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Brian Goodman April 19, 2011

Profitability of American Professional Team Sports

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Abstract

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I analyze the effects of market and team factors (including city population, city income, age of stadium, percent of stadium subsidies, regular season wins, number of all-stars, average points per game, historical championship appearances, and previous season's performance) on the amount of profits for a sports franchise in the National Football League, National Basketball Association, Major League Baseball, and the National Hockey League. I find that there is no consistent correlation with city income and a franchise's profitability across the four leagues. Furthermore, average points scored per game appears to be positively correlated with profits. Most significantly, I find that for all but one league the age of the stadium are negatively correlated with a team's level of profitability. I hypothesize this can largely be attributed to luxury suite revenue which is not included in any of the league's Collective Bargaining Agreements during the period of the study, 1991-2008.

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I. Introduction

Americans love their sports. We treat the Super Bowl as a national holiday, riot in the streets after our home team wins the finals, and have multiple television channels devoted to playing and analyzing sports 24 hours a day 7 days a week. Professional sports are big business in the United States with the four biggest professional leagues raking in more than $20 Billion of aggregate league revenue in 2008 according to Forbes annual franchise valuation report. Despite formidable monopolistic powers many franchises across all leagues are unprofitable often citing poor stadium leases or an unfavorable labor agreement with the players.[1] This has led to a threat of the seemingly impossible, lockouts in both the NFL and the NBA for the 2010-2011 seasons.[2] All four major professional sports leagues (NFL, NBA, NHL, MLB) operate under a collective bargaining agreement, CBA, with their respective Player's Unions. The current contracts for the NFL and NBA expire within the next year and current meetings have largely ground to a standstill. It is under this atmosphere of future uncertainty amid two of the largest American Professional Sporting Leagues that this paper is being written. The purpose of which, is not to argue on behalf of the Owners or Players but explain the deeper question, what market and team attributes are significant to sports franchise profitability of any professional team sports league in the United States.

The four major American professional sporting leagues, the so called Big Four, are Major League Baseball, the National Football League, the National Basketball Association, and the National Hockey League are the focus of this paper. This analysis expands upon current sports literature by looking at multiple leagues, instead of focusing on one or two, and by specifically addressing the question of profitability of individual franchises. Furthermore, I take a more holistic approach including a variety of team, market, and stadium quality explanatory variables to distinguish between leagues and between franchises within a professional league.

[1] Owen (2003) and Murphy and Topel (2010)
[2] Woodard, Larry. "Could There be Football of Basketball Next Season." January 19, 2010. ABC News. <http://abcnews.go.com/Business/nba-nfl-path-lockout/story?id=12638774>.

I find that the market quality factors (City Population and City Income) are not consistently correlated across the four leagues. City Income is negatively correlated with profits for the NBA and NHL but positively correlated for the MLB and insignificant for the NFL. Current and previous team performance do not appear significant to team profits but there does appear to be a noticeable offensive bias for fans as the average points per game is positively correlated across all four leagues and significant for the NBA and NHL. I find that the most significant component of franchise profits is the age of a stadium which is significant for three of the four leagues and negatively correlated with profit for each. The reason for this, I hypothesize, is the increasing number of luxury suites in the newer stadiums because this revenue is not included in the CBAs and goes entirely to the franchise's bottom line.

II. Monopoly Powers

The American love for competition does not transcend into the business of professional sporting leagues. Indeed, the professional sporting league appears to have many characteristics of the illusive natural monopoly. After all, the benefits of a single league increase the quality of the play and competition between teams, better centralize and wean out the best players, standardize the rules of the game, and legitimize the yearly champion. The best proof for the natural monopoly argument is the simple observation that for every major professional sport in the United States there currently exists only one dominant league.

Every team franchise has monopolistic or cartel powers separating them from many issues experienced by purely competitive markets. With the exception of Major League Baseball, all the leagues incorporate a salary cap. The NFL has a so-called "hard cap" where are there are little or no exceptions to paying beyond the predetermined team allowance for player salaries. In the NFL players receive 56% of league wide revenue and a team must use a minimum of 87.6% of the cap. The NBA has a "soft cap" where there are many exceptions to the predetermined salary cap and a limited penalty.

These exceptions are generally based on the number of years a player has been in the league and been on its current team among others. In the NBA players receive 51% of league wide "basketball related income" and each team must use at least 75% of their cap. Like Major League Baseball, the NHL had no salary cap prior to the 2005 season when it introduced a hard cap similar to the NFL where players earn a maximum of 54% of league revenue and each team can't spend less than $16 million under the maximum. The salary cap allows each franchise to predict how much their labor cost will be as well as control growth in labor costs while keeping the teams more equal in player talent and thereby competitive. Salary caps, coupled with the lack of other employment opportunities for professional athletes, greatly increase the monopsony power of the leagues even if each currently must bargain with player's unions.

Similar to a town with only one grocery store, sports franchises often operate as a local monopoly of their good. One could argue sports teams are simply part of the larger entertainment industry and must contend with compete with other forms of live and recorded entertainment. Another source of potential competition, with fewer differences in the provided good, is minor league teams and collegiate sports. The NCAA sports, however, have shorter seasons, smaller stadiums, often located away from major metropolitan areas, and cater to current students and alumni. More often than not, the NBA is going to be the primary, if note sole, source of basketball to a fan of the sport. Furthermore, local media contracts in radio and television frequently make the local team the only game on without paying for a special package. Meaning local teams will gain new fans in their hometown and teams will get money from special satellite or cable deals from loyal fans that have changed residency.

No good monopoly exists without barriers to entry and professional sports are no exception. Unlike European sports leagues where a minor league team can join the premier league through performance, a new team must apply for league membership through the current league owners a

league commissioner. As a result, expansion is strictly controlled and limited. The same process holds for franchise relocation. Furthermore, a number of intangible barriers prevent new team franchises. An established fan or customer base and contracts with local advertising, television, and radio are all components of a successful franchise. All this does not even mention the highest initial cost – the stadium. In recent years these stadiums routinely cost in the range of several hundred million dollars and in the case of the new Dallas Cowboys stadium over a billion.[3] This level of quality and size is expected of stadiums and arenas which severely limit the pool of potential new franchises. The stadium is paramount to the level of profitability of the franchise and is one of the most important factors the league considers when evaluating a possible expansion.

The stadium, however, acts as much more than a barrier to entry. It also acts as a potential source of revenue for the franchise. Much of the profit of those ten dollar beers and eight dollar hotdogs goes to team owner. The stadium allows for a local monopoly on concessions as well as a prime location for merchandise with the patented team logo. Furthermore, the city government of subsidizes the high building cost of the stadium under the assumption of increased economic activity created by the sports team and its patrons.

There are some structural league differences which I will explore in my analysis. Beyond the salary cap differences between the leagues discussed previously, there are various levels of revenue sharing. The NFL is far and away the most socialistic in approach. Ticket sales are also divided 60-40 to the home and away teams respectively. All NFL television contracts are made by the league, not individual teams, and the revenue is split evenly amongst each franchise furthermore, these media revenues constitute roughly 65% of all league revenue.[4]

[3] Owen (2003)
[4] Lee and Chun(2002)

All the other leagues also equally distribute their national television revenues, although they frequently are much lower in comparison to local media revenues. Major League Baseball, for example, earned $1.3 Billion in national media contracts in 2001 which were shared equally amongst all 30 teams. In local revenue, however, the New York Yankees earned $52 million while the Montreal Expos received $536,000. Until 1994 none of the local media revenue was shared amongst teams but has since hovered between 31 and 39 percent.[5] Baseball also partially shares ticket sales but at a much less favorable rate of 85-15 from the home to the away team.

The NHL, until after the 2004 lockout, had no salary cap or revenue sharing. It currently employs both, with a complicated revenue sharing system where money from the top 10 performing franchises are distributed on a need basis to those in cities with fewer than 2.5 million and make below the league average revenue. It does not share ticket revenue or local media revenue directly but are included in the calculation of total income to be distributed.

The NBA, like all the leagues shares money from official merchandise. Furthermore, beginning in 2001 the NBA instituted a luxury tax whereby for every dollar a team goes over the "soft" salary cap the franchise must contribute a dollar to the general pool which is divided amongst teams who did not exceed the salary cap. Previously there was no other major revenue sharing to speak of including ticket sales beyond national television contracts.

III. Literature Review

The field of sports economics is a rich and variable one covering microeconomic decision making to ticket pricing strategies and beyond. My research focus lies primarily with the business of professional sports, specifically what makes them successful as a business. Strikingly, there is relatively little

[5] Whaples (2007)

literature which broaches the specific question of franchise profitability although there are similar topics such as the effects of certain business practices on revenue, an analysis on competitive balance within a professional sporting league, and the decision making of franchise owners. More often than not, these papers deal primarily with a single sports league. These topics are of interest to the scope of this analysis which will attempt to expand sports economics literature by combining the revenue maximization theories as well as the comparative differences within different teams of the same professional sports league and the institutional differences between the four major professional sports leagues in the United States. In order to see the effects the literature had on my model it is organized by subject matter in relation to this analysis.

Alexander and Kern (2004) address a question similar to profitability – franchise valuation. It also is one of the few articles to analyze all four major American professional sports leagues. Furthermore, their primary data source, Financial World Report, for team value is the same I am using for operating income. They find relative team standing, market size, and a new stadium are all significant to determining the value of a sports franchise. I will, however, go into greater depth regarding team quality determinants to better distinguish between teams within a league.

One strand of literature important to this analysis deals with justifying a seemingly innocuous yet important assumption – namely the rationality or profit maximization of the franchise owner. The literature largely supports this assumption. Addressing the recent findings of below market ticket prices at professional sporting events , Krautman and Berri(2007) dismiss that pricing within the inelastic portion of demand necessarily implies that owners are not profit maximizing. They focus on revenues from concessions across all four major American leagues. Krautman and Berri conclude that indeed owners are rational profit seekers who supplement gate sales with concessions for revenue. Ferguson

(1991) using data from the NHL further supports the hypothesis of profit maximization by owners by predicting ticket prices with a limited number of team and market quality explanatory variables.

In contrast to this supporting literature, Zimbalist (2003) provides a brief yet insightful analysis on the guiding behavior of professional sports franchise owners. Zimbalist highlights the range and complexity of the motivations of franchise owners as various and somewhere between pure profit-maximizing and pure utility-maximizing. Furthermore, he emphasizes the problem of data collection as many owners have the incentive to underreport revenue to lessen revenue sharing amongst the league and to justify higher prices or lower costs. This is an ongoing, unresolved issue with all analyses of the business of sports.

Smith and Lee (2008) test the explanation of profit maximization of owners in the Korean Baseball League. By examining attendance records they find that attending professional sports games may be habit forming, thereby implying tickets priced within the inelastic range are, in fact, profit maximizing for the franchise. This interesting conclusion explores an interesting question regarding the "good" provided by professional sports teams and has implications into the importance of a loyal fan base.

Other papers address the effects of a stadium or arena on a sports franchise. Depken (2004) addresses the effects of new stadiums on ticket and concession sales finding a "novelty" effect of a new stadium as fans will come out to see the new facilities. He concludes that this is a determinant of gate revenue and concession sales. The paper, however, fails to distinguish whether this is due to an increase in seating capacity or to a larger percentage of tickets sold.

Quinn and Bursik(2003) focuses on the lack of correlation between competitive success of a team with venue quality or age of a stadium but he also finds that, with the exception of MLB, a new stadium has no effect on gate sales across all four major professional leagues in America. Owen (2003)

was the inspiration for the inclusion of public subsidy in my analysis. Owen examines city subsidies for new stadiums. His conclusion that smaller markets, which could not otherwise profitably host a team, may offer large stadium subsidies and thereby host one despite being more suitable cities.

Beyond stadiums and institutional structural differences between leagues an often cited reason for levels of financial success of a sports franchise is the sheer size of their potential market. While Burger and Walter are primarily focused upon the effect and cause of payroll discrepancy between teams with large and small markets in MLB, it contains several implications of wider consequence amongst the leagues. They describe a "bandwagon" effect as a primary reason for teams with a larger market to have greater revenues as team wins increase. This is because the larger the local population the greater the number of possible bandwagon fans in their market. Another interesting result relates to new stadiums. Walter and Burger (2003) find that while a new stadium significantly boosts annual revenue it has no additional effect on marginal win values. This implies a new stadium has no effect on team performance but also implies a new stadium draws in more revenue from advertising and/or ticket sales regardless of team performance. This supports Depken's "novelty" hypothesis for a new stadium. Brown and Link (2008) provide a continuation and expansion of Burger and Walter's analysis for MLB. Their findings support the stadium novelty and bandwagon effects. They extend the bandwagon effect into the number of playoff games from the previous year as a significant factor in current year local revenues.

The effect of superstar athletes is an important question in the determination of the bottom line of a sports franchise. Brandes and Franck (2007) examine the effects of superstars on game attendance in the German Bundesliga. He concludes that a team with a superstar or, if we extrapolate out, a team from a large market will have in larger road game attendance. This is an important observation which could explain some differences across the leagues in revenue sharing from gate sales. Small market

teams in the same division with a large market team can gain significant economic benefits by revenue from the larger franchises fans.

In another article, Berri and Schmidt (2004) tests the impact of a top 10 all star vote getter on the gate revenue of his team in the NBA. He finds that the existence of a "star" has a statistical significance but is much lower in magnitude to overall team performance. To insure consistency across the four leagues in my analysis, I used the number of players on a team's roster invited to the all-star game as a proxy for the number of stars on the team because there is no common method of nominating all-stars across the NFL, NHL, MLB, and NBA.

A final strand of literature important to this paper regards the structural differences and general league rules regarding finances, labor, and revenue sharing. Hill and Groothuis (2001) study collective bargaining agreements provide my understanding of the differences in payroll between the various leagues, particularly for the NBA. Hamlen (2007) attempts to illuminate comparative advantages of large market teams through an examination of the NFL. He emphasizes the importance of premium and luxury seating to a franchise's revenue as these are not shared amongst the league or with player salaries. I expect this to be highly correlated with the age of the stadium as premium seats are relatively new. Furthermore, Hamlen discusses the role of coaching salary as a determinant for a team's success on the field and therefore success on the balance sheet. A larger market team is better able to afford an experienced and expensive coaching staff which is not included in the salary cap.

Lee and Chun (2002) investigate recent trends in the business of professional team sports in the United States. It illustrates the differences in league sharing of broadcasting revenue with special attention given to the NFL. And, again in the breakdown of the different levels of revenue across leagues from Luxury Suites the NFL is a leader.

Finally, Rodney Fort must be mentioned for his contributions to this analysis by providing a general setting for this paper in his book *Pay Dirt* and for the data sets provided on his website.

IV. Model

My model explores possible team quality factors and market factors which contribute to the profits, as measured by net operating income before taxes in millions of dollars, of a professional sports franchise across the four major professional sports leagues in the United States, namely, Major League Baseball, the National Football League, the National Basketball Association, and the National Hockey League over the period 1991-2008. To do this, I have run a separate regression for each league but with the same assumptions and equivalent variable and from the same data source with team and year fixed effects. The only exception is certain stadium information which is obtained from franchise websites.

The regression analyzes the relationship between the net operating profit before taxes and a variety of market and team specific factors from 1991 to 2008. The net operating income before taxes, hereby Profits, is the dependent variable. The data comes from the annual franchise valuations reported in Financial World Report and later in Forbes. It is consistent across all leagues and years in my analysis. Profits are measured in millions of US dollars of the nominal value for that year. The fact that the franchise owners have the incentive to underreport earnings to avoid league revenue sharing creates an unexpected downward bias on profitability across leagues and over the time span of this study. This potential measurement bias is on the dependent variable. These errors are contemporaneously and temporally correlated. This makes the regression errors (disturbances) correlated across unit and time.

The two market quality factors considered are the City Population and City Per Capita Income for the metropolitan statistical area where the sports franchise is located. The population and income data are both calculated annually by government agencies. The Census Bureau (1991-2008) post the population data and the St. Louis Federal Reserve Bank (1991-2008) provide annual income data. Data for the Canadian teams are from the Statistics Canada and are in the Canadian metropolitan statistical area equivalent called Census Statistical Areas (1991-2008).

The team quality factors considered in this regression are Regular Season Wins, Previous Season Semi-Final Appearance, Historical Franchise Championship Appearances, Average Points Per Game, and All-Stars on Roster. Regular Season Wins attempt to capture current performance and competitiveness of the game by counting the number of wins for the franchise in its current season. Assuming fans wish to see their team succeed, with less loyal fans only supporting the local franchise when it wins. I expect this variable to be positively correlated with operating income. It should be noted that for the NHL, the only league to allow for tie games, works on a point system instead of simple number of wins. There are two points for a win and one point for a tie. This was used instead of total wins per season.

Previous Season Semi-Final Appearance is used to control for the band-wagon effect from the previous season by using a dummy variable for appearance in the league's semi-final game as a proxy. The momentum from the previous year's success should create more fan loyalty as well as increased media exposure on a national scene resulting in a positive correlation with profit. Historical Franchise Championship Appearances tries to account for cumulative fan loyalty by using the all time number of franchise appearances in the league finals as a proxy of historical reputation for success. Historical significance and a reputation for success should be positively correlated with profit as it increases national exposure and suggests a loyal fan base.

All-Stars on Roster is the number of players on the team who were invited to that season's all-star game. It is an effort to control for the effect of particularly famous and or talented players. All-star players may increase profits by drawing fans and media exposure, but their high salaries and stereotypical antics may outweigh their benefit, resulting in a negative correlation. The potential offensive bias of fans is held constant by the average points in a regular season game. I expect this to be positively correlated with profit across all leagues but to be noticeably more significant in the NFL and NBA.

Finally, Years of Existence is the number of years the franchise has existed in its current city. This variable acts as another proxy for fan loyalty. While there could be a novelty effect for a newly established franchise, I expect this to be positively correlated with profits as a more established team will have more notoriety on the national stage as well as larger fan support. This variable resets as a team relocates to another city despite that the players and administrators often remain constant.

All of these data sets were obtained from the official website of each league with the exception of all-star lists which are on the ESPN website. There is a chance of collinearity among some of these team variables. More points per game, for example, is obviously correlated with number of wins, or more star players not only score more but are expected to be on winning teams. The evidence presented later, however, indicates that the collinearity is relatively small.

The final two factors considered in the model are stadium related. Age of Stadium is the number of years a stadium has existed in its current state. It is a tricky factor because it may have conflicting impacts on profit. There is the historical significance factor that suggests older stadiums house more profitable teams. But, newer stadiums might also be more profitable as they typically have larger seating capacity and more luxury suites. Furthermore, the stadium novelty effect could cause a short term boast in revenues but sharply decline. Usually, the value for this variable is the date the stadium or arena opened, however, any major renovations, as reported at ballparks.com, will reset this to zero to account for any new amenities, seating, or luxury suite changes.

Percentage of Public Subsidy is the second stadium factor. It is simply the percentage of the cost of the stadium paid for with public money. The city government, in many cases, wholly or partially pays for the stadium and then leases it out to the team. I suspect higher public subsidy will also be positively correlated with franchise profitability because of its effect on lowering the fixed cost of the stadium.

Data for both factors come from ballparks.com which is used by Leadly and Zygmont (2005) as well as Owen (2003).

Three different regression models with all of the aforementioned team and market related variables are estimated in this analysis. The first is a fixed effects model. The second is also a fixed effects model but with cluster correction. The third and final is an OLS regression for the sake of comparison. Separate regressions were used because of the different magnitudes of many variables such as Average Points Per Game could provide confusion in interpreting the results. Moreover, an important feature to my analysis is comparing between sports to look at league structural differences not just franchise differences. It should be noted that the dependent variable for these regressions, Profits, is approximately normal for all leagues and, indeed, is centered near zero for all leagues with the exception of the NFL which is more profitable on average. This is seen with an eyeball test of histograms for the data.

The data covers each league for each season from 1991 to 2008. The 1997 and 1998 seasons for the NHL were excluded because valuation was not reported in either Financial World or Forbes because Forbes had just purchased Financial World. Furthermore, the NHL is missing the 2004 season year due to full cancellation of play due to labor disagreements. The NBA and MLB are also missing one year of data because of labor strikes over the period of analysis. The NFL, until now, has not had any particularly disruptive labor disputes. Furthermore, the structure of each league remained relatively constant over the period of this analysis. Most changes in the Collective Bargaining Agreements are accounting based and only alter the amount of revenue potentially available for revenue sharing or in regards to the salary cap. The exception to this is the 2005 CBA for the NHL which instituted the salary cap and the luxury tax of the NBA which didn't come into effect until the 2002 season.

V. Summary Statistics	Obs	Mean	Std Dev	Min	Max
NBA					
Profit (millions $)	490	7.50	15.66	-85.1	59.3
City Population (10,000s)	594	363.38	404.50	97.26	2019.665
City Per Capita Income (10,000s)	490	3.30	0.82	16.55	5.6824
Regular Season Wins	490	41.00	12.75	11	72
Franchise Finals Appearances	490	3.54	5.72	0	28
Avg Points Per Game	490	98.20	5.52	81.9	118.7
Age of Stadium	490	10.63	9.38	0	64
All-Stars on Roster	459	0.84	0.83	0	4
Percent of Public Subsidy for Stadium	490	47.36	42.44	0	100
Years of Franchise Existence	491	26.32	13.78	0	62
Last Year Semi-Finalist	594	0.11	0.32	0	1

NFL	Obs	Mean	Std Dev	Min	Max
Profit (millions $)	549	17.21	17.99	-20.9	108.4
City Population (10,000s)	549	421.50	448.88	19.8	2019.6
City Per Capita Income (10,000s)	549	3.25	0.84	1.8	6.2
Regular Season Wins	549	7.99	3.01	0	16
Franchise Finals Appearances	549	2.05	2.08	0	8
Avg Points Per Game	545	20.68	4.26	8.8	36.8
Age of Stadium	549	14.82	10.41	0	43
All-Stars on Roster	545	3.18	2.42	0	13
Percent of Public Subsidy for Stadium	549	86.82	26.12	0	100
Years of Franchise Existence	549	37.15	22.77	0	87
Last Year Semi-Finalist	648	0.11	0.31	0	1

NHL	Obs	Mean	Std Dev	Min	Max
Profit (millions $)	418	2.261244	10.80193	-29.4	78.9
City Population (10,000s)	419	455.81	479.68	66.07	2019.67
City Per Capita Income (10,000s)	452	3.52	0.79	1.93	5.94
Regular Season Wins	418	84.21	18.68	23.00	131.00
Franchise Finals Appearances	419	17.81	22.68	0.00	92.00
Points Per Game	419	2.87	0.55	1.40	4.41
Age of Stadium	418	15.42	16.50	0.00	71.00
All-Stars on Roster	390	1.34	1.11	0.00	5.00
Percent of Public Subsidy for Stadium	418	50.02	43.88	0.00	100.00
Years of Franchise Existence	418	31.07	27.17	0.00	99.00
Last Year Semi-Finalist	594	0.09	0.29	0.00	1.00

MLB	Obs	Mean	Std Dev	Min	Max
Profit (millions $)	492	5.62	13.71	-50.00	43.70
City Population (10,000s)	492	506.59	456.82	150.23	2019.67
City Per Capita Income (10,000s)	492	3.42	0.84	1.99	6.26
Regular Season Wins	492	81.00	11.29	43.00	116.00
Franchise Finals Appearances	492	6.52	7.73	0.00	39.00
Points Per Game	493	4.63	0.63	2.88	6.23
Age of Stadium	492	13.97	10.93	0.00	47.00
All-Stars on Roster	492	2.05	1.37	0.00	8.00
Percent of Public Subsidy for Stadium	492	74.34	37.24	0.00	100.00
Years of Franchise Existence	491	56.17	39.34	0.00	132.00
Last Year Semi-Finalist	558	0.11	0.32	0.00	1.00

VI. Tables

Table 1: Determinants of Franchise Profitability Regression Results

Variable	NBA	NFL	NHL	MLB
City Population (10,000s)	0.059 (3.15)***	-0.008 (0.45)	0.017 (0.99)	0.017 (0.86)
City Per Capita Income (10,000s)	-5.197 (1.77)*	2.633 (0.79)	-2.963 (1.82)*	6.590 (2.18)*
Regular Season Wins	-0.029 (0.53)	-0.045 (0.15)	-0.061 (1.74)*	0.029 (0.47)
Franchise Finals Appearances	2.573 (3.07)***	0.413 (0.33)	0.088 (.66)	-5.075 (3.69)***
Avg Points Per Game	0.488 (3.99)***	0.162 (0.77)	2.928 (2.51)**	0.386 (0.38)
Age of Stadium	-0.355 (5.74)***	-0.480 (5.11)***	-0.064 (1.64)	-0.332 (5.32)***
Number of All-Stars on Roster	-0.486 (0.63)	-0.545 (1.55)	-0.913 (1.99)*	-0.337 (0.65)
Percent of Public Subsidy for Stadium	0.010 (0.29)	0.055 (0.62)	-0.032 (1.35)	-0.039 (1.27)
Years of Franchise Existence	0.373 (0.8)	1.269 (2.58)**	0.264 (1.07)	-0.221 (0.50)
Last Year Semi-Finalist	1.403 (0.84)	0.958 (0.53)	-2.039 (1.38)	-2.355 (1.34)
Adj. R-Squared	0.5043	0.51	0.3895	0.2665
Observations	459	541	390	491

Note: None of the dependent variables are logged. The numbers in parentheses are the absolute values of t-statistics. Robust standard errors and fixed effects for the team were used for this regression.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 2: Determinants of Profitability Regression Results

Variable	NBA	NFL	NHL	MLB
City Population (10,000s)	0.059 (1.95)*	-0.0073 (0.30)	0.017 (0.55)	0.017 (0.55)
City Per Capita Income (10,000s)	-5.197 (1.25)	2.633 (0.46)	-2.963 (1.02)	6.590 (1.49)
Regular Season Wins	-0.029 (0.47)	-0.045 (0.11)	-.06 (1.18)	0.029 (0.43)
Franchise Finals Appearances	2.573 (2.21)**	0.412 (0.23)	0.088 (.49)	-5.071 (1.78)*
Avg Points Per Game	0.488 (3.09)***	0.161 (0.73)	2.928 (1.69)	0.386 (0.32)
Age of Stadium	-0.355 (3.82)***	-0.480 (3.22)***	-0.064 (1.02)	-0.334 (3.21)***
Number of All-Stars on Roster	-0.486 (0.53)	-0.545 (1.51)	-0.913 (1.71)	-0.335 (0.59)
Percent of Public Subsidy for Stadium	0.010 (0.26)	0.055 (0.26)	-0.032 (0.90)	-0.039 (1.06)
Years of Franchise Existence	0.373 (0.47)	1.269 (1.58)	0.264 (0.57)	-0.221 (0.50)
Last Year Semi-Finalist	1.403 (0.88)	0.958 (0.39)	-2.039 (1.55)	-2.352 (-1.95)*
Adj. R-Squared	0.5043	0.51	0.3895	0.2665
Observations	459	541	390	491

Note: None of the dependent variables are logged. The numbers in parentheses are the absolute values of t-statistics. Robust standard errors and fixed effects for the team were used for this regression. All results were clustered around the team variable.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3: Determinants of Franchise Profitability by OLS

Variable	NBA	NFL	NHL	MLB
City Population (10,000s)	0.007 (3.26)***	-0.002 (1.36)	-0.014 (1.07)	0.0015 (0.98)
City Per Capita Income (10,000s)	-1.53 (2.02)*	8.87 (7.70)***	-.786 (1.28)	3.50 (3.95)***
Regular Season Wins	-0.085 (1.40)	0.202 (0.56)	-0.057 (1.73)*	0.024 (0.40)
Franchise Finals Appearances	.532 (3.70)***	1.16 (3.68)	-0.145 (1.05)	-.112 (.89)
Avg Points Per Game	0.249 (1.81)*	-0.177 (0.67)	2.901 (2.71)**	0.113 (0.10)
Age of Stadium	-0.297 (4.93)***	-0.343 (5.13)***	-0.082 (2.67)**	-0.341 (6.32)***
Number of All-Stars on Team	-1.184 (1.16)	-0.311 (0.83)	-0.931 (2.00)*	-0.606 (1.16)
Percent of Public Subsidy for Stadium	0.058 (3.70)***	0.015 (0.46)	-0.008 (0.65)	-0.005 (0.26)
Years of Franchise Existence	0.006 (0.08)	-0.438 (1.34)	0.227 (4.80)***	-0.016 (1.08)
Last Year Semi-Finalist	2.764 (1.36)	0.958 (0.53)	-0.798 (0.54)	0.675 (0.38)
Adj. R-Squared	0.220	0.298	0.247	0.16
Observations	459	541	390	491

Note: None of the dependent variables are logged. The numbers in parentheses are the absolute values of t-statistics. Robust standard errors and fixed effects for the team were used for this regression.
* significant at 10%; ** significant at 5%; *** significant at 1%

VII. Results

First and foremost, there is some remarkable consistency between the results of each different regression technique. With the exception of the years of franchise existence for the NFL all of the factors have consistent effect on profits across all three regressions. The only other large differences between the three techniques are questions of increased significance between the OLS regression and the other two techniques. The OLS regressions reported a large increase in significance from none to the 1 percent

level for Per Capita Income for the NFL. The other notable changes are the drop of significance of previous World Series appearances in MLB and the increased significance of years of franchise significance for the NHL. Furthermore, with the exception of Regular Season Wins and Points Per Game for the NHL factors that were significant without clustering retain significance, to some degree, with clustering. The differences between the OLS regression and the other two can be somewhat relaxed when one considers the quite large drop of fit for the OLS regression by analyzing the values for adjusted R-Squared. The overall consistency amongst the three models is reassuring for the accuracy of the correlation results.

The total population for the Metropolitan Statistical Area the sports franchise operates within appears to be largely insignificant across the leagues with the exception of the NBA. Here, the population is significant at the 1 percent level and indicates that for every 1 million more residents, potential home fan base, an NBA franchise may expect an extra $5.9 million in annual before tax profit. This may be part of the more urban appeal of basketball or the importance of ticket sales and local media contracts in a league which does not share gate receipts with the visiting team and has comparatively few national television contracts.

Income Per Capita for the Metropolitan Statistical Area of the sports franchise varies substantially between the leagues. It is unexpectedly negative and significant at the 10 percent level for both the NBA and NHL while positively correlated with profit for professional baseball. Perhaps basketball and hockey have a more blue-collar appeal than football or, more significantly, baseball. This may partly be explained by baseball's status as America's Original Pastime and henceforth, its connection to older Americans. This is further supported by the high correlation, 61%, between the median age of the city and the per capita income of the city. It would be interesting to compare the average age and ticket price between the leagues to further explore these correlations to profits.

Regular season wins, surprisingly, seems to be relatively unimportant to the overall profitability of a sports franchise. Indeed wins are negatively correlated with profits in every league except the MLB. It is significant only for professional hockey and only at the 10 percent level. The regression results suggest that for every regular season win, which counts as two points in hockey standings, the franchise will lose $122,000. This may be indicative of the high cost of paying players and coaches good enough to buy a win, since for most of my data set hockey had no salary cap. This theory is further supported by the significant negative correlation between team profits and the number of all-stars present. The NHL may simply have been paying its players a disproportionally high amount. Another possible explanation lies with the fan base of hockey. It may rely on a more loyal fan base who will attend games despite the performance of their team or hockey's appeal lies beyond the result of the team. Hockey fans may desire simply the violence and excitement of the sport or the various promotions offered at the game over the relative quality of their home team. A final possible explanation may be that, due to the relatively high cost of a ticket and long term media contracts, both fans and contracting media companies make their decisions to support the franchise prior to the knowledge of the relative quality of their home team thereby, making profits independent of regular season performance.

The total number of franchise appearances in the league championship does not appear to be consistent across leagues. It is very significant, at the 1 percent level, for both baseball and basketball although not at all for football or hockey. Furthermore, Major League Baseball has a negative correlation between profits and historical team performance, against expectations. The NBA supports my initial predictions indicating that for each past championship appearance an NBA franchise can expect to earn just over $3 million in annual profits. Possibly a result of perennial winners receiving greater media contracts, a larger fan base, and indicate a well run business overall. The MLB results, meanwhile, could be explained by its lack of a salary cap and therefore the very high cost of winning coupled with the existence of several outliers. The New York Yankees, for example, have appeared in the World Series

more than 40 times. They also have frequently turned a net operating loss over the 18 years of my data in large part due to exceptionally high player salaries. Meanwhile, several routinely profitable franchises such as the Houston Astros have appeared in only one World Series.

The average number of points per game is positively correlated across all leagues and significant in both the NBA and NHL at the 1% and 5% levels respectively. Offensive performance may be more important to fans of these sports or they may be more closely related to overall team quality than the NFL and MLB. Defensive prowess may be appreciated more in the football and baseball as fans may watch to see sacks and double plays as much as they come to see touchdowns or homeruns. A slower, lower scoring game may not be so highly desired in basketball or hockey where a higher fan emphasis lies on impressive feats of scoring.

The current age of the stadium may be the most important factor across leagues that I have considered. It is significant at the 1% level for three of the four leagues in each of the regression models. Furthermore, the lone holdout, professional hockey, is significant in the OLS regression at 1% and is almost significant at the 10% level in the non-clustered fixed effects regression at a t-score of 1.64. For the other three leagues with each year since the stadium was built the franchise loses at least $300,000 in profits. This facet is most likely explained by the increased importance of luxury suites to the success of a franchise. Despite the importance of media contracts for a franchise, the revenue received from ticket sales in the 2008-2009season ranged from a league average of 22% for the NFL to 41% for the NHL of total franchise revenue according to the Forbes annual franchise valuation report. This remains a compelling argument for both newly built stadiums and newly renovated stadiums as many renovations include an increase in luxury suites. As an example, the newly renovated Yankees Stadium in New York

City went from 19 to 56 luxury suites which is still less drastic than the 67 suites added to Wrigley Field for its 1989 renovation.[6]

These suites are a new phenomenon across professional sporting leagues in the United States and Canada. As a result, the revenue from them is not included in the current Collective Bargaining Agreements. In fact, they are one of the primary causes of the current labor disagreements in the NFL and NBA. Luxury suite revenue is not included in either the revenue sharing schemes of the league or included in the percentage of league wide profits players are entitled to. It is money belonging solely to the bottom line of the franchise which has them and typically the newer the stadium the more luxury suites as well as other amenities which aren't included in the bargaining agreements such as concessions.

The number of all-star players on a team's current roster only seems to be significant for the NHL. It is significant only to the 10% level and like all the other leagues is negatively correlated with profits. One reason for this may be the remarkably high player salary expenditure in the NHL prior to the 2005 collective bargaining agreement which instituted the salary cap. Player salaries, according to Canadian Public Broadcasting, constituted 76% of all league revenue prior to the 2005 CBA. This contrasts to 64% in the NFL, 63% in MLB, and 58% in the NBA.[7] A franchise could be predicted to lose just over $900,000 in annual profits for each all-star player on their roster. It should be noted that the average NHL team had only 1.34 all-star players and at most five of them.

The percent of public subsidy provided for a franchise's stadium appears to be insignificant for all leagues. It could be that the benefits of any public money donated to the stadium was balanced out by appropriate rental agreements with the sports franchise or from lost franchise revenue from renting the stadium out for other events. Regardless, despite the regression technique public subsidies were not

[6] Lee and Chun(2003)
[7] ""Salary Cap." Canadian Broadcasting Company. <http://www.cbc.ca/sports/indepth/cba/issues/salarycap.html>

statistically significant, except for the OLS regression for the NBA. Furthermore, the coefficients for public subsidies are all in the hundredths indicating a lack of economic significance even if the t-statistics were higher.

The number of years a sports franchise has existed in their current stadium seems to be insignificant for each league except the NFL. It does, however, become insignificant at even the 10% level when clustering is taken into account and in the OLS regression. It is difficult to say with much confidence what the years of franchise existence means regarding an NFL franchise or the reason it is possibly significant for professional football and not the other leagues. It is possible that football is unique with its hard salary cap and large number of players that it takes longer to become an established franchise with a team identity and relative competitiveness than the other sports who have smaller rosters and a less stringent salary cap.

Team momentum from the previous season's performance, represented by an appearance in the semi-finals the year before, appears to be insignificant across leagues. It may be that it is simply difficult to repeat the success of the previous year or the money spent on the players and coaches to make a push deep into the playoffs balances out any benefits from fan support. This theory of increased player salaries is supported by the coefficients of the NHL and MLB. The two leagues which do not have a salary cap for much of the data set are negatively correlated with profits although, at less than 10% significance. The two leagues which control the amount of player salaries are both less significant and positively correlated with their previous year's performance.

VII. Conclusion

It is never easy to determine causal effects from statistically significant correlations between variables. First, data collection represents a limitation to this analysis. This is particularly important for the dependent variable, profits, which could be subject to a downward incentive by team owners to

underreport a franchise's revenue for tax and revenue sharing purposes. Second, without data for player salaries by franchise the effect of rising player salaries and bonuses remains untouched. Third, without information on annual revenue transfers for each franchise from league revenue sharing practices it is difficult to make any conclusions on their effects to team profitability.

There does, however, appear to be several distinct relationships between the level of profitability and various team and market quality factors in recent American professional sports history. The only two determinants included in this model with significant correlation to a franchise of the four different team sports are the per capita income of their respective home cities and the age of their current stadium.

Stadium age indicates very significant negative correlation to the profitability of a sports franchise with statistical significance of 1% across three of the four leagues in question. This, potentially, is of particular importance to the current debate over changes to the Collective Bargaining Agreements for the NFL and NBA. The players wish to expand the definition of league revenue to include money gained from luxury suites and premium seats which are currently not included in what owners are required to share amongst players and the less financially successful franchises. The extra revenue gained from a newer stadium, presumably due to luxury suites among others, could contribute as much as $480,000 a year of profits according to my results. When considering a stadium near the end of its life, 30 years, it could make more than $14 million less than an equivalent team in a brand new stadium.

Per capita income of the home city also appears to have broad importance across the four leagues although lacks a consistent effect. It is negatively correlated in the NBA and NHL but positive in professional baseball and football. An analysis of demographics of their respective sports fans may shed further light on this determinant but the models do suggest a population's income is important to a team's profitability.

Professional football is the most profitable of all the leagues in terms of league average additionally; it has the largest maximum and lowest minimum values. The teams in the two leagues without a salary cap, the NHL and MLB, have the lowest levels of profitability in the analysis. The NBA with its "soft cap" and limited profit sharing business model has the second most profitable sports franchises. The more socialist approach of the NFL appears to be the best business plan in terms of individual franchise profits. It is the most insulated of the leagues from the effects of both market and team quality variables as all but two yielded statistically significant results. Contrary to classical economic thought, the case of the NFL seems to suggest that greater revenue sharing and wage control increase profits. This is further corroborated with the results of the NBA. Furthermore, for the two leagues without wide revenue sharing or salary caps appear to, if anything, be economically punished with their greater market freedom. Both the NHL and MLB have either negative or insignificant effects upon franchise profits for regular season wins, all time franchise finals appearances, number of all-stars, and previous season semi-final berth. This may be due to owners paying extra to achieve results on the field.

If the ultimate goal of a professional sports franchise owner is to make money then league owners may want to emulate the NFL with increased wage controls and revenue sharing. The most important factor to a franchise owner may be a new stadium. It will be interesting to see if this aspect continues after the resolution of current labor disputes regarding revenue from luxury suites. This correlation may explain the ongoing complaints and requests for new stadiums on behalf of the owner as well as many franchise relocations to get better stadium deals. The results of this analysis may not guide a explain the financial success or failure of American sports franchises but sheds some much needed light into the stakes and consequences of the Collective Bargaining Agreements the NFL, NBA, NHL, and MLB are built upon.

Future research focusing on addressing the limitations, particularly the players cost by franchise and percent of revenue gained from league sharing, could provide valuable information to collective bargaining agreements. Additional analysis could be performed on the short and long term effects of new stadiums to determine whether the short term stadium novelty effect has a larger influence on profits than the longer term effect of more amenities and seats. Another possibility for future research could be the effects of demographics of the home city or of sports fans for each league. This could help explain the negative correlations between City Income and Profits for the NBA and NHL. Finally, research could be done involving European Football Leagues to see if these results are uniquely American results. Of particular interest is the possible effect of the FIFA "hospitality" tickets which could have a similar effect to luxury suites in the US.

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