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Are U.S. Professional Sports Leagues Recession Proof?

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Senior Thesis

Are U.S. Professional Sports Leagues Recession Proof?

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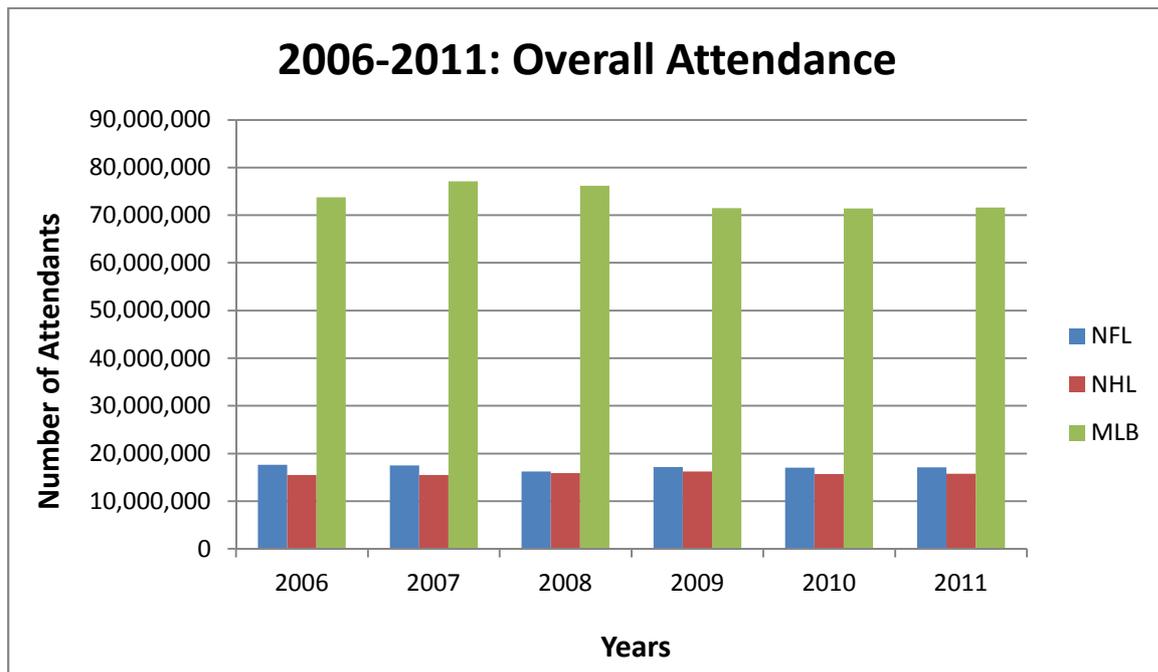
Abstract:

In the U.S., there is a strong passion for professional baseball, football, and, increasingly hockey. An interesting issue is whether this passion diminished during the recession of 2007-2009, the worst since the Great Depression, or remained the same. This study investigates the impact of economic downturns on the professional sports industry. In particular, it examines whether the National Football League, National Hockey League, and Major League Baseball are recession proof (i.e. minimally impacted by recessions). Using regression analysis, this study explores the effect of recession and other factors on U.S. attendance and league revenue for the three professional leagues from 1990 to 2012. While much research has been done concerning whether other industries are recession proof, not much information exists discussing whether the sports industry is recession proof.

I. Introduction

Americans have a passion for professional sports. Baseball is “America’s Pastime”, Sunday afternoons and evenings are traditionally dedicated to football games, and hockey is becoming more popular, especially in the Eastern United States, as the Canadian influence transcends international borders. According to ESPN (2013), in 2007 alone, over 17 million people attended National Football League (NFL) games, more than 77 million fans attended Major League Baseball (MLB) games within the United States, and over 15 million Americans attended National Hockey League (NHL) matches. However, Americans are still feeling the effects of the worst recession since the Great Depression. WR Hambrecht and Company Sports Finance (2012, p. 4) reflected on the 2007 to 2009 recession saying, “While the length of the recession was not unique or overly lengthy from a historical perspective, what is most alarming is the snail’s pace of growth in the wake of the crisis.” Below is a graph displaying the total/overall league attendance per year for the three leagues during this financial crisis.

Table 1 (ESPN)



The table above indicates how attendance levels for American teams, although decreasing slightly at points from 2006 to 2012, remained fairly stable throughout the recession. Therefore, there is evidence, from the most recent recession, that the sports industry may possibly be recession proof. For the purpose of this study, a recession proof industry will be defined as an “industry that is minimally impacted by economic downturn . . .” (Manuel, 2014). Further, a sports industry that is “minimally impacted” by economic downturn and is thus recession proof has revenue and attendance figures that still reflect growth, even if these figures are growing at a lower rate. This is based on Michael Urquhart’s (1981) definition of recession proof.¹ Moreover, this study will explore whether these industries have been minimally impacted by recessions, as indicated by their attendance and revenue data, or whether they have been heavily affected by recessions. Evidence

¹Michael Urquhart (1981) finds that recession proof is “The combination of steady growth and relative cyclical insensitivity . . . however, certain qualifying factors are necessary. The rate of growth is reduced during downturns, and some components of this division are more cyclically sensitive than others.” Some definitions argue that recession proof means that an industry must be completely resistant to all economic downturns. This is too strict of a definition for the purpose of this study.

towards recession proof leagues comes from data provided by Forbes (2013) which indicates that from 2007 to 2008, right in the middle of the recession, total league revenue for the MLB climbed from \$5,900,909,733 to \$6,021,826,532 (2.04%), while the NHL's total league revenue also slightly rose from \$2,284,401,772 to \$2,286,310,622.² The NFL total league revenue grew most substantially from 2007 to 2008 by 2.89% from \$7,850,900,000 to \$8,077,799,000.³ This data highlights how as families tried to make every dollar go a little further, when unemployment was pervasive, and when certain activities had to be eliminated because of constraining finances, people still attended NFL, NHL, and MLB games. This warrants a few questions:

1. Starting in 2007, did fewer people attend professional athletic events than when the country is not in a recession? Is it only for particular leagues that attendance decreased?
2. Are fewer people still attending these events today because of the recession?
3. Do organizations have to increase ticket prices during recessions in order to maintain revenue?
4. Are certain professional sports leagues more recession-proof than other professional sports leagues?

Through this study, some of the questions listed above will be answered while different questions will also be addressed. To determine if the NFL, NHL, and MLB are recession proof, this study will compare data from the 1990-1991, 2001, and 2007-2009 recessions to data from non-recessionary years. These are considered official recession years by the National Bureau of Economic Research (2010). The data for each variable will only correspond to American teams.

² This includes only American teams' data.

³ These numbers, like all numbers in this study, are measured in 2012 American dollars.

The format of this paper is as follows: Section II reviews related literature. A model of attendance and revenue is provided in Section III. Data used in the analysis are described in Section IV. Section V discusses regression estimates of the models. The concluding section is a summary of the paper with some analysis and insights into the results from the regression.

II. Literature Review

Several studies have been conducted that are related to this study. While some of them do not pertain to professional sports, they are relevant as they analyze factors that influence industries within a recessionary period.

According to the National Bureau of Economic Research (2010), a recession is defined as a “decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales”. In regards to the sports industry, particularly the NFL, NHL, and MLB, K.C. Joyner (2008) hypothesized that the only U.S. recession that affected the National Football League was the 1973-1975 recession. Joyner explains, “. . . attendance dropped by 4.6% from 1973 to 1975 . . . this last bit of information shows that while the league hasn’t been completely recession proof, it has weathered these financial storms”. In contrast, Koba (2013) believes that the National Hockey League is the only recession proof league from 2007 to 2012 because, despite an increase in ticket prices, attendance remained steady. He attributes this trend to hockey fans being more financially affluent than other sports fans. Lastly, MLB saw record breaking revenues in 2009, thus underscoring how it, too, may be recession proof.

A. Factors that Influence Attendance and Revenue:

Borland (2006, p. 23) identifies various factors which contribute to professional sports league revenue such as the price of a single game ticket, sales of television/internet rights, and merchandise sales. Downward and Dawson (2000, p.116) also identify various elements which influence attendance at games. Those include market size, price of tickets, and income. Downward and Dawson further explain, “. . . market size is a ubiquitously significant determinant of demand”. These authors conduct an empirical analysis of how these listed factors affect attendance and revenue. Despite their data not reflecting a recessionary period, their study provides a model of factors that influence attendance and revenue. Rottenberg (2001, p. 7) further elaborates, “Attendance at baseball games, as a whole, is a function of the general level of income, the price of admission to games . . . is a positive function of the size of the population of the territory in which the team” plays. Rottenberg highlights that from 1931 to 1950 attendance to games in New York City was 27,270,000 while in St. Louis attendance was only 4,160,000.

Welki and Zlatoper (2001) present a regression analysis on various factors which influence NFL attendance. They only focus on the 1991 season. The model used in their study has game-day attendance as the dependent variable and price of tickets, real per capita income, price of parking at one game, season’s winning proportion of the home team prior to game day, season’s winning proportion of the visiting team prior to the game, number of regular season games played, temperature, whether the game is in a dome, whether teams are in the same division, whether the game is on Sunday or not, Sunday night games, and if the game is a blackout on television as independent variables.

WR Hambrecht and Co. Sports Finance Group (2012, p. 32), in their analysis of descriptive statistics, concludes that the “US sports market is an incredibly unique sector for a multitude of reasons, the most significant of which is that it is highly resistant to the ebbs and

flows of the economy overall”. The study goes on to say that “attendance and overall spend [sic] has continued to rise despite the recent economic recession”. Attendance records and average ticket prices for the NHL, MLB, and NHL from 2006 through 2012 are also provided. The strength of this study comes from its franchise valuations which reflect a steady increase in team values from 2006 to 2012. As league revenue and average operating income per league is further explored, WR Hambrecht asserts that revenue has remained fairly stable. Team valuations cover every team in the NFL, MLB and NHL which draws a nice comparison between cities and thus population. The data provided reflects the most recent recessionary period, and the study analyzes the trends revealed by that period.

Noll (2001) also conducts a regression analysis. He highlights how professional sports are able to survive and be profitable based on the demand for them. He commences by going through the a priori factors or independent variables that go into the demand for a game: a good game versus a bad game, population of the city the game is played in, team quality, price of ticket, the stadium/arena the game is played in, weather conditions, racial composition of a city and whether it is a playoff game. Pricing and attendance are the dependent variables. Noll then presents the regression results for MLB attendance for the 1970 and 1971 seasons. He finds that there is a negative correlation between income and attendance which highlights that baseball is a “working-class sport”.

Noll also studies the demand for NFL games; he notes that in 1970, roughly two-thirds of teams were completely sold out or within only a few thousand fans of doing so. A regression for the results of the 1970 NFL season attendance is also presented. Football attendance negatively correlates with income just like baseball. This is because football is associated with lower per capita income fans and is predominately popular in Southern cities. Noll provides the same regression analysis for NHL game attendance for the 1972-1973 season. Hockey is a much more regionally based than other sports; it is mostly popular in the

Northern U.S. and Canada. Despite this study not being conducted using recessionary data, it is important to note that Noll regards attendance and revenue as key indicators of the success of a league or organization. In turn, those variables are particularly influenced by income and the region where the team plays. For Noll, “Attendance is heavily influenced by the size of the cities’ population: the larger the city, the greater the attendance” (204).

B. Analysis from Parallel Industries

The United States Department of Transportation (2012) explains how the most recent recession affected the aviation industry. Many airlines introduced additional baggage fees and reduced the number of flights. These changes, such as fare increases and capacity reductions, are the main factors that enabled this industry to survive the recession. The U.S. sports industry can be compared to the aviation industry in that many teams increased ticket prices in order to maintain revenues. For example, from 2007 to 2008, MLB raised ticket prices from \$25.21 to \$26.98, NHL raised prices from \$48.87 to \$50.15, and NFL raised ticket prices from \$74.31 to \$76.98 (Fort, 2012). Despite these being only modest increases, many teams also offered promotional incentives in order to get people to attend games. According to Britt (2011), “Teams are also doing a lot more promotions in order to get fans into the stadium and once at the stadium, there are now a lot more activities to entertain fans besides the game itself”. For instance, the Pittsburgh Penguins (NHL) organized a successful campaign with Pizza Hut in which they did commemorative cups featuring different players each week. This, in turn, encouraged fans to attend the games because these cups became a collector’s item. Finally, attendance at sporting events during a recession depends on ticket price and income which is similar to the aviation industry’s fee increases and their effects on number of people willing to fly.

Legg and Tang (2012) focus on the effect on the gaming industry of the most recent recession. This study declares that the gaming industry is not recession proof. Its methodology is particularly applicable to the current study in that the dependent variable is gaming revenue while one of the independent variables is attendees. The authors use the Ordinary Least Squares method, binary recession variables, and annual time-series data for 2001 to 2010. Legg and Tang then perform a one way t test on the binary recession variables and conclude that the latest recession heavily impacted the gambling industry.

In another relevant study, Hiraide (2012) analyzes the auto industry, particularly Ford Motor Company, during the most recent recession. The author asserts, "It is hypothesized in this study that the demand for new vehicles is negatively related to vehicle prices and gasoline prices and positively related to . . . household income". Covering over a twenty year period (1990-2010), the author performs a time series analysis of data on Ford. In the model used, sales, which is the number of Ford vehicles sold in North America, is the dependent variable. The independent variables include the average price of Ford vehicles, the average price of gasoline in the previous year, the units of single family housing starting in the previous year, total non-farm employment (million), and whether the economy was in a recession.

One final study is comparable to this study in that it explores the variables which affect NBA (National Basketball Association) revenue. Jacobs (2009) studies whether losing affects the revenues of a particular NBA franchise. He uses NBA franchise revenue as the dependent variable. Some of his independent variables for revenue include gate revenue, ticket prices, overall league attendance, and national population. Jacobs predicts that gate revenue is to have a positive effect on revenue, and his analysis confirms this hypothesis. He also predicts that attendance will positively affect revenue, and this proves to be true as well. According to Jacob's study, population also positively impacts the revenue of a team. Lastly,

he finds, from his model, that ticket prices have a positive and significant effect on franchise revenue.

III. Model

In Welki and Zlatoper's study (2001, p. 221), they reference a survey done by Schofield (1983b) of factors that affect attendance, and those factors encompass four categories, three of which are used in the current study. The ones used in this study are economic variables (e.g., average ticket price, per capita income), demographic variables (e.g., total national population), and variables reflecting influences or preferences not already accounted for by the other categories (e.g., average ticket price of substitutes such as average ticket prices of opposing sports). Therefore, the model created includes these three categories along with recessionary variables (e.g., percentage of a sport season that was during recession, unemployment rate) and a variable which indicates the number of teams in a league per season. For the purpose of the current study, variables that will be pulled from the Welki and Zlatoper study are price and income; these are independent variables and will be used to see what influence they have on attendance which is the dependent variable. Finally, the study presented will use Jacob's revenue model as the model for overall league revenue for the NHL, MLB, and NFL. The model follows:

$$\begin{aligned} \text{ATTENDANCE} = f(\text{PRICE, INCOME, POP, TEAMS, SUBS,} \\ \text{RECESS, UNEMPL, LOCKOUT)} \end{aligned} \quad (1)$$

where Table 3 lists the variable names and definitions.

Table 3: Description of Attendance Variables

ATTENDANCE	Total League Attendance per year
PRICE	Average Ticket Price per game per season (2012 U.S. Dollars)
INCOME	Real Per Capita U.S. Income per year (2012 U.S. Dollars)
POP	Total National U.S. Population per year
TEAMS	Number of Teams in each league per season
SUBS	Average ticket price of rival sports leagues (2012 U.S. Dollars)
RECESS	Based on NBER recession years – Percentage of months of a league’s season that occurred during a recession
UNEMPL	National U.S. Unemployment Rate per year
LOCKOUT	Dummy variable used to account for NHL lockout years of 1991-1992, 1994-1995, 2004-2005. 1 = season that followed a recession, 0 = season that did not follow a recession.

For some of these variables, the expected relationship between them and attendance, ceteris paribus, is clear. For other factors, contradictory forces prevent the a priori prediction. Therefore, below are the hypothesized relationships between the independent variables and total attendance.

PRICE is expected to negatively impact total fan attendance to games. As the average ticket price per game increases, fans will opt to attend fewer games. Differently, the price of substitutes will positively affect fan attendance. As the ticket price of a certain league increases, the number of fans attending another league will increase as a result. For instance, if the average ticket prices for NHL and NFL tickets fall, people will opt to attend more NHL and NFL games and fewer MLB games as a result.

TEAMS will positively affect fan total attendance. According to MLB, NFL, and NHL league history records (2013, 2014), since 1970, the NFL has increased the number of teams in the league from 26 to 32, the MLB has increased from 24 to 30, and the NHL has

increased from 14 to 30 teams. In turn, as the number of TEAMS increases so too does total league fan attendance because there are additional teams for fans to come and watch. For total national population (POP), it has a positive relationship with attendance. As the population grows, there will be an increased number of fans who attend sporting events.

The anticipated effect of the remaining independent variables on overall league attendance remains unclear. Welki and Zlatoper, (2001, p. 222) explain, “How changes in income (INCOME) will affect game attendance is indeterminate. There have been mixed results in previous research on the relationship between income and attendance at sporting events”. Noll (2001, p. 170) finds a “negative correlation between attendance and income” within baseball and football, but not hockey. Other factors that are also uncertain in their effects on overall fan attendance include RECESS and UNEMPL. However, as for RECESS, intuition would say that that during a recession, total fan attendance would decrease. This is exactly what this study will test. Lastly, UNEMPL mirrors RECESS in that intuition would say that the higher the unemployment rate, the fewer the number of people who attend sporting events. This study tests if this hypothesis holds.

Finally, LOCKOUT is an independent variable that will only be included in the NHL regressions. LOCKOUT has an unknown relationship with attendance in that a year following a lockout, fans will either be overjoyed to attend games and will attend games in large numbers or fans will be mad that a lockout occurred and will choose not to attend games in protest.

Below is the model that includes factors which affect total league revenue during a recessionary period:

$$\text{REVENUE} = f(\text{GATE}, \text{ATT}, \text{PRICE}, \text{POP}, \text{INCOME}, \text{RECESS}, \text{UNEMPL}, \text{LOCKOUT}) \quad (2)$$

where Table 4 lists the variable names and definitions.

Table 4: Description of Revenue Variables

REVENUE	Total League Revenue per year (2012 U.S Dollars)
GATE	Total Gate Receipts per league per year (2012 U.S. Dollars)
ATT	Total League Attendance per year
PRICE	Average Ticket Price per game per season (2012 U.S. Dollars)
POP	Total National U.S. Population per year
INCOME	Real U.S. per capita income per year (2012 Dollars)
RECESS	NBER recession years – Percentage of months of a league’s season that occurred during a recession
UNEMPL	National U.S. Unemployment Rate per year
LOCKOUT	Dummy variable used to account for NHL lockout years of 1991-1992, 1994-1995, 2004-2005. 1=year that followed a recession, 0=year that did not follow a recession

Turning to REVENUE, for some of these variables, the relationship between them and total league revenue, *ceteris paribus*, is clear. For others, the relationship is uncertain.

Therefore, below is a brief description of the a priori relationships between REVENUE and its independent variables. These are hypothesized relationships.

GATE and ATT have a positive relationship with REVENUE. The higher the total gate revenue, the higher the league’s revenue. As for ATT, the greater the total number of people who attend a game, the higher the total league revenue.

The relationship between PRICE and REVENUE is unclear as it depends on price elasticity of demand. For instance, as the price of a ticket goes up, if attendance remains the same because of a perfectly inelastic demand, total league revenue could also increase. However, if price increases so much so that potential fans do not attend games, then total league revenue will decrease because there are fewer people going to games. Jacobs (2009) predicts and proves that ticket price has a positive relationship on NBA total revenues. In

turn, the relationship between PRICE and REVENUE is dependent on the number of people who attend games.

The relationship of REVENUE with both POP and INCOME is positive. Jacobs (2009) explains, “Population is very important to the ability of franchises to generate revenue because a higher population translates into a larger consumer base for a specific team”. Jacobs also finds that POP “proved to be extremely significant in the model, having a t-statistic of 5.55”. Similarly, people with a higher INCOME have the ability to spend more money attending professional sporting events.

The relationship of REVENUE with both RECESS and UNEMPL, the recessionary variables, is unclear. While intuition would indicate that total league revenue would decrease during a recession and when unemployment rates are high, this is exactly what this study wishes to further examine. Because no previous studies explore the effects of RECESS and UNEMPL on REVENUE, the predictions for these relationships are uncertain.

Finally, LOCKOUT is a variable that will only be included in the NHL regressions. LOCKOUT has an unknown relationship with REVENUE. In the year following a lockout, fans will either be overjoyed to attend games and will spend money on the National Hockey League, thus increasing overall revenue, or fans will be mad that a lockout occurred and will choose not to attend games or spend money on the NHL in protest, thus hurting revenue.

IV. Data

The variables and data below used in both equation 1 and equation 2 deal with information ranging from 1990 to 2012 within the United States and account for only American teams in the National Hockey League, Major League Baseball, and National

Football League.⁴ As a reminder, all dollar values provided in this study have been adjusted for inflation and reflect real terms based on 2012 dollars.

In equation 1, ATTENDANCE refers to the total, overall league attendance per year for the NHL, MLB, and NFL, measured in units, as reported by ESPN (2013) and Fort (2012). PRICE is the average ticket price, in 2012 dollars, per year for each of the three leagues. The average ticket price for each league was compiled by Fort (2012) and *Forbes Magazine* (2013).

INCOME, measured in units, is the U.S. per capita income as recorded by the World Bank (2014) from 1990 to 2012 and converted into 2012 dollars. POP is the total U.S. population for the years 1990-2012 in millions. This data was provided by the United States Census Bureau (2012).

TEAMS refer to the total number of teams in a certain league for a given year, and this data was also recorded by the National Football League, National Hockey League, and Major League Baseball (2013, 2014). For the NHL and MLB, Canadian teams were subtracted out of the total number of teams so as to solely focus on American teams.

SUBS refer to the average ticket prices, in 2012 U.S. dollars, of competing sports leagues. For instance, MLB's average ticket price will compete against the average ticket prices of the NFL and the NHL. All average ticket prices were compiled by Fort (2012) and *Forbes Magazine* (2013).

RECESS and UNEMPL are the study's recessionary variables. RECESS is the percent of months that a certain league's games occurred during a U.S. recession. The

⁴For Major League Baseball, the Montreal Expos were factored out of all variable data from the years 1990 to 2004, and the Toronto Blue Jays were factored out of the data sets from 1990 to 2012. For the National Hockey League, the Montreal Canadiens, Ottawa Senators, Toronto Maple Leafs, Calgary Flames, Edmonton Oilers, and Vancouver Canucks were factored out of each category from 1990 to 2012. The Quebec Nordiques existed from 1990-1994 so they were eliminated from all data sets, and the Winnipeg Jets were factored out from 1990-1996 and then again from 1999-2012. The reason for taking out the Canadian teams' data is that this study aims to focus strictly on U.S. recessions and their impact on American based-teams.

recessionary period is defined by the National Bureau of Economic Research (2010).

UNEMPL, a percentage, is the annual U.S. unemployment rate compiled by the Bureau of Labor Statistics (2014) taken from the July recordings.

Finally, LOCKOUT is a variable that will only be included in the NHL regression, as the NHL is the only league with more than one lockout over the time span of 1990-2012. According to National Hockey League (2014), the 1992 lockout postponed thirty games, the 1994-1995 lockout shortened the regular season to forty-eight games, and the 2004-2005 lockout cancelled the entire season. While the MLB cancelled its entire 1994-1995 season due to strike, this is only one strike as compared to the three within the NHL from 1990-2012. LOCKOUT refers to whether a season occurred after a lockout, and it is a dummy variable. 1 = a season that occurred after a lockout and 0 = a season that did not occur after a lockout. Tables 5,6,7 contain summary statistics on the variables used in the attendance analysis.

Table 5: Summary Statistics of Attendance Variables for NFL

Variables	Mean	Standard Deviation
ATTENDANCE	15,706,926	1,617,349.93
PRICE	62.70	12.87
INCOME	36,132.00	8,916.51
POP	283,643,478	19,828,052.35
TEAMS	30.52	1.62
SUBS (NHL)	54.53	6.14
SUBS (MLB)	21.66	5.00
RECESS	.13	.31
UNEMPL	6.06	1.61

Notes: The average was taken for overall league attendance for the years 1992-1998

SUBS (NHL): ticket price for 1991 is the average of 1990 and 1992 ticket prices, in 2012 dollars =50.39, ticket price for 2004 is the average of 2003 and 2005 ticket prices, in 2012 dollars = 50.54, ticket price for 2012 is the average of 2013 (60.13) and 2011 ticket prices = 55.63 (required to do this because missing these years due to lockout)
 SUBS (MLB): ticket price for 1994 is the average of 1993 and 1995 ticket prices, in 2012 dollars = 15.74

Table 6: Summary Statistics of Attendance Variables for MLB

Variables	Mean	Standard Deviation
ATTENDANCE	65,343,910	9,201,632.98
PRICE	21.93	4.94
INCOME	36,566.29	8,873.88
POP	384,577,273	19,770,250.18
TEAMS	27	1.77
SUBS (NHL)	54.54	6.29
SUBS (NFL)	63.38	12.74
RECESS	4.63	21.31
UNEMPL	6.06	1.65

Notes: 1994 season not included because of strike

Average Ticket Price for 1990 is average of ticket price in 1988 (2012 U.S. dollars equals 11.94) and average ticket price of 1991
 SUBS (NHL): ticket price for 1991 is the average of 1990 and 1992 ticket prices, in 2012 dollars =50.39, ticket price for 2004 is the average of 2003 and 2005 ticket prices, in 2012 dollars = 50.54, ticket price for 2012 is the average of 2013 (60.13) and 2011 ticket prices = 55.63 (required to do this because missing these years due to lockout)

Table 7: Summary Statistics of Attendance Variables for NHL

Variables	Mean	Standard Deviation
ATTENDANCE	14,265,625	2,156,167.45
PRICE	54.91	6.64
INCOME	36,355.66	8,456.38
POP	284,163,158	18,681,072.14
TEAMS	21.71	2.00
SUBS (NFL)	63.52	12.33

SUBS (MLB)	21.88	4.91
RECESS	.15	.32
UNEMPL	5.99	1.74
LOCKOUT	.16	.37

Notes: Seasons not included are 1991-1992, 1994-1995, 2004-2005, 2012-2013 because these are lockout years
Total attendance for 1992-1993 comes from the average of total attendance for 1990-1991 and 1993-1994
Average ticket price for the year 1990-1991 is the average of the average ticket price of 1989-1990 (42.49) and the average ticket price of 1995-1996, the average ticket price for 1991-1992 is the average of the average ticket price of 1990-1991 and 1995-1996, the average ticket price of 1992-1993 is the average of the average ticket price of 1991-1992 and 1995-1996, the average ticket price of 1993-1994 is the average of the average ticket price of 1992-1993 and 1995-1996, and the average ticket price of 1994-1995 is the average of the average ticket price of 1993-1994 and the average ticket price of 1995-1996

In equation 2, REVENUE, measured in 2012 U.S dollars, refers to the total league revenue per year, adding up each teams' individual revenues, for each of the three leagues. This information was gathered by *Forbes Magazine* (2013) and Fort (2012). GATE refers to the total gate revenue for a given year for a given league, measured in U.S. 2012 dollars as reported by Fort (2012). ATT is the total attendance per league per year, measured in units, and this information was recorded by ESPN (2013) and Fort (2012). PRICE refers to the average ticket price per year per league, in 2012 U.S. dollars, and this information was gathered by Fort (2012).

POP, recorded in units, is the total national U.S. population for the years 1990-2012. This data was provided by the U.S. Census Bureau (2012). INCOME is the U.S. annual per capita income, measured in 2012 dollars, as recorded by the World Bank (2014).

Lastly, RECESS and UNEMPL are recessionary variables. RECESS is the percentage of months per season in which games were played during a recession. The recessionary years are defined by the National Bureau of Economic Research (2010). Unemployment figures reflect the U.S. unemployment rate compiled by the Bureau of Labor Statistics (2014) taken from the July recordings.

Finally, LOCKOUT is a variable that will only be included in the NHL regressions, as the NHL is the only league with more than one lockout over the time span of 1990-2012.

LOCKOUT refers to whether a season occurred after a lockout, and it is a dummy variable. 1 = a season that occurred after a lockout and 0 = a season that did not occur after a lockout.

Tables 8,9,10 contain summary statistics on the variables used in this analysis.

Table 8: Summary Statistics of Revenue Variables NFL

Variable	Mean	Standard Deviation
REVENUE	5,657,748,348	2,403,946,465
GATE	1,305,044,728	468,178,490
ATT	15,706,926	1,617,349.93
PRICE	62.70	12.87
POP	283,643,478	19,828,052.35
INCOME	36,132	8,916.51
RECESS	.13	.31
UNEMPL	6.06	1.61

Notes: The average was taken for overall league attendance for the years 1992-1998
 For 1997 league revenue, the average of league revenue of 1996 and 1998 was used
 Total gate receipts of 1997 came from the average of total gate receipts of 1996 and 1999, total gate receipts for 1998 was taken from the average of total gate receipts of 1997 and 1999, total gate receipts for 2000 was taken from the average of total gate receipts of 1999 and 2002, and total gate receipts for 2001 was taken from average of total gate receipts of 2000 and 2002, and total gate receipts for 2012 is the same as 2011

Table 9: Summary Statistics of Revenue Variables MLB

Variable	Mean	Standard Deviation
REVENUE	4,313,440,797	15,511,196,500
GATE	1,670,130,282	756,729,349.7
ATT	62,902,941	9,201,632.98
PRICE	21.93	4.94
POP	284,577,273	19,770,250.18
INCOME	36,566.29	8,873.88

RECESS	4.63	21.30
UNEMPL	6.06	1.65

Notes: 1994 season not included in data because of strike
Average Ticket Price for 1990 is average of ticket price in 1988 (2012 U.S. dollars equals 11.94) and average ticket price of 1991
Total Revenue for 1998 is the average of 1997 and 1999
Total Gate Receipts for 1997 is the average of 1996 and 1999 gate receipts and the Total Gate Receipts for 1998 is the average of 1997 and 1999 gate receipts

Table 10: Summary Statistics of Revenue Variables NHL

Variable	Mean	Standard Deviation
REVENUE	2,018,731,492	1,026,686,878
GATE	809,176,231.5	158,414,598.6
ATT	14,265,625	2,156,167.45
PRICE	54.91	6.64
POP	284,263,158	18,681,072.14
INCOME	36,355.66	8,456.38
RECESS	.15	.32
UNEMPL	5.98	1.74
LOCKOUT	.16	.37

Note: 1991-1992, 1994-1995, 2004-2005, 2012-2013 seasons are not included in data because of lockout years
Total attendance for 1992-1993 came from the average of total attendance for 1990-1991 and 1993-1994
Average ticket price for the year 1990-1991 is the average of the average ticket price of 1989-1990 (42.49) and the average ticket price of 1995-1996, the average ticket price for 1991-1992 is the average of the average ticket price of 1990-1991 and 1995-1996, the average ticket price of 1992-1993 is the average of the average ticket price of 1991-1992 and 1995-1996, the average ticket price of 1993-1994 is the average of the average ticket price of 1992-1993 and 1995-1996, and the average ticket price of 1994-1995 is the average of the average ticket price of 1993-1994 and the average ticket price of 1995-1996
Total gate receipts for 1996-1997 is the average of 1995-1996 and 1999-2000 total gate receipts, total gate receipts for 1997-1998 is the average of 1996-1997 and 1999-2000 total gate receipts, total gate receipts for 1998-1999 is the average of 1997-1998 and 1999-2000 total gate receipts, total gate receipts for 2000-2001 is the average of 1999-2000 and 2002-2003 total gate receipts, and total gate receipts for 2001-2002 is the average of 2000-2001 and 2002-2003 total gate receipts

V. Estimation Results

This section presents the results from the six regressions that were run. Two separate models (ATTENDANCE and REVENUE) were run three times each for each of the leagues (NFL, NHL, MLB) to see which variables have a significant effect on ATTENDANCE and

REVENUE. Based on the results, one can decide if these three leagues are recession proof. While all variables are important in explaining what factors influence ATTENDANCE and REVENUE in these leagues, this analysis will pay particular attention to RECESS and UNEMPL and their relationship to these dependent variables. Through UNEMPL and RECESS, this study will decide if each of these leagues are recession proof. The first recessionary variable, UNEMPL, ignoring any possible lags, tends to increase during a recession. For example, before the 1991 recession, the unemployment rate in 1990 was 5.5% and, in 1991, the unemployment rate rose to 6.8%. In 2006, the unemployment rate was 4.7%, and by 2009, it had reached 9.5% (Bureau of Labor Statistics, 2014). Table 11 shows the results for the three regressions run on the ATTENDANCE model for each of the three leagues. The first number in the row is a variable's estimated coefficient, and the number in parentheses is the coefficient's t-statistic. The F statistic, the number of observations, R^2 , and the adjusted R^2 are provided at the bottom of each table.

Table 11: Regression Estimates of Dependent Variable Attendance in NFL, NHL, MLB

Independent Variable	Expected Sign	Regression 1 (NFL)	Regression 2 (MLB)	Regression 3 (NHL)
Intercept	?	19920222.33 (1.256)	250812274.6 ^{bb} (2.487)	-70863905.32 (-1.659)
PRICE	-	-34594.53 (-0.457)	1396424.791 (1.398)	15026.598 (0.090)
INCOME	?	188.811 (0.967)	4184.916 ^{bb} (1.132)	-461.107 (-0.809)
POP	+	-0.101 (-0.957)	-1.966 (-3.132)	0.365 ^a (1.585)
TEAMS	+	387049.908 ^{aa} (1.78)	6662994.679 ^{aa} (3.691)	242015.866 (0.624)
SUBS	+	MLB 362226.591 ^{aa} (3.228)	NHL 653367.724 ^{aa} (2.077)	NFL -82301.878 (-0.239)
SUBS	+	NHL	NFL	MLB

		20624.553 (0.483)	-622568.52 (-0.972)	-45138.742 (-0.108)
RECESS	–	-600429.280 ^a (-1.676)	10751.798 (0.294)	223108.845 (0.186)
UNEMPL	–	-141823.285 (-1.14)	1826975.088 (1.923)	-305634.483 (-0.939)
LOCKOUT	?			517728.203 (0.643)
F-statistic		53.480	19.716	9.111
N		23	22	19
R²		.968	.924	.901
Adjusted R²		.950	.877	.802

^a significant at .10 level (one tail test)

^{aa} significant at .05 level (one tail test)

^b significant at .10 level (two tail test)

^{bb} significant at .05 (two tail test)

ATTENDANCE

Regression 1:

This regression examined the results of 8 independent variables against the dependent variable of NFL ATTENDANCE. Two of these variables proved to be significant in affecting NFL ATTENDANCE. The two significant variables at a significance level of .05 were SUBS (MLB) and TEAMS. One variable that was not significant but proved to be interesting was RECESS. The regression, as a whole, was extremely significant with an R² of 0.968 and a very high F statistic of 53.480 compared to a low Significance F of 3.537E⁻⁰⁹. According to this regression, 96.8% of the variation in ATTENDANCE can be explained by the independent variables. This regression includes 23 observations.

SUBS (MLB) was hypothesized to positively affect NFL ATTENDANCE, and the hypothesis failed to be rejected. As MLB ticket prices increase, more people will attend NFL games. This also implies that the NFL is a closer substitute to the MLB than the NHL.

SUBS (NHL) positively related to ATTENDANCE, as predicted, but was not significant.

This is not surprising in that hockey is a more regional sport than football and baseball which are popular across the U.S. Noll (2001, p.200) elaborates, “The long hockey tradition in eastern Canada is obviously reflected in attendance figures for that area, and the spread of

hockey's popularity has been more rapid and complete in regions where winter weather permits hockey to be played more extensively".

TEAMS was also hypothesized to positively affect NFL ATTENDANCE, and this hypothesis failed to be rejected. TEAMS had a p-value of .0484. As predicted, the more teams in the league, the higher the attendance. RECESS, although not significant, was very close to being significant with a p-value of .05799. This result indicates that NFL games played during a recession negatively impact NFL ATTENDANCE. Because RECESS, a recessionary variable, was nearly significant, this implies that the NFL ATTENDANCE may be affected by recessions. Greg McFarlane (2011) explains, "The NFL's immunity to economic hardship is a classic example of how wonderful it is when a third party picks up the tab. It starts with the NFL's own acknowledgment that 95% of fans *never attend a game*". He argues that the NFL remains recession proof because of TV revenues as the NFL "goes out of its way to accommodate you. There are multiple camera angles, replays and instant access to scoring drives on the Red Zone Channel, which is better than life itself. All you have to do is keep your eyes glued to the screen". Leeds (2006, p.521) further elaborates that TV is "the lifeblood of the NFL . . . A significant decline in TV revenue could cause several teams to sustain operating losses". Finally, McFarlane and Leeds argue that the NFL remains recession proof partly through the league's ability to accommodate fans at home through television outlets. However, because RECESS is nearly significant, this highlights how RECESS hurts fan attendance.

The rest of the variables proved to be insignificant. This can be attributed to the issue of multicollinearity in which some of the variables included in the regression overlap one another causing certain variables to be insignificant; Table 13 in the Appendix provides the correlation matrix for NFL ATTENDANCE. When running a separate regression, in an effort to account for multicollinearity, when PRICE was eliminated, RECESS, SUBS (MLB),

and TEAMS were all significant at the .05 level. RECESS was significant with a p-value of .02695. According to these results, when average ticket price was eliminated, the number of months the NFL holds games during a recession significantly and negatively affects ATTENDANCE as proven by the coefficient of -666663.577. In having this variable affect ATTENDANCE negatively, even with television revenue, this highlights how the NFL is not completely recession proof as overall attendance is negatively impacted during a recession. For example, according to the ESPN (2013), in 2006, overall NFL attendance was 17,509,509 and, in 2008, attendance decreased to 16,190,099 which displays how the NFL suffered attendance loss during the most recent recession.

Turning back to the initial regression which did not consider multicollinearity, ATTENDANCE was not significantly impacted by any other variables except SUBS (MLB) and TEAMS. PRICE negatively affected ATTENDANCE, as predicted, but was not significant; INCOME was positively related to ATTENDANCE but was also not significant. POP, which was predicted to positively affect overall attendance, appeared negatively related to ATTENDANCE but was also insignificant. One reason that POP may not be related to ATTENDANCE is because POP is highly correlated with other variables such as INCOME, TEAMS, and SUBS (MLB).

Finally, UNEMPL was not significant but negatively related to ATTENDANCE as predicted. This means that as the unemployment rate increases, ATTENDANCE decreases. However, UNEMPL should not be considered when deciding if NFL ATTENDANCE is recession proof because it was not significant. In contrast, although not fully significant in the first regression, when collinearity was considered, RECESS was significant. This indicates that NFL ATTENDANCE may not be recession proof as one of the two recessionary variables proved to be significant and negatively related to ATTENDANCE.

Regression 2:

The second regression, under the ATTENDANCE model, included 8 variables against the dependent variable of MLB ATTENDANCE. Three of the variables were significant in this regression, and two variables, although not significant, provided interesting results. The three variables that were significant at the .05 level include TEAMS, INCOME, and SUBS (NFL). The variables which were not significant but are interesting to explore include UNEMPL and POP. This regression had an R^2 of 0.924 which means that 92.4% of the variation in MLB ATTENDANCE is explained by the independent variables. This regression also had 22 observations as the 1994 data, due to a strike, was eliminated.

TEAMS was hypothesized to positively affect overall attendance as the more teams in the MLB, the more opportunity people have to attend games. The results failed to reject the hypothesis as the p-value of .001336 proved to be positively significant with ATTENDANCE. As noted earlier, this relationship is not surprising as Major League Baseball increased the number of teams from 24 teams in 1970 to the current number of 30 teams (Major League Baseball, 2013). INCOME, which had an indeterminate hypothesized relationship, positively affected ATTENDANCE with a p-value of 0.0079 and a coefficient of 4184.916448. This is a surprising result in that Noll (2001, p.171) finds a very different relationship between ATT and INCOME. He explains, "Given the negative correlation between attendance and income, baseball appears to be a working class sport". While Noll (2001, p.190) argues that baseball is more "successful in cities with lower average income," that is not necessarily true as, today, there are ranges of seat options. People with higher incomes can sit in box seats or club seats whereas people with lower incomes can sit in regular seating or in the grand stand which are cheaper seats. Therefore, INCOME should not negatively impact ATTENDANCE, arguably, because there are ranges of seating prices that accommodate any level of income.

Lastly, the hypothesized relationship between SUB (NFL) was positive because as NFL ticket prices increase, the number of people attending MLB games will increase. The results indicate a significantly positive relationship between SUBS (NFL) and ATTENDANCE with a p-value of 0.0291. While these results contradict the earlier findings in Regression 1, which showed that NFL ATTENDANCE and MLB (SUBS) had a significant relationship, one possible reason for why SUBS (NFL) is significant and not SUBS (NFL), within this regression, is that the NFL and MLB seasons overlap with one another for more months of the year. While MLB typically runs from April to late October, the NFL (October until June) overlaps with the MLB four months of the year while the NFL (September to February) overlaps with MLB only in the months of September and October.

POP, hypothesized to have a positive relationship with ATTENDANCE, was not significant in the appropriate one-tail test, even with a p-value of .00395, because it has an unexpected negative coefficient of -1.966. This is extremely interesting in that, typically, the higher the population, the greater the demand to attend games. One way to justify this inverse relationship, despite it being insignificant, is that even with an increasing population in a given city, this does not necessarily mean that the increased population contains MLB fans.

One variable which was not significant but is interesting to explore further is UNEMPL. Intuition finds that the higher the unemployment rate, the lower the number of people who attend MLB games. Within this study, the unemployment rate had an unexpected positive coefficient with a t-statistic of 1.923, thus it also was not significant. Many economists argue that the MLB is recession proof, as shown by neither RECESS nor UNEMPL being significant, because MLB finds ways to get its fans to attend games even during economic downturns. Klayman (2008) explains that in the 2007-2009 recession, the San Francisco Giants offered, “. . . a \$25 gas card through August when fans buy four game

tickets online for \$75". He also comments, "Baseball was there during the Depression, during World War II, as an element of the country's recovery from 9/11, and will continue to be available at affordable prices". Lastly, Klayman cites Andrew Zimbalist as saying, "The evidence of past recession is indeed that sports is one of the last things that people cut back on . . . They need their distractions and they need their obsessions". Similarly, the fact that UNEMPL was positively related to ATTENDANCE also highlights how individuals still attend games even with high unemployment rates; this will be discussed further in the analysis of Regression 4. RECESS, although not significant, was positively related to ATTENDANCE; this simply highlights how individuals still managed to attend games even during a recession. Therefore, MLB ATTENDANCE, based on the non-significant positive results of RECESS and UNEMPL, appears to be recession-proof.

Finally, the remaining two variables of SUBS (NFL) and PRICE were both insignificant and do not heavily influence ATTENDANCE. Despite PRICE not being significant, it is also interesting to explore. Over the three recessions, average real ticket prices generally increased slightly from \$13.53 in 1990 to \$15.12 in 1991, \$22.75 in 2000 to \$23.36 in 2001, and \$25.24 in 2006 to \$28.79 in 2009. While PRICE generally increased during a recession, this did not prevent people from attending MLB games as PRICE proved to be insignificant in relation to ATTENDANCE; teams found that they could increase PRICE to maintain revenue because fans would still attend games during a recession. Further evidence of this is found in Regression 5 in which PRICE is positively related to MLB REVENUE.

Regression 3:

Within this regression, 9 variables were examined against NHL ATTENDANCE.

The regression's R^2 was 0.901 and its F-statistic was 9.111. This means that 90.1% of the variation in NHL ATTENDANCE can be explained by the independent variables. Despite this, none of the independent variables proved to be significant at the .05 level when individually examined against NHL ATTENDANCE. There are several possible explanations for this. The first explanation may be that within the data set ranging from 1990-2012, there were four lockouts. These years were eliminated from the regression which means there were four less data sets to work with than the NFL and three less than MLB (1991-1992, 1994-1995, 2004-2005, 2012-2013).

The second possible explanation is the issue of multicollinearity; the Appendix provides the correlation matrix for NHL ATTENDANCE in Table 14. When running a second regression to consider collinearity, PRICE and TEAMS were eliminated. As a result, two variables were significant. One was POP and the other was UNEMPL. The predicted relationship between NHL attendance and POP was that the higher the population, the more fans attend NHL games. With a p-value of .0286 and a positive coefficient, this regression failed to reject the hypothesis. Moreover, the hypothesized relationship between UNEMPL and ATTENDANCE was negative in that the higher the unemployment rate, the lower the overall NHL attendance. The regression results failed to reject this hypothesis with a p-value of 0.00725. Therefore, without PRICE and TEAMS, NHL ATTENDANCE shows signs of not being recession proof because it was affected by UNEMPL; the greater the UNEMPL, the lower the ATTENDANCE.

Returning back to the original regression, the third possible reason that none of the variables proved individually significant is that seven of the of the twenty-three NHL teams are Canadian. Because the NHL is so regionally based and is extremely popular in Canada, excluding Canadian teams' data may have skewed attendance figures. For instance, in 2012, NHL total attendance was 21,470,155 (Fort, 2012). Canadian attendance made up 5,941,424

of that 21,471,155 which is approximately 27.67% of overall attendance. This is a fairly high percentage and may account for the large number of insignificant variables.

Koba (2013) argues, “Only hockey among the four major pro sports was able to have greater attendance now than before the Great Recession”. He finds that this is the case because “Hockey fans are also more affluent than in other sports . . . the NHL can jack up the ticket prices more than other sports and still keeps its fans”. Lastly Koba calculates hockey fans average per capita household income at approximately \$104,000 compared to MLB fans at \$96,000 and \$94,500 for NFL fans; this is measured in 2013 U.S. dollars. However, Koba’s argument is difficult to accept because in both regressions, the first one and the second one (when considering collinearity), INCOME was not significant which highlights how an individual’s INCOME does not affect his/her NHL ATTENDANCE.⁵ Therefore, this finding disproves Koba’s assertion that income matters and causes this study to return to the second NHL regression which considers collinearity. When collinearity is considered, which appears to be the stronger argument for the high number of insignificant variables, UNEMPL is significant. This implies that the NHL may not be recession proof as the higher the unemployment rate, the lower the ATTENDANCE. Finally, turning to the other variables considered in the original regression, LOCKOUT, POP, SUBS (NFL), SUBS (MLB), and TEAMS were all insignificant

Table 12 provides the results for the second regression run based on REVENUE for NFL, MLB, and NHL. The first number in the row is a variable’s estimated coefficient, and the number in parentheses is the coefficient’s t-statistic. The F statistic, the number of observations, R^2 , and the adjusted R^2 are provided at the bottom of each table.

⁵ It is important to note that, as seen in Table 14, INCOME is highly correlated with other variables such as ATT, POP, SUBS (NFL), and SUBS (NHL).

Table 12: Regression Estimates of Dependent Variable Revenue in NFL, NHL, MLB

Independent Variable	Expected Sign	Regression 4 (NFL)	Regression 5 (MLB)	Regression 6 (NHL)
Intercept	?	-9498870120 (-1.268)	8618129521 ^{bb} (3.397)	52016293632 (0.863)
GATE	+	1.741 ^{aa} (2.481)	0.089 ^a (1.528)	5.621 (1.079)
ATT	+	222.261 ^{aa} (2.016)	24.801 ^{aa} (3.708)	-250.014 (-0.800)
PRICE	?	-22721762.33 (-1.099)	98418001.66 ^{bb} (3.676)	118278957.4 (1.360)
POP	+	19.201 (0.567)	-58.875 (-4.724)	-306.209 (-0.932)
INCOME	+	123587.895 ^{aa} (2.567)	218518.824 ^{aa} (9.212)	750035.035 (1.099)
RECESS	?	92614736.05 (0.446)	-1833944.672 (-1.463)	-1135221133 (-1.066)
UNEMPL	?	147576016.3 ^{bb} (4.968)	89178194.73 ^{bb} (4.862)	413581748.5 (1.233)
LOCKOUT	?			-6835045.303 (-0.011)
F-statistic		703.105	561.281	2.575
N		23	22	19
R²		.997	.996	0.673
Adjusted R²		.996	.995	0.412

^a significant at .10 level (one tail test)

^{aa} significant at .05 level (one tail test)

^b significant at .10 level (two tail test)

^{bb} significant at .05 (two tail test)

A. REVENUE

Regression 4:

The fourth regression included 7 independent variables examined against NFL REVENUE. Overall, the regression had a high R² of 0.997 and F statistic of 703.105. This means that 99.7% of the variation in NFL REVENUE can be explained by the independent variables. Four of the variables proved to be significant at the .05 level of significance and those include GATE, ATT, INCOME, and UNEMPL. This regression included 23 observations.

GATE was predicted to have a positive relationship with REVENUE, and the hypothesis failed to be rejected. With a p-value of 0.0127 and a coefficient of 1.741, the higher the GATE, the greater the NFL REVENUE. These results coincide with ATT in that the higher the ATT, typically, the greater the GATE and thus the higher the REVENUE. ATT was also positively significant with a p-value of 0.031. Therefore, the higher the ATT, the greater the NFL REVENUE.

The next variable that was significant was INCOME with a p-value of 0.0107. INCOME was predicated to positively affect REVENUE, and this hypothesis failed to be rejected. Therefore, a person with a higher INCOME has the ability to spend more money on the National Football League. The last significant variable was UNEMPL with the p-value of 0.0001. Intuition argues that the higher the UNEMPL, fewer people attend games or are less inclined to spend money on the NFL which lowers REVENUE. The results reveal that UNEMPL was positively related to REVENUE. According to the positive coefficient of 147576016.3, as UNEMPL increases, so too does REVENUE. The first possible explanation for this is that even though those who are unemployed cannot or do not attend games during a recession, those who are wealthy or middle class choose to attend NFL games and spend money on the NFL. This contradicts Noll's (2001, p.194) argument when he asserts, "Football attendance, like baseball, is negatively associated with income". Noll neglects to consider that REVENUE remains high because the middle class and wealthy continue to spend money on the NFL. Differently, another reason UNEMPL may be positively related to REVENUE is that even the unemployed, who are on a fixed income, need sports as a release from every day stresses. Klayman (2008) finds that "Sports are a great distraction from the economy". Klayman, in his article, interviewed a fan who was laid off during the 2007-2009 recession, and the fan commented that he still attended sporting events saying, ". . . it kind of perks me up, at least for a minute anyway". Therefore, even those who are unemployed opt

to spend money and attend, as indicated by the significant ATT variable of .0310, NFL games. Finally, under both possible explanations, the fact that UNEMPL and REVENUE are positively related indicates that NFL REVENUE may be recession proof.

Three variables that proved insignificant in relation to REVENUE were PRICE, POP, and RECESS. PRICE, with a p-value of 0.289, was negatively related to REVENUE. POP, with a p-value of 0.290, was positively related to REVENUE, as predicted, because as POP rises, REVENUE is expected to rise as well. Lastly, RECESS, insignificant with a p-value of 0.662, highlights how a recession has little to no effect on NFL REVENUE. Despite being insignificant, RECESS was positively related to REVENUE which means REVENUE still increases during a recession. In conclusion, with a positive RECESS variable, although not significant, and a positive UNEMPL variable, which was significant, NFL REVENUE appears recession proof.

Regression 5:

The fifth regression tested seven variables against MLB REVENUE. The regression produced an R^2 of 0.996 and a high F statistic of 561.281. This means that 99.6% of the variation in MLB REVENUE can be explained by the independent variables. Four of these variables proved significant at the .05 level and those include ATT, PRICE, INCOME, and UNEMPL. RECESS and GATE, although not significant, are interesting to explore further. There were 22 observations in this regression.

Firstly, ATT was predicted to positively affect REVENUE and, with a p-value of 0.00117, the hypothesis failed to be rejected. This means that as ATT goes up, so too does MLB REVENUE. Likewise, INCOME was expected to positively impact REVENUE, and this also proved true. With a positive p-value of $1.28E^{-07}$, the higher the INCOME, the more people will opt to spend money on Major League Baseball.

PRICE was positively significant with a p-value of 0.002. This means that as PRICE increases, so too does REVENUE. During the most recent recession, MLB PRICE rose from \$25.21 in 2007 to \$28.23 in 2009. While this is only a slight increase in PRICE, it was enough to accumulate some additional MLB REVENUE.

The final significant variable was UNEMPL with a p-value of 0.000252 and with a positive relationship to REVENUE. This positive relationship to REVENUE is similar to NFL REVENUE's relationship to UNEMPL. There are several reasons for this positive relationship. The first explanation directly contradicts Noll's (2001) argument that baseball is a "working class sport". This coincides with the discovered positive relationship between MLB REVENUE and INCOME. While Noll finds that baseball is a "working class sport" because he discovered a negative correlation between income and MLB attendance, this study found a positive relationship between MLB REVENUE and INCOME which counters Noll's argument. Those who attend games during an economic downturn may be middle class or wealthy individuals who can afford to spend money on Major League Baseball. Similarly, several MLB teams opened new stadiums during the 2007-2009 recession. Those teams include the Yankees, whose new stadium opened April 2009, and the Mets who also opened a new stadium in 2009. These franchises were able to charge premium prices for certain tickets in these new stadiums. Those who could pay for these premium tickets were more willing to do so because they wished to see these new, state of the art stadiums. Therefore, despite UNEMPL increasing and the possibility of the unemployed not being able to attend games, those who can afford to go to games will choose to go.

The second reason that UNEMPL and REVENUE may be positively related is because those who are unemployed still opt to attend MLB games and spend money on MLB; this is the same reasoning as NFL REVENUE in relation to UNEMPL. Klayman (2008) interviewed a Chicago Cubs fan, recently laid off from work, and the man explained, "The

tickets cost a lot, but that's what you have savings for, for special events". Therefore, even those who are unemployed find value and desire to spend their money on Major League Baseball.

Two variables which proved to be insignificant include RECESS, with a p-value of 0.166, and GATE, with a p-value of 0.07. RECESS was negatively related to REVENUE, and GATE was positively related to REVENUE. In RECESS not being significant, one can assume that a recession does not influence MLB REVENUE. This indicates that the MLB may be recession proof as RECESS does not influence MLB REVENUE and UNEMPL is positively related. Lastly, GATE was positively related to REVENUE, as expected, but it was not significant. One reason that GATE may not be significant is that ATT and GATE have a high collinearity of .78 which means that because ATT was significant, it prevented GATE from also factoring into REVENUE.

Surprisingly and counter to the prediction, POP was negatively related to REVENUE but was also not significant. It was not significant in the appropriate one-tail test since it had an unexpected negative sign in relation to REVENUE.

In conclusion, in UNEMPL being positively, significantly related to MLB REVENUE and RECESS not being significantly related, this implies that MLB REVENUE may be recession-proof as REVENUE shows signs of growth even during a recession.

Regression 6:

The final regression explored 8 variables and their effects on NHL REVENUE. Overall, the regression had an R^2 of 0.673 and F statistics of 2.575. This means that 67.3% of the variation in NHL REVENUE was explained by these 8 variables. None of the variables proved to be significant individually at the .05 level of significance. The main explanation for this is the issue of multicollinearity; the correlation matrix for NHL REVENUE is Figure

15 of the Appendix. When considering collinearity and eliminating POP, INCOME was significant with a p-value of 0.04878. This indicates that as INCOME increases so too does NHL REVENUE as more people will invest in the National Hockey League when they have a higher income.

Other reasons why the variables failed to be significant are similar to those mentioned in Regression 3 concerning NHL ATTENDANCE. Primarily, this regression only contained 19 observations because four years of data were eliminated due to lockouts. Another reason is that Canadian teams' statistics were eliminated from the data sets. Because hockey is so regionally based and 7 out of the 23 NHL teams are based in Canada, as discussed previously, eliminating Canadian teams may have hurt the regression results. According to Forbes (2012), in the 2011-2012 season, the 7 Canadian NHL teams combined to make up \$774 million dollars in revenue out of the \$5.6 billion made in the season for the entire league. Also, when it comes to total revenue per team for the 2011-2012 season, three Canadian NHL teams were ranked in the top ten for highest team revenues for the season. The Toronto Maple Leafs came in first place with revenue at \$200 million, the Montreal Canadiens came in third place with revenue at \$169 million, and the Vancouver Canucks came in seventh place with revenue at \$143 million. It is clear, through revenue figures, that excluding the Canadian teams may have disrupted the accuracy of the NHL regression results.

Moreover, it is important to explore the relationship between REVENUE and its insignificant variables. GATE was positively related to REVENUE as predicted, but ATT was negatively related to REVENUE which counters the hypothesis. PRICE, despite being insignificant, was positively related to REVENUE. POP was negatively related to REVENUE, and, as seen in the previous regressions, despite POP increasing, it does not necessarily mean that it contains NHL fans. As predicted, INCOME was positively but

insignificantly related to REVENUE. LOCKOUT, which was only included in the NHL regressions, proved to be insignificant, but negatively related to REVENUE. This indicates that REVENUE tends to be lower following a LOCKOUT.

Lastly, the two recessionary variables of UNEMPL and RECESS were insignificant. UNEMPL, if it was significant, would positively affect REVENUE. This, like with NFL and MLB REVENUE, explains that fans will continue to spend money on the NHL even when they are unemployed or wealthy/middle class attendance and support makes up for the unemployed people who are no longer able to attend games or spend money on the NHL. RECESS would be negatively related to REVENUE, if it was significant, which means that NHL REVENUE would decrease during a recessionary period. Because both RECESS and UNEMPL do not strongly affect NHL REVENUE, there is not enough evidence, and the results are not strong enough to dub the NHL recession proof.

VI. Conclusion:

The goal of this study was to determine whether the NFL, MLB, and NHL were recession proof based on the results of the recessionary variables' (UNEMPL and RECESS) impact on the dependent variables of ATTENDANCE and REVENUE. As defined in the introduction, for the purpose of this study, a recession proof league reflects any league which continues to show growth, even if this growth slowed, in its ATTENDANCE and REVENUE figures. ATTENDANCE and REVENUE are two indicators that define a successful league versus an unsuccessful league as a team with higher overall attendance and higher total revenue is more successful than one that is stagnant in these categories. While focusing on whether these leagues were recession proof, this study also created a model which included other, non-recessionary factors which affect ATTENDANCE and REVENUE. These

variables were included in order to see what affects annual league attendance and revenue within or not within a recession.

It can be concluded that one league appears to be recession proof, another is partially recession proof, and another does not have strong enough results to prove it is recession proof. Foremost, the only league which proved to be completely recession proof is Major League Baseball. This is because people still attend games and spend money on Major League Baseball even with high unemployment rates. Support for this conclusion is further provided by concrete data. In 2006, MLB overall attendance was 73,776,554 and, by 2008, attendance was 76,191,330 (ESPN, 2013). Growth also occurred in MLB REVENUE in that REVENUE, in 2006, was 5,641,908,115, and by 2008, it was 6,021,826,532.

The NFL shows signs of being recession proof but is not completely unaffected by economic downturn. NFL ATTENDANCE is not recession proof as RECESS impacted ATTENDANCE negatively. Concrete data to support this can be seen as NFL overall attendance in 2006 was 17,606,057 and decreased by 2008 to 16,190,099. The NFL recovered since the 2007-2009 recession with 2012 figures at 17,178,573. Differently, NFL REVENUE shows signs of being recession proof. In UNEMPL being positively significant against REVENUE, fans opt to spend money on the National Football League even when there is higher unemployment. In 2006, NFL REVENUE was 7,466,999,000 and grew to 8,077,799,000 by 2008. This underscores how REVENUE remains generally unaffected by economic downturns. Finally, one cannot assert that the NFL is completely recession proof as attendance decreases and fails to grow during an economic downturn. However, the NFL is not completely hurt economically during a recession because the league is able to grow in its REVENUE sector. Therefore, the NFL is partially recession proof.

The NHL is not recession proof for several reasons. Foremost, because UNEMPL was negatively significant when collinearity was considered, it is impossible to argue that

NHL ATTENDANCE is recession proof. In 2008, NHL overall attendance was 16,209,885. By the 2009 season, ATTENDANCE decreased to 15,686,771. These numbers highlight how NHL ATTENDANCE cannot be recession proof. The NHL has seen a slight recovery, since the 2007-2009 recession, in that 2012 ATTENDANCE increased to 16,133,902. Moreover, NHL REVENUE is also not recession proof as neither UNEMPL nor RECESS significantly affected REVENUE; in both recessionary variables not being significant, one cannot boldly assert that NHL REVENUE is recession proof. There is not enough evidence to make such an assertion.

Other non-recessionary variables proved to be significant when testing against ATTENDANCE and REVENUE; this shows what factors go into affecting ATTENDANCE and REVENUE even when not in a recessionary period. SUBS (MLB) and TEAMS were significantly and positively related to NFL ATTENDANCE. TEAMS, INCOME, and SUBS (NFL) positively affected MLB ATTENDANCE. GATE, ATT, and INCOME were positively and significantly related to NFL REVENUE. ATT, PRICE, and INCOME all heavily influence MLB REVENUE.

While this study is helpful in looking into which league is recession proof, which league shows signs of being recession proof, and which league is not recession proof, there are several areas that could be explored further in the future. Within the REVENUE model, one of the goals was to indicate which variables, overall, affected league revenue. However, some variables, such as TV/Internet contracts, merchandise sales, and concession sales, were not included in the model. These variables were excluded from the model due to largely incomplete data sets. If someone wished to create a more comprehensive model for REVENUE, they could look more deeply into these excluded variables and see how much they impact REVENUE and REVENUE during a recession.

Another way to expand upon this study would be to see if team record during a recession would impact ATTENDANCE and REVENUE for these leagues. Does a winning team have greater revenues and attendance during a recession than a losing team? Coinciding with this, it would also be interesting to see if certain areas with sports teams are more recession proof. For instance, is a team in Boston, which is a larger city with a very good NHL team most years, better able to withstand economic downturns than a team like Buffalo, a smaller city with a generally mediocre NHL team? How does record and location coincide with one another to affect ATTENDANCE and REVENUE during and not during a recession?

Lastly, the LOCKOUT variable should be explored more closely within future studies. How does a LOCKOUT affect REVENUE and ATTENDANCE? Does a LOCKOUT more negatively affect the NHL than a recession? Does a LOCKOUT positively affect the NHL and, if so, how much does the NHL benefit? Within this study, LOCKOUT was insignificant, but, in future studies, it would be interesting to explore why a LOCKOUT is insignificant. Finally, it would also be stimulating to see how influential a LOCKOUT is on the NHL as compared to a recession.

The hopes for this study were threefold. Firstly, it was to underscore how pivotal these leagues are in the lives of Americans. Secondly, it was to explore an unprecedented study. Thirdly, this study hopes to inspire further analysis on the subject so leagues and teams can be aware of what influences ATTENDANCE and REVENUE most heavily to avoid economic hardships during future recessions.

VII. Appendix

Table 13: NFL Attendance Correlation Matrix

	ATT	PRICE	POP	INCOME	RECESS	UNEMPL	TEAMS	SUBS (MLB)	SUBS (NHL)
ATT	1								
PRICE	0.9228417	1							
POP	0.9221705	0.9860284	1						
INCOME	0.9209274	0.9739584	0.9920144	1					
RECESS	-0.048394	0.0151373	-0.030584	0.04169	1				
UNEMPL	0.0476237	0.224871	0.2836274	0.25398	-0.2035	1			
TEAMS	0.9410993	0.9023066	0.9264060	0.91861	-0.051	0.12315	1		
SUBS (MLB)	0.9453879	0.9828919	0.9791751	0.9703	-0.0054	0.27005	0.91717	1	
SUBS (NHL)	-	-	-	-	-	-	-	-	1
	0.1708347	0.1041316	0.2077369	-0.2817	-0.1712	-0.44611	-0.24911	-0.2041	

Table 14: NHL Attendance Correlation Matrix

	ATT	LOCKOUT	PRICE	POP	INCOME	RECESS	UNEMPL	SUBS (NFL)	SUBS (MLB)	TEAMS
ATT	1									
LOCKOUT	-0.254	1								
PRICE	-0.011	-0.2384051	1							
POP	0.875	-0.2737818	-0.3089	1						
INCOME	0.837	-0.2551563	-0.3904	0.98964	1					
RECESS	-0.089	-0.2135997	-0.2287	0.05650	0.149641	1				
UNEMPL	0.076	0.038103369	-0.4666	0.32671	0.284953	-0.207019	1			
SUBS (NFL)	0.883	-0.3078074	-0.1873	0.98607	0.971054	0.091161	0.2637873	1		
SUBS (MLB)	0.865	-0.2811380	-0.2773	0.98205	0.969605	0.064663	0.3127728	0.9829	1	
TEAMS	0.885	-0.38719	0.0441	0.83141	0.806019	-0.008741	-0.060422	0.8569	0.8579	1

Table 15: NHL Revenue Correlation Matrix

	REVENUE	GATE	ATT	LOCKOUT	PRICE	POP	INCOME	RECESS	UNEMPL
REVENUE	1								
GATE	0.638786	1							
ATT	0.650712	0.922955016	1						
LOCKOUT	-0.27309	-0.3144171	-0.25461024	1					
PRICE	-0.09868	0.078883222	-0.01156102	-0.23841	1				
POP	0.754138	0.804518365	0.875469984	-0.27378	-0.3089	1			
INCOME	0.72276	0.74869771	0.837938575	-0.25516	-0.3904	0.989646859	1		
RECESS	-0.08682	-0.08478589	-0.08939747	-0.2136	-0.2287	0.056506654	0.149642	1	
UNEMPL	0.3448	0.03204798	0.076089417	0.038103	-0.4666	0.326716446	0.284953	-0.20702	1

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