to fill this gap in attendance literature. I examine the factors that determine average season attendance. I examine whether college hockey attendance depends on the same variables as other college sports. One important factor I include, that has been important in determining attendance for other sports, is the presence of success of other sports teams, which may be substitutes or complements. Of particular interest are the effects of both men's college basketball and professional hockey on collegiate hockey attendance. I hypothesize that both will draw fans away from collegiate hockey.

I collected data on team statistics, community demographics, and other variables relating to potential substitutes for hockey. Variables that measure substitutes for hockey are the success of the men's basketball team at the same college, the success of the football team at the same college, and the proximity to the nearest professional hockey team. The data is from 2002-2003 to 2011-2012 on the 58 schools that had Division I programs over those years. This sample covers little known schools like Bentley, which averaged just over 500

fans per game in 2012, to the big powerhouses like Minnesota, which averaged nearly 10,000 fans per game in 2012.

I use two models to estimate demand for each school across the years and I also examine the determinants of ticket prices. I examine what makes the attendance for each school differ from its average. The first model is a fixed-effects model. This model allows the intercept for each school to vary, so it captures the effects of variables that are fixed across time but differ between schools. It accounts for heterogeneity of schools and captures effects that may be difficult to observe. The second model I use is a pooled OLS model. This model does not allow the intercept to vary between schools. An advantage of this model is that the importance of specific variables that are fixed over time but vary across schools can be examined. In the third model, I examine the determinants of ticket prices. Ticket prices proved difficult to collect. I was able to collect ticket prices for only the 2013-2014 season. If there are variables that are highly correlated with ticket prices, I could use coefficients from my regression using this season's ticket prices and past data on other variables to get an estimate of ticket prices. Unfortunately, the explanatory variables I used for ticket prices while significant, did not explain ticket prices very well. So, ticket prices are not included in my attendance regressions.

Literature Review

Attendance is a major source of revenue for college sports, including hockey. There is no published study on attendance at the Division I level for college ice hockey. I rely on studies relating to attendance at professional hockey and different collegiate sports, to see if these factors also affect college hockey attendance.

In the National Hockey League, Coates and Humphreys (2011) found that the quality of the team and uncertainty of the game outcome affect attendance. The better the team has been in the past and the more goals that it scores per games, the higher the attendance. The uncertainty of outcome hypothesis that is explored in this research suggests that fans prefer home games where either the home team is expected to win or where there is a possibility of an upset for the home team. Yet regardless of the expected outcome of a game, other factors have been found to affect attendance in the National Hockey League such as the existence of another sports team in the same metropolitan area.

Some studies of professional sports have found that sports teams in the local area are substitutes for one another. The demand for hockey is lower if there is another professional athletic team in the metropolitan area (Paul 2003). Other professional sports in the same city are substitutes for fans, and thus the presence of multiple sporting teams lowers hockey attendance. Gitter and Rhoads (2010) found that attendance at minor league baseball games is lower if there is a nearby professional team. This study used a distance variable where Major League Baseball (MLB) teams within 100 miles were considered local and MLB teams between 101-250 miles were considered regional. While regional teams had no significant impact on minor league attendance, it is clear that local MLB clubs are substitutes for minor league teams.

Substitutes and compliments for collegiate sports may depend on school specific variables. Depken, Williams, and Wilson (2011) found that women's college basketball attendance is affected by the presence of a football team and whether the football team is in the Bowl Championship Series (BCS) division. At big BCS schools, football complemented women's basketball, while non-BCS football program's effect on women's basketball were

insignificant. In another study, NFL teams within 50 miles of campus had a strong negative affect on college football attendance (Falls and Natke 2014). Proximity was significant at the 1% level, decreasing the ratio of attendance to capacity of the stadium by 6.76 percentage points. NFL teams are a clear substitute for college football. I examine the effect of both the presence of a local professional hockey team and the success of other sports at the college itself. I expect similar results to those found in both studies for collegiate hockey.

Community demographic variables affect attendance at collegiate athletic events. The population of the urban area, the per-captia income, and the size of the school are significant determinants of the attendance in other studies. For example, Depken, Williams, and Wilson (2011) found that student enrollment positively affects attendance at women's basketball games. This means that higher undergraduate enrollment is associated with higher attendance at basketball games. In a study of college football attendance, Falls and Natke (2014) found undergraduate enrollment to have a significant positive affect at the 10% level and city population to have a significant and positive affect at the 1% level.

Team success appears to be the most important factor in determining attendance. Current and past success and winning in the post season increase attendance. In women's collegiate basketball, simply participating in postseason play will increase current season attendance, but winning games in the postseason has a lasting impact on attendance. (Depken, Williams, and Wilson 2011). In collegiate football the number of current season wins has a strong positive affect on attendance. Season wins is significant at the 1% level and will increase stadium utilization by 3.58 percentage points (Falls and Natke 2014). This means that one more win during the season will increase the attendance relative to capacity of the stadium by 3.58%. More measures of success are lifetime win percentage and bowl

participation in the last 10 years, both of which are significant at the 1% level. All these variables positively affect attendance, meaning more success yields greater attendance.

Higher winning percentages in professional hockey also raise attendance. In the National Hockey League the better a team preformed in the last season, the higher the attendance is in the current season (Coates and Humphreys 2011). This study also examined the impact of game statistics such as goal scoring. Higher home goal scoring and low opponent scoring both lead to higher attendance.

Data

Data collected to investigate men's collegiate hockey were gathered from U.S. College Hockey Online (USCHO), the Bureau of Economic Analysis, and the Integrated Postsecondary Education Data System (IPEDS). The sample size is 575[1], with panel data from the 2002-2003 season to the 2011-2012 season (ten years) on the 58 schools that have division I programs.

Table 1 contains descriptive statistics for a selected set of variable used in the study. The dependent variable used in this study is average game attendance. Note that average attendance for the season ranged from a low of 140 in 2003-04 at American International to 15,048 in 2009-10 at Wisconsin, while the average was 3,439.

In all studies relating to attendance that I have read, team success has been an important variable and I expect hockey to be no different. Although success is measured differently in hockey because there are a significant number of ties. To account for this and also capture wins and loses, I use a team's winning percentage to measure success. Winning

[1] With 58 schools and 10 years of observations, the expected sample size is 580, but two schools entered Division I during the years over which the sample spans. Robert Morris became Division I in the 2004-2005 season and Rochester Institute of Technology (RIT) became Division I in the 2005-2006 season.

percentage equals the number of wins plus half the number of ties divided by the number of games played. The range of winning percentages is very wide. The minimum is 8.33% (2 wins, 27 losses and 1 tie) by Alabama-Huntsville in 2011-12. The best winning percentage in the sample is 84.72% (30 wins, 5 losses, and 1 tie) by Cornell in 2002-03.

An important factor in determining attendance is the presence of potential complements and substitutes. I examine the effects of both NHL team proximity and collegiate basketball and football success on college hockey attendance. Football success may be independent of hockey attendance because there is not much overlap in the seasons. However, a successful football team may draw attention to the school's sports programs creating a higher demand and more attendance for all sports. Because they present fans with alternative options to see sporting events, I expect NHL proximity and the success of the basketball team to decrease attendance at college hockey games. However, if the presence of an NHL team reflects a greater interest in hockey so fans simply demand more hockey, collegiate attendance could increase.

NHL team proximity is measured as a dummy variable. Distance from a campus to the closest NHL team was measured in 25-mile intervals up to 100 miles. The concentration of collegiate hockey programs falls in the Midwest and the East Coast, with 52 of the 58 schools in these areas. The New England area has the highest concentration of programs with 20, and if you include New York the number of programs increases to 30. Over half the collegiate hockey programs are located in only seven states in the upper northeast. These are the schools that are most susceptible to substitutes as there are more options for fans to choose from. These schools also have the highest likelihood of being located close to an NHL team.

Collegiate basketball success refers to the success of the basketball program at the same school as the hockey team in question. The measure I use is whether or not the basketball team was in the top 25-preseason poll. The basketball and hockey season have substantial overlap, so it is likely that fans will often have to choose to attend one or the other. More successful basketball programs may lead people to go to basketball games rather than hockey games.

Ticket price is also likely to be an important variable. The cost of attending a game is likely to be strongly and negatively related to the current season attendance. There is substantial variation in ticket prices across programs, which may indicate differing demand across colleges. Collecting ticket data was problematic. I found no database for ticket prices, so to collect data I visited every school's athletic web page. Further, schools have varying price schemes. Some schools have a single price for a game ticket, while others have multiple prices. Some schools have upper and lower deck seating, while others have standing room only. In addition, many schools have higher prices for premium games. Schools understand that rivalry games and games against better opponents inherently attract more fans. So they price these games accordingly by raising ticket prices. Many teams have a few of these games a year.

All schools have their own ticket offices, so many schools sell tickets directly. However some schools use outside websites, such as Ticketmaster.com, to sell tickets online. These sites are difficult to navigate to obtain a single game ticket price. Even worse, once the season ends, they stop displaying any information. Season ticket prices are also complicated. Sometimes you have to be a member of the support club to even be eligible to purchase season tickets. Sometimes there is a waiting list. Some schools have a single price for all

season tickets, but most schools have different seats wih different prices. Some schools have packages that let you choose which games you want to attend. All of this combined makes it extremely difficult to obtain a single ticket price that is comparable across schools. Further, there appears to be no way to collect data on past ticket prices.

With all of this complexity and variability between schools, I used the following method to obtain a measure of ticket price. If there was only one seating level then I use an adult ticket (no senior or youth discounts). If there were multiple ticket options (upper or lower deck), then I took the median ticket price. I didn't take premium game ticket prices into account because it is likely that the price of tickets for premium games are higher the higher the school's ticker prices for other games. For season tickets, I used the same method of choosing the adult ticket price if there was only one option or the median ticket price if there were multiple options. Because I only have ticket price data for only one year, I examine the factors that determine ticket price. If I can find variables that explain ticket prices well, I could use my regression results and past data on the variables that help explain prices, to "backcast" previous years ticket prices. Below is a table of the descriptive statistics for the data:

Table 1: Descriptive Statistics

	Average Attendance	Enrollment	Winning Percentage	Post-Season Games	NHL Proximity	Basketball Top 25	Football Top 25
Mean	3,438.81	10,126.16	49.63	3.45	.62	.06	.06
Std. Dev	2,635.50	8,752.69	14.43	2.13	.49	.24	.24
Min	14.0	936	8.1	0	0	0	0
Max	15,048	42,916	84.7	9	1	1	1

Model 1

The goal of my empirical model is to determine which variables affect the average attendance from year to year for each university that has division I hockey. The first model I use is a fixed-effects model to estimate attendance. In a fixed-effects model individual intercepts are estimated for each school. The intercept captures effects that are fixed across time but differ across schools. Things like enrollment and NHL proximity are relatively constant for a school across our time period, but differ between schools. These types of variables cannot be included in the fixed-effects model as independent variables because the constant of the model itself captures or largely captures their effects. For this reason, I could not include the variable for NHL proximity in the fixed-effects model. The independent variables in this model capture the effects of team success, college and community characteristics, and potential substitutes and complements to hockey. The equation used is as follows:

$$aveattend_{it} = \beta_i + \beta_1\, winpct_{it} + \beta_3\, l.winpct_{it} + \beta_4\, l2.winpct_{it} + \beta_5\, l.champ_{it} + \beta_6\, bb25_{it} + e_{it}$$

The independent variable *winpct* is the team's winning percentage in that year. The success of a team is probably one of the most important factors that determines attendance. In hockey, games can end in ties, and *winpct* captures that in the way it is calculated. A tie counts as a full game but only half a win. This means that a team with four ties will have two more wins when calculating its winning percentage (a record of 20-10 has a winning percentage of 66.67%, but a team with a record of 20-10-4 has a winning percentage of 70.59%). The expected sign for *winpct* is positive, which means that the more successful a team is during the season, the more fans it will attract.

Previous studies found that winning has a lasting impact on attendance. To account for this, I lagged a team's winning percentage to determine the effects of last season's winning

percentage on current year attendance. The variable *l.winpct* is a team's winning percentage in the previous year, and *l2.winpct* is a teams winning percentage two years prior. Since I expect more success to attract more fans, I also expect past success to attract more fans particularly given that some fans purchase season tickets and new fans may return the next season. This implies the sign on the coefficient for both *l.winpct* and *l2.winpct* should be positive.

Depkin, Williams, and Wilson (2011) found winning games in post-season play to be a highly significant determinant of attendance. I use the variable *l.champ*, which is a lagged indicator of winning the NCAA tournament championship. It is a dummy variable equal to 1 if a team won the championship in the previous season. Only highly successful teams win the championship, so this success will attract more fans in the next year. But teams that win the championship may have many key players that will be drafted and leave, which may decrease the appeal for fans to watch in the next season decreasing average attendance. Based on previous studies and our intuition on the affects of success, I expect that success will outweigh decreased appeal from players leaving and *l.champ* will have a positive sign.

I examine the effects of substitutes and complements on attendance at hockey games. The variable *bb25* is a dummy variable to capture the effect of basketball success on hokey attendance. Its value is 1 if the school's basketball team was ranked in the top 25 AP postseason poll and its value is 0 is the basketball team was not in the top 25 poll. A successful basketball team (one in the top 25) presumably draws a lot of fans and may draw fans away from hockey. The more successful the basketball team is, the more attractive it becomes relative to hockey so it would be expected that highly ranked basketball teams will be associated with lower hockey attendance, so it is likely the sign of the coefficient on *bb25* is negative. A successful football team could increase hockey attendance by drawing more

attention to a college and its sports programs, though it seems likely this effect would be small. Although hockey and football seasons have little overlap, top ranked teams play in winter bowl games and fans with limited time and funds might choose football over hockey. The coefficient on *fb25* which is a dummy variable equal to 1 when a college's football team is in the top 25 is not significant and so is not included the in model below. A table of the significant independent variables and their definitions follows:

Table 2: Model 1 Independent Variables

winpct	winning percentage
l.winpct	winning percentage in previous season
l2.winpct	winning percentage two seasons prior
l.champ	= 1 if won championship the previous season, 0 otherwise
bb25	= 1 if basketball team in preseason top 25 poll, 0 otherwise

Results 1

The fixed effects regression results for hockey are consistent with the results for other college sports. Below is a table of results, with each column as a separate regression containing an alternative specification. **Table 3: Model 1 Results**

Average Hockey Attendance By College and Year 2002-2003 to 2011-2012: Fixed Effects Model				
	Model 1	Model 2	Model 3	Model 4
winpct	7.52*** (3.42)	7.65*** (3.42)	7.44*** (3.55)	7.57*** (3.56)
l.winpct	6.54*** (3.00)	6.10*** (2.73)	6.68*** (3.12)	6.23*** (2.85)
l2.winpct	4.85** (2.31)	5.00** (2.37)	4.94** (2.31)	5.10** (2.38)
l.champ		334.46** (2.05)		340.33** (2.05)
bb25			-320.40*** (2.97)	-323.41*** (2.95)
R-squared overall	0.26	0.26	0.17	0.18

*** significant at the 1% level, ***significant at the 5% level, *significant at the 10% level

Higher winning percentages (*winpct*) have a lasting impact on attendance. Both winning percentage and lagged winning percentage (*l.winpct)* were significant at the 1% level, while the twice lagged winning percentage (*l2.winpct*) is significant at the 5% level. In a given year, a 1-percentage point increase in a team's winning percentage will increase attendance by about 7.50 fans *per game*. The next year an additional 6 fans will attend, and the year after that about 5 additional fans will attend. This result is consistent across all regression.

The team that wins the NCAA College Hockey Tournament Championship attracts more fans in the next year. Lagged championship (*l.champ)* is significant at the 5% level across all regressions. It has a substantial impact on the number of fans attracted, attracting on average well over 300 more fans per game over the course of the next season.

A successful basketball team (*bb25)* reduces hockey attendance. The dummy variable for the basketball team finishing in the top 25 poll has a negative coefficient which is significant at the 1% level. Having a basketball team in the top 25 poll decreases attendance by about 320 fans per game. Note that football teams in the top 25 had no impact on attendance.

Model 2

The second model that I used is a pooled OLS model. Unlike the fixed-effects model, the intercept of a pooled OLS model is the same for all teams, which allows me to include variables that are fixed across time for a team. With a pooled OLS model, I can determine the effects of variables I think are important that cannot be separated from the constant in a fixed-effects model. Another distinction is that I use the log of average attendance as the dependant variable. I do this to even out the skewness in the big variance of average attendance between

schools. Since the change in the log of variables is the percentage change, the effects of changes in explanatory variables on attendance are now interpreted as percentage changes rather than level of attendance changes. This is consistent with models in previous literature.

New variables that I included in the pooled OLS model are variables that are constant or relatively constant across time but differ across schools. This includes the lagged log of attendance, which is average attendance in the previous year. I expect this is strongly positively related to average attendance as many factors that affect attendance are likely persistent or have lasting effects. The equation used is as follows:

$$ln.aveattend = \beta_i + \beta_1 l.ln.attend + \beta_2 ln.enroll + \beta_3 pctwomen + \beta_4 winpct + \beta_5 l.champ + \beta_6 bb25 + \beta_7 nhlprox + e$$

I am able to include undergraduate enrollment and the percentage of women enrolled. These variables are relatively constant across time and both have been found to affect attendance in previous studies. I expect higher enrollment to increase attendance because more students means more potential fans. Bigger schools have more alumni and community support which leads to more fans that attend games. It is unclear how the percentage of women enrolled will affect attendance. Previous studies of college attendance have found that higher percentages of women have decreased attendance at games. The reason cited is that fewer women may have an interest in athletic events. If they demand less sports attendance at games decreases.

The variable of particular interest that I am able to include in the pooled OLS model is NHL proximity. This is used to capture the affect of whether professional hockey is a substitute or complement. The distance from the schools campus to the nearest professional hockey team was collected. NHL proximity is a dummy variable equal to 1 if a school is

within 75 miles of a professional hockey team and 0 if a school further than 75 miles from a professional team. Professional hockey may be a substitute for college hockey, as fans are drawn to the highest level of hockey. If having a professional team close to campus draws fans away, the sign on the coefficient of NHL proximity will be negative. It may be, however, that there are more college hockey fans in regions where profession teams are located. In these regions, the demand for hockey may be high so the presence of a professional hockey may be associated with higher attendance at college games. If this were the case, NHL proximity would have a positive sign and be considered a complement to college hockey. A table of the significant independent variables and their definitions follows:

Table 4: Model 2 Independent Variables

l.ln.attend	log of average attendance in the previous season
ln.enroll	log of undergraduate enrollment
pctwomen	percentage of the undergraduate population that is female
winpct	winning percentage
l.champ	= 1 if won championship the previous season, 0 otherwise
bb25	= 1 if basketball team in preseason top 25 poll, 0 otherwise
nhlprox	= 1 if campus is within 50 miles of NHL team, 0 otherwise

Results 2

The pooled OLS regression results for hockey are consistent with the results for other college sports and the results from the fixed-effects model. Below is a table of results, where the dependant variable is the log of average attendance.

Table 5: Pooled OLS Results

	Coef.	Robust Std. Err.	t
l.ln.attend	.93599***	.01180	79.27
Ln.enroll	.02425**	.00890	2.72
pctwomen	-.10522***	.03586	-2.93
winpct	.30770***	.04290	7.17
l.champ	.07477**	.03690	2.03
bb55	-.06108**	.02622	-2.33
nhlprox	-.02126**	.01029	-2.07
const	.20836***	.07012	2.97

*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level

Variables used in the fixed-effects model to be significant in the pooled OLS model as well. Winning percentage, lagged championship, and top 25 basketball teams all were significant with the expected sign. These results show that if winning percentage rises by 1% point, for example from 65% to 66%, then attendance rises by about .31% per game. So for a school with attendance of about 3000, attendance would rise to about 3009 in the current year. This is consistent with my initial results.

The log of enrollment is significant at the 5% level and has a positive sign. This means that as enrollment increases attendance at hockey games increases, in particular a 1% increase in enrollment increases attendance by .024%. The percentage of women enrolled is significant

at the 1% level and has a negative sign. Previous research is supported because I found that more women enrolled at a school leads to lower average attendance for hockey.

The proximity to an NHL team is of primary interest in this regression. It is significant at the 1% level and has a negative sign. This means that teams that are within 75 miles of a professional hockey team will have decreased average attendance. This shows that professional hockey is a substitute to college hockey.

Ticket Price Model

In addition to modeling attendance, I modeled ticket prices. I used an OLS model with the median ticket prices as the dependent variable. This model is used to find the determinants of ticket price. I only have one year of ticket price data and I was unable to find prices for a few schools. However, if ticket prices are highly correlated with other variables, I could use those other variables to estimate ticket prices for previous years. The equation I estimate is as follows:

$$medtprice = \beta_i + \beta_1\, l.attocap + \beta_2\, l.enroll1000 + \beta_3\, l.winpct + \beta_4\, nhlprox + \beta_5\, city + e$$

A new variable that I include is a ratio of the previous season's average attendance relative to capacity of the stadium (*l.attocap).* If this is high it means the stadium is nearly filled to capacity so the school can charge higher prices. The only other new variable that I included in this regression is a dummy variable for location of the university (*city).* This variable is equal to 1 if the school is located in an urban environment, and 0 if not.

I have used the other variables in this model in previous models. I include a measure of school size (*l.enroll100),* a measure of team success (*winpct),* and a measure of a substitute to college hockey by including the proximity to an NHL team (*nhlprox).* I expect school size and team success may be positively associated with higher ticket prices. Because it is a substitute I expect proximity to an NHL team to be associated with lower ticket prices. A table of the independent variables and their definitions follows:

Table 6: Ticket Price Model Independent Variables

l.attocap	attendance relative to capacity of the stadium in previous season
l.enroll1000	undergraduate enrollment in thousands
l.winpct	winning percentage in previous season
nhlprox	= 1 if campus is within 50 miles of NHL team, 0 otherwise
city	= 1 if campus is located in a city, 0 otherwise

Ticket Price Results

The results for the pooled OLS regression for median season ticket price are as follows.

Table 7: Ticket Price Model Results

Median Ticket Price	Coef.	Robust Std. Err.	t
l.attocap	0.12***	0.04	3.18
l.enroll1000	0.23***	0.07	3.18
l.winpct	0.01	0.05	0.24
nhlprox	-0.10	1.70	-0.06
city	1.03	1.33	0.77

const	4.19*	2.78	1.51
Adj. R-squared	0.36		

*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level

The only variables that were significant were lagged attendance relative to capacity and lagged enrollment. Both of these variables were significant at the 1% level. All other variables were not significant. This means there is no evidence that these variables help explain ticket prices.

Both of the significant variables have a positive coefficient meaning that an increase in the variable will increase ticket prices. The coefficient for attendance relative to capacity in the previous season is 0.12. This means that a 1% increase in the attendance relative to capacity increases the ticket price by 12 cents. The coefficient for enrollment in the previous year is 0.23. This means that an increase in undergraduate enrollment by 1000 will increase the ticket price by 23 cents. However, the model explains only about one-third of the variation in ticket prices. The adjusted R-squared is 0.36. Since the model can't explain much of the variation in ticket prices, I do not include estimated ticket prices in my attendance regressions.

Conclusion

This study examined college hockey attendance at the 58 universities that had division I men's hockey programs from 2002-2003 to 2011-2012. This empirical study was designed with two purposes: To fill the gap in literature regarding attendance at college hockey games and to determine if college basketball, college football, and professional hockey were substitutes for or complements to college hockey, and if so how large their effects were.

My results support previous findings on determinants of attendance even though college hockey is played at a comparatively small number of schools and has a smaller fan

base. In both models, I found the amount of variance explained (the adjusted R^2) was similar to those for other attendance studies. In the pooled OLS model both enrollment and percentage of women enrolled were significant at the 1% level, while NHL proximity was significant at the 5% level. All these variable's effects were also as I expected.

Higher winning percentages have a lasting impact on attendance. The more successful a team is, the more fans it will attract. The pooled OLS model confirms the results from the fixed-effects model. Looking at the lagged winning percentages of the hockey teams, I found that past success positively affects attendance. This means that having a highly successful season will increase attendance for years to come.

I found that higher undergraduate enrollment is associated with higher attendance. This is likely because more students at the school means more potential fans. Bigger schools have larger alumni networks and larger fan bases. But I found that if a high percentage of the undergraduate enrollment is women, then hockey attendance decreases. This is consistent with the findings of previous studies and suggests that women simply have a lower interest and so lower demand for college hockey than males.

One of the purposes of this study was to determine whether other sports were substitutes or complements to college hockey. The first sport I examined was men's basketball. I found that a university with a successful men's basketball team attracts fans away from hockey. The number of fans that hockey looses is substantial. If the basketball team is in the AP Top 25 poll current season attendance is about 6% lower. For a school with attendance of about 3000, attendance would fall by about 180 per game. The next sport I examined was hockey. I found evidence that professional hockey is also a substitute. Fans are drawn away from college hockey if they are within 75 miles of the nearest NHL team. This

makes college and professional hockey substitutes, not complements.

An OLS model is used to determine the factors that influence ticket prices. I cannot include ticket prices in attendance regressions because I only have one year of data on ticket prices. If ticket prices are highly correlated with other variables, then those variables can be used in other regressions instead of ticket price. The only variables that were statistically significant were attendance relative to capacity of the stadium and undergraduate enrollment. Both variables were positively related to ticket price meaning that as the attendance relative to capacity increases and as enrollment increases, ticket prices increase. However, the amount of ticket price variation explained in this model is low. Better estimates might be possible if I had more years of ticket price data and if I could find a variable that better explains ticket prices.

This is the first paper to study attendance at the collegiate ice hockey level, but there is further work that can be done. First, there are alternative measures of basketball and football success, such as winning percentage. It would be useful to use winning percentages because some Division I hockey programs do not have Division I basketball so using winning percentages would show the success of basketball relative to the level at which they compete. Last, there is no measure of ticket price in either of my regressions. This variable was difficult to collect and was only available for on season, so I could not confidently include it in this study. Ticket price is important to the demand for games. Future studies will want to include ticket price as a variable to accurately capture the demand for college hockey, so the collection of ticket prices in future years would be valuable.

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has been approved as meeting the thesis or project requirement for the Designation

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Dr. Bryce Kanago, Honors Thesis Advisor

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Date

Dr. Jessica Moon, Director, University Honors Program