AN ECONOMIC ANALYSIS OF THE RISE IN FRANCHISE VALUES IN THE FOUR MAJOR NORTH AMERICAN SPORTS LEAGUES FROM 2008-2016

by

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ABSTRACT

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North American professional sports franchise values have been growing rapidly over the last 10 years, leading some to wonder how this rise might mirror previous economic booms such as those of the internet and housing sectors, and thus impact the future of the sport industry. To investigate this phenomenon, financial and other team-specific data was acquired from Forbes, while metropolitan area statistics were mostly gathered from the Bureau of Economic Analysis and the U.S. Census. The results of this study showed that revenue, metropolitan area population and GDP, multiple teams in the same metro area and the same league, and year that a venue opened (or was renovated) have a significant effect on team value. Additionally, a large "bubble" in team prices for 2016 was evident throughout, helping explain the drastic rise in prices since 2014. Revenue, metroGDP, and year=2016 were all positively correlated with franchise value, while metroteamssame, metropop, and venueyropened were all negatively correlated Since professional sports is a private industry, the bubble is most likely driven by external factors such as the rise in TV and broadcasting revenue, and thus does not seem to be in danger of bursting. As such, it will be interesting to see how new TV deals increase these valuations even further. Additionally, one can theorize how recent and forthcoming sales transactions might continue to "set the market" higher and higher, as typically occurs in other industries throughout the economy.

TABLE OF CONTENTS

CHAPTER ONE

INTRODUCTION

Section 1.1: Research Question and Answer

This paper aims to prove how market demographics like metropolitan area income and population, and financial statistics such as revenue and player expenses can be determinants of the rise in North American professional sports franchise values over the last 10 years.

As the analysis below will show, a franchise's revenue, the population and GDP of the metropolitan area in which it plays, having more than one team from the same league in the same metro area, and the year in which a team's venue opened are the factors that are statistically significant and correlated to its overall rise in value over the last 10 years. Even though revenue prevails as the primary factor causing the large rise in value over this time period, it is not large enough to explain the drastic spike in values more specifically between 2014-2016. Even after controlling for revenue, team valuations in 2016 are still $312 million higher than they would have been with the same revenue and other factors in earlier years. As such, these findings support the idea that an economic bubble might be present in the sports industry, with values far exceeding their true expected range. Given this information, along with the theory that the bubble is most likely driven by external factors such as TV and broadcasting revenue and ever-climbing real transaction prices, it can be expected that these values continue to rise exponentially in the near future.

Section 1.2: Research Motives

Sports economics has commanded a greater share of attention from economists around the world since the early 1990s, and even more so over the past 15-20 years. While

topics have ranged from the impact of free agency to labor issues to team nomenclature, one specific area of interest that has yet to be fully developed is the impact of factors such as costs, revenue, and metropolitan demographics on a franchise's estimated value. This topic has come into even greater focus over the last decade as team values across the four major North American sports leagues (NFL, MLB, NBA, NHL) have skyrocketed, with little economic reasoning or theory to explain such a drastic rise. *Forbes* has estimated these franchise values using its own formulas and economic data, providing further evidence behind this growing trend. Additionally, over this same time period real transaction prices for teams throughout the four leagues have increased exponentially as well, most times even exceeding the estimated value as calculated by *Forbes*.

This phenomenon is especially interesting to study as the sports industry has shown fluctuations in value in response to various economic factors and events as well. Some team values decreased between 2008-2012 as the U.S. endured The Great Recession and subsequent long period of recovery. On the other end of the spectrum, the largest increase in franchise values has occurred since 2014 – the same time during which the economy has boomed and the stock market has flourished. These similar trends between the U.S. macroeconomy and the sports industry might suggest a greater correlation between a firm's finances and its overall value than previously thought, as well as provide the potential underlying theory of an economic bubble that franchises have witnessed more recently, as seen during the technology boom of the late-1990s and the housing bubble of the mid-2000s.

CHAPTER TWO

BCKGROUND ON THE PROFESSIONAL SPORTS INDUSTRY

Section 2.1: Overview of North American Professional Sports History

With a rise in popularity and the growing importance of sports economics and sports money, the North American professional sports industry has become increasingly more interesting to study in the last 20-30 years. Unlike publicly traded companies, sports franchises are almost all completely privately owned (with the exception of the Green Bay Packers – whose public offerings occur very rarely and come with almost none of the benefits of owning traditional stock). However, these franchises operate much in the same ways that public companies operate, with values ultimately derived from the return on capital investment in them, among many other factors. As such, changes in value are often reflected by stock market swings, and other economic, political, and social events that shock the economy. The sports industry survived The Great Depression, and more recently the impact that The Great Recession had on sponsorship and attendance revenues to continue on the path towards reaching the peak in value seen today (Van Riper, 2008). This statement implies that the main factor that differentiates the professional sports industry from many others is its ability to keep growing even in business cycle downturns. Even so, while this privatized nature suggests that underlying factors must play a role in the overall valuation, in the end a sports franchise is still a business like any other, and so the usual tools of valuing businesses should apply to it in a similar sense.

The rest of this chapter will discuss the history of the four different professional sports leagues in order to provide background knowledge on important events that have fostered the development of each to reach where they are today. Part of this history acts as

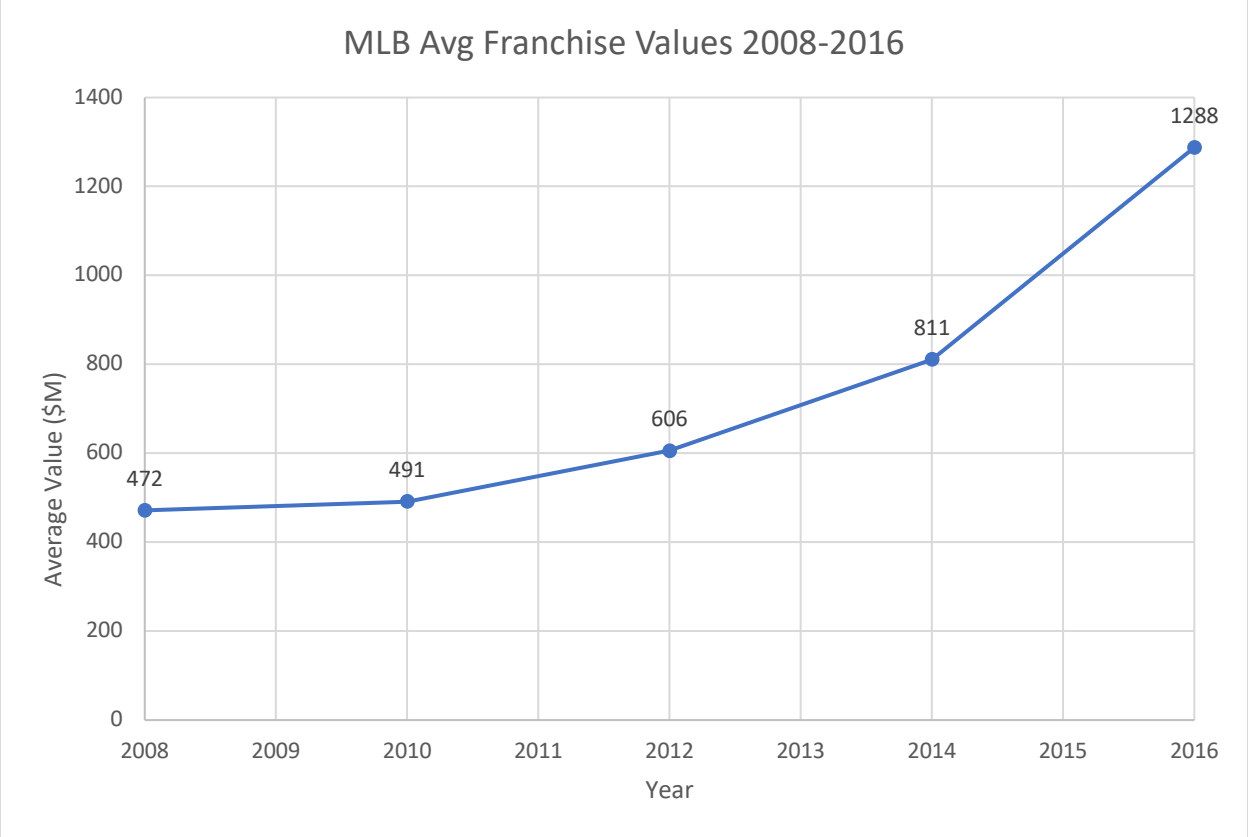
the foundation upon which these leagues have grown to become integral pieces of both society and the economy. Without changes such as free agency, advertising revenue, westward expansion, and many others, one could hypothesize that team values would never have reached the heights they are at today. Additionally, more recent history provides the motivation behind this paper, as evidence exists behind the idea that various factors have contributed to the rapid rise in valuations. One specific piece of evidence that will be studied in even greater detail is the potential formation of a "bubble" in the industry since 2014. Although the analytical portion of this study will group the four major North American sports leagues into one for simplicity of regression analysis, it is easier to first understand the growth of each league individually before then bringing all of these ideas back together as it pertains to the model, results, and conclusion.

Section 2.2: History of Major League Baseball

Professional sports gained immense popularity in the United States and Canada following World War II. During this same time period the current formation of the MLB, NFL, NBA, and NHL slowly evolved as the leagues "progressively found ways to deal with long-standing issues such as franchise relocations and nationwide expansion, conflict with interlopers, limiting player salaries, racial integration, and many others that threatened to hinder the expected growth" (Reiss, 2017). While Major League Baseball has long been known as America's pastime, this distinction has not come without scrutiny. Financial woes were long a problem for many MLB teams, only to be resolved in the mid-20th century with the game expanding to the West Coast, as well as aid from rapidly rising attendance and the introduction of TV broadcasting (Reiss 2017).

Along with this relocation and expansion came the construction of new ballparks. In those early days, many teams secured public financing for these venues by claiming them as multi-purpose venues, while more present-day stadiums embrace the look and feel of the technological innovation revolution of today's age that precedes increased private financing and sole ownership. Additionally, the formation of the player's union in 1954 was a moment that forever changed the course of baseball history, although its true impact was not felt until the late 1960s and early 1970s by fighting for improved player benefits and salaries, and eventually free agency (Reiss, 2017). No longer under the strict rules of ownership, free agency is arguably the driving force behind the exponential rise in player salaries that is seen today. Through multiple labor strikes and plateauing attendance, Major

Figure 1: Average MLB Team Valuation 2008-2016



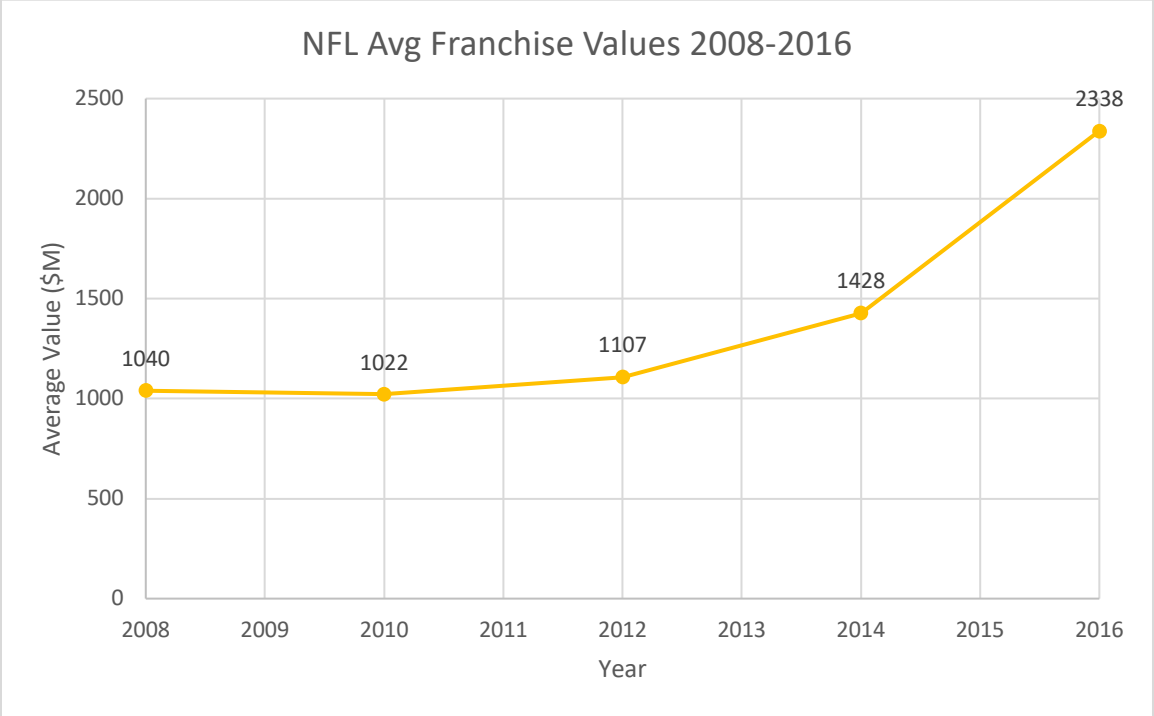
**Data comes from Forbes*

League Baseball has continued to grow in the 21st century due to higher ticket prices and increased TV revenues, thanks in large part to arguably the strongest labor union in North America. A more detailed representation of recent MLB team values that precedes the regression analysis to follow can be seen in Figure 1 above, which shows average forecast sales values since 2008. In particular, it is interesting to note the 59% average increase in team value between 2014-2016, indicating the potential for some external factor affecting these valuations beyond the measured variables that Forbes already uses in its calculation.

Section 2.3: History of the National Football League

Similar to Major League Baseball, the NFL made great strides in its national appeal through westward expansion and merging with the American Football League. Likewise, the formation of the NFL Players Association in 1956 eventually gave rise to free agency, though unlike in MLB, with a hard salary cap that restricts player salaries to a maximum dollar value (Reiss 2017). Many would argue that football has surpassed baseball as America's pastime as the NFL has the most teams of any professional league and a growing fan base both domestically and internationally. Much of this growth into the 21st century can also be attributed to league-wide TV and broadcast revenues – by far the largest among any of the sports leagues. However, as the league seeks to continue to thrive in the coming decades, it is challenged by two important matters: an increased social divide between players and society, and the fallback of years of concussions and other playing-related health issues that threaten the league's profits, reputation, and future. More recent trends in NFL estimated average team value can be seen in Figure 2 below, which shows a staggering 64% increase in value between 2014-2016 – exceeding that of Major League Baseball teams over the same time period.

Figure 2: Average NFL Team Valuation 2008-2016

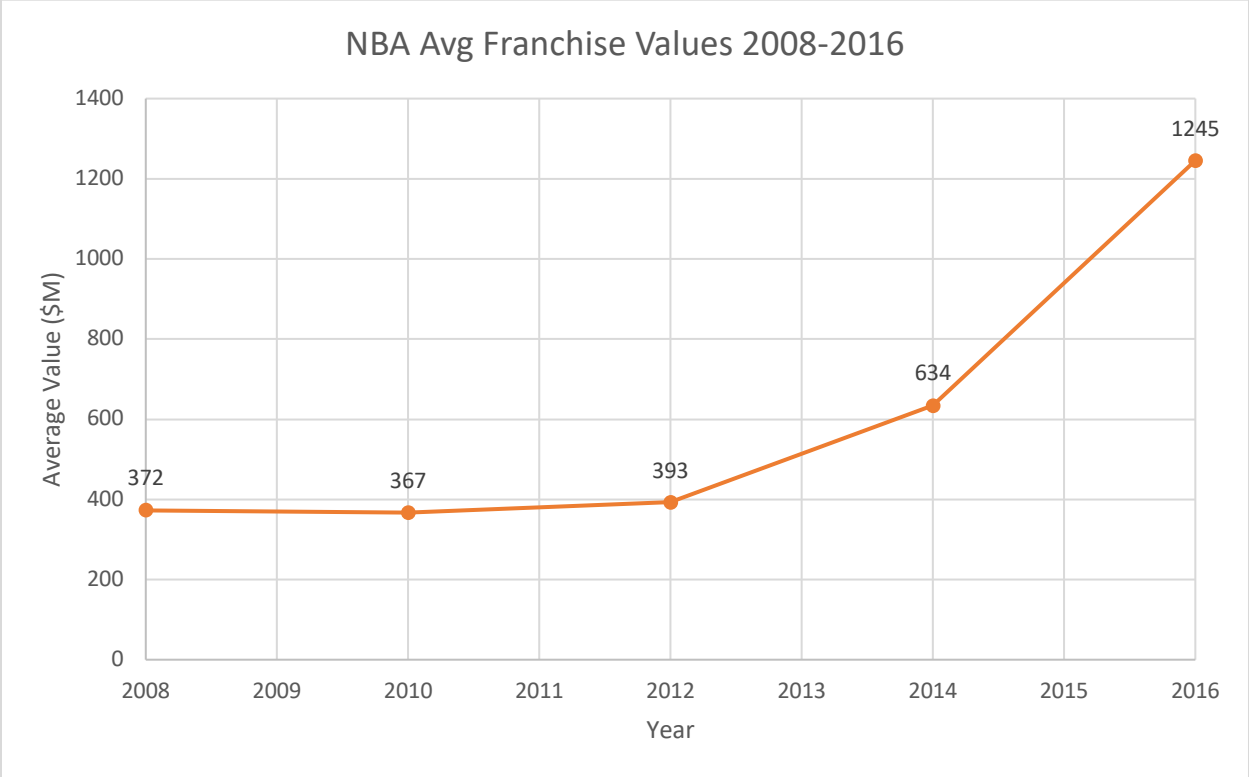


**Data comes from Forbes*

Section 2.4: History of the National Basketball Association

Basketball has a long-standing tradition throughout the United States and more recently in Canada as well, though its popularity did not begin to rise until the NBA-ABA merger in 1970 (Reiss 2017). Similar to the NFL and NBA, the initial growth of the sport can be largely attributed to the formation of the player's union, free agency, and nationwide expansion. However, two main factors contributed to the late 1990s – early 2000s era of prosperity: TV revenue sharing similar to the NFL, and the impact of Michael Jordan – arguably the greatest and most influential athlete of all time – creating a brand and a culture for future generations to follow and imitate. Since that time, NBA popularity has continued to rise to rival that of the NFL and MLB, especially internationally where it has arguably the second greatest appeal of the four major sports behind the NHL, and thus an immense

Figure 3: Average NBA Team Valuation 2008-2016



**Data comes from Forbes*

market for sustained growth for years to come. The impact of this rise in popularity on NBA team values more recently can be seen in Figure 3 above. Similar to the two previous graphs above, this graph also illustrates average team valuations over the ten-year time period. Additionally, the trend of a large increase in team values since 2014 continues in the NBA as well, though the 96% increase seen here far exceeds both the MLB and NFL.

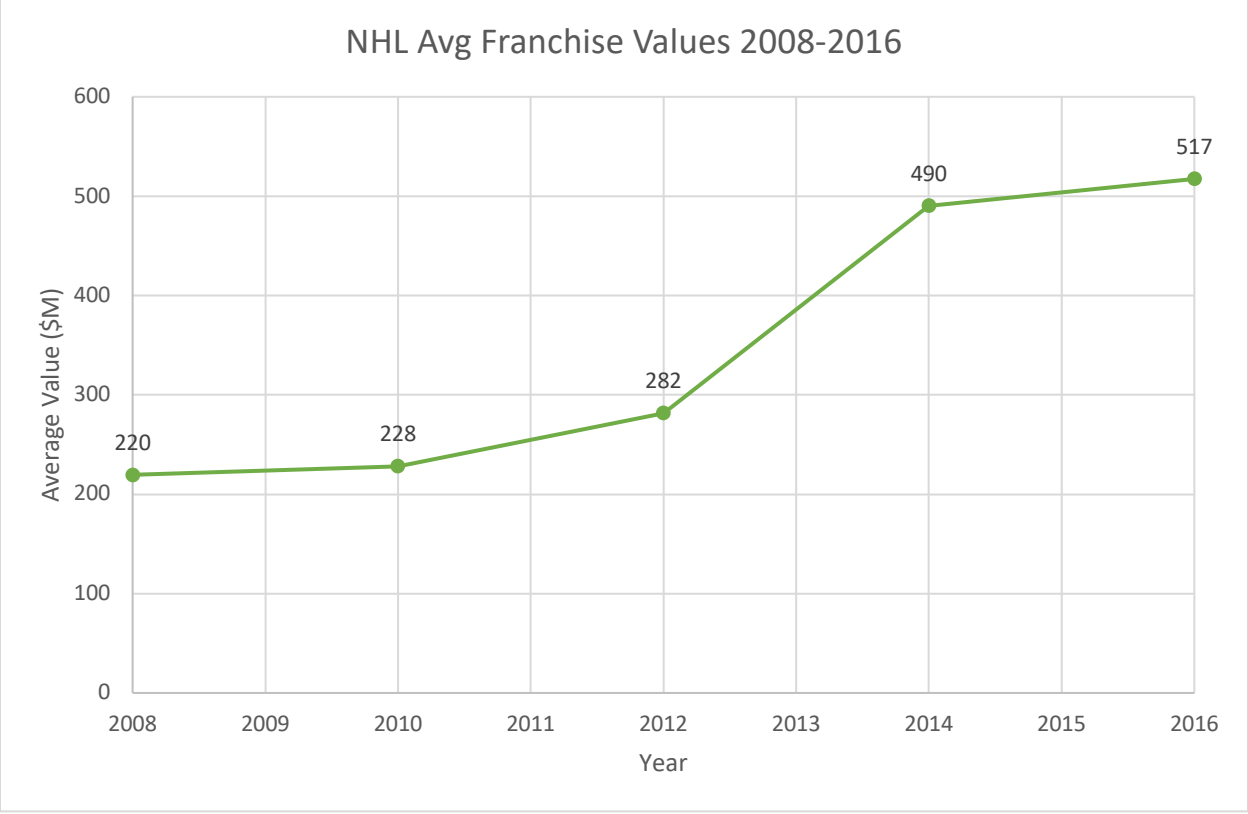
Section 2.5: History of the National Hockey League

Unlike the three previous sports, historically hockey has a much bigger drawing internationally than it does in the United States. The league was long known for its "Original Six" franchises – the Boston Bruins, Chicago Blackhawks, Montreal Canadians, New York Rangers, Detroit Red Wings, and Toronto Maple Leafs – who comprised the

entire league for nearly three decades (Reiss 2017). While the NHL has seen steady but slow growth since, many external factors have caused it to lag behind other North American professional sports leagues. Since many of its players immigrate from overseas countries, the NHL has had to embrace this diversity by conforming to Olympic and other national team demands, which typically fall in the middle of the season.

Additionally, a lack of union structure hindered growth during the late 20th century – a time when other leagues prospered. During this same time period relocation and expansion were abundant, but with little success – especially in the southern part of the U.S, a warmer climate with minimal hockey appeal and a history deeply rooted in the other three leagues. Lacking the same national engagement of the other three sports, the NHL

Figure 4: Average NHL Team Valuation 2008-2016



**Data comes from Forbes*

clearly trails the MLB NFL, and NBA in terms of current popularity and growth as evidenced by average franchise values over the last 10 years seen in Figure 4 above. This is especially true considering NHL teams did not exhibit the same trend of drastic growth since 2014 with only an 11% value gain on average, compared to the 59%, 64%, and 96% seen in the MLB, NFL, and NBA respectively. Whatever factors may be driving the growth in the other three leagues do not seem to be having the same effect in the National Hockey League, which supports the theory that each league operates independently and reacts differently than the others.

Section 2.6: Current and Future Sports Market Data

As of 2014, Forbes valued the current North American professional sports market at $60.5 billion, with it expected to reach $73.5 billion by 2019 (Heitner, 2015). Along these same lines, it is expected that revenue from media rights deals – especially in the NBA, NHL, and NBA where current contracts expire in 2019 – will surpass gate revenues as the industry's largest income segment. The underlying economics here is that franchise values should rise when they receive more TV revenue, under the assumption that revenue shows as significant and positively correlated with team value.

The accompanying sports market history and projections that previously supported this position can be seen in Figure 5 below. The largest increases in market-associated revenue between 2010-2014 occurred in both media rights and sponsorship, with gate revenues and merchandising trailing slightly behind in terms of gains. In particular, media rights climbed 15.2% from 2010-2011[1], and 19% between 2013-2014[2]. The 2015-2019

[1] NFL signed TV deals worth $27 billion, and NHL new 10 year deal, in 2011.
[2] NBA signed new $24 billion deal with Turner in 2014, expected to begin during 2016-17 season

Figure 5: North American Sports Market History and Projections

North America sports market by segment											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	CAGR
US$ millions											
Gate revenues	16,176	16,116	15,821	17,372	17,707	18,251	18,637	19,385	19,717	20,122	2.6%
Media rights	9,423	10,858	11,743	12,262	14,595	16,366	18,427	19,150	19,949	20,630	7.2%
Sponsorship	11,820	12,615	13,257	13,900	14,689	15,309	16,140	16,822	17,635	18,306	4.5%
Merchandising	12,571	12,482	12,771	13,144	13,493	13,672	13,861	14,042	14,252	14,464	1.4%
Total	49,990	52,071	53,592	56,678	60,484	63,598	67,065	69,399	71,553	73,522	4.0%
% change year on year											
Gate revenues		-0.4%	-1.8%	9.8%	1.9%	3.1%	2.1%	4.0%	1.7%	2.1%	
Media rights		15.2%	8.1%	4.4%	19.0%	12.1%	12.6%	3.9%	4.2%	3.4%	
Sponsorship		6.7%	5.1%	4.9%	5.7%	4.2%	5.4%	4.2%	4.8%	3.8%	
Merchandising		-0.7%	2.3%	2.9%	2.7%	1.3%	1.4%	1.3%	1.5%	1.5%	
Total		4.2%	2.9%	5.8%	6.7%	5.1%	5.5%	3.5%	3.1%	2.8%	
CAGR: Compound annual growth rate											

Source: PwC Sports Outlook (October 2015)

projections support the current data to continue this trend as well, with projected CAGR returns of 7.2% and 4.5% for media rights and sponsorship respectively. Expected year-over-year changes for this same time period remain relatively steady as well, with media rights expected to fall to more normalized levels after the jump associated with the latest NBA television deal. Given these rapid changes along with the overall evolution of the sports industry, there is great anticipation about how this continued growth nationally will contribute to the paralleled rise in franchise valuation.

Section 2.7: Theory of an Economic Bubble

As seen with the rapid rise of estimated values between 2014-2016 in the NBA, MLB, and NFL, evidence suggests that this increase might be explainable by the theory of an economic bubble. An economic bubble can be defined as a rapid rise in the market prices of an asset so far beyond its fundamental value that it can be considered an 'irrational exuberance' (Investopedia 2017). In technical terms, a bubble occurs when there are too many buyers who are too keen to buy and not enough supply, and thus prices get driven up

extremely quickly. This can especially be true in an industry such as professional sports in which there is a minimal number of firms compared to a typical market, and these firms are not sold very often. Additionally, the fact that teams are often sold through a closed-bidding process pushes these prices up even further. Once one team sets the sale price high in a particular sport, others are more likely to follow in the future.

Contemporary examples of an economic bubble support these assumptions. The technology rise of the 1990s gave way to the dotcom bubble the formed and eventually burst at the turn of the century as the economy could not handle the rapid rise in equity markets fueled by investments in internet-based companies. The bubble formed as a result of an influx of cheap money, easy capital, market overconfidence, and pure speculation. However, the companies that investors hedged their bets on failed to turn a profit, and eventually the market crashed as many of the companies declared bankruptcy and folded (Investopedia, 2016). Even more recently, the housing bubble and subsequent Great Recession in 2008 shook the economy in ways that economists had never seen before. Partly fueled by the decreased investment in stocks following the dotcom bubble, investors instead began purchasing real estate, driving up home prices across the country. However, as time went on and prices continued to rise, these investments became more speculative and the mortgages subprime until eventually homeowners defaulted, leaving banks and institutions deprived of cash and capital (Investopedia 2017). What both of these events have in common is the idea of speculative investment and greater demand than supply rapidly increases prices – something that can be applied to many firms in many different industries, even a professional sports team.

CHAPTER 3

REVIEW OF EXISTING LITERATURE

The history of growth in the professional sports industry is especially interesting to study as it relates to specific factors that may be affecting the exponential rise in franchise valuation seen more recently – especially in the MLB, NBA, and NFL. Since these changes cannot be attributed to specific macroeconomic variables or events, they must come from other internal and external causes that are directly related to a specific franchise and its corresponding market. Previous studies have sought to build upon this historical knowledge by testing the correlation between many of these factors as it relates to the increased franchise valuation across all four sports leagues. Much of this previous analysis originally focused on the impact of facility construction and franchise relocation since it was theoretically assumed throughout the industry that these factors increased the value of a franchise and provided a positive externality to the surrounding city. Similarly, more recent economists have further developed these ideas by questioning the importance of team ownership, public vs. private funding of these new facilities, and the impact of different pricing schemes, given that professional sports is a private industry and thus financial statements are difficult to find. However, where this topic lacks analysis and understanding – but provides an opportunity for additional research – is in this cross-relationship between underlying financials, market demographics, and franchise valuation, and the potential economic reasoning behind both this rise in value as well as the decision-making determinants for potential investors in overvaluing a team during the bidding process.

Section 3.1: Real Transaction Price and Economic Models

One way in which economists have approached the topic of professional sports franchise values is by looking at real transaction prices and how economic models can predict such values. While these models are imperfect in determining specific factors that may impact the sale price, they do a great job of examining the impact of the market structure of the professional sports industry as a whole, especially as it pertains to various microeconomic theories.

One of the distinct characteristics of a professional sports league compared to other industries is the fact that there are industry-wide cooperative behaviors among teams with some degree of antitrust exemption. Given this assumption, Bae and Choi (2007) analyzed the optimal number of firms in a professional sports league using Salop's circular city model under two different assumptions. One assumption was a cartel with full collusion that has absolute control over the number of firms as well as their pricing, and the other was a semi-collusive cartel that controls the number of firms, but pricing is independently determined by each firm in a non-cooperative manner. Although this study would not seem to have a direct relationship to firm value, in a deeper sense the number of firms in a league – or more specifically, in a single market – can potentially be a determining factor in overall team value. As it relates to my study below, I have variables that measure competition between franchises between firms and its effect on profits. However, in this scenario the authors assumed that a professional sports league acts as the cartel that coordinates the number of teams and possibly ticket pricing as well.

In modeling this cartel collusion, the authors used the location of consumers in the circular city model as a representation of their fan loyalties for an ideal team. After

analyzing this model under three scenarios: a cartel with full collusion, a semi-collusive cartel without price control, and free entry, the authors found that each scenario had its own advantages and drawbacks in relation to a professional sports league. The semi-collusive cartel provided a smaller number of firms than the fully collusive cartel because the inability to control prices forces it to relax price competition. As for North American sports leagues, since they operate as a semi-collusive cartel, the number of franchises must come close to the socially optimal number in order to maximize benefits for both the consumer and the firm. However, this analysis also concluded by stating that any policy related to the number of franchises should be evaluated with greater care because they depend on the extent to which the leagues can control franchisees' pricing behavior – an important note for future studies on this topic. As it relates to overall franchise market value and the effect of franchise location on this value, it is important to consider the number of teams in a specific market – and even multiple teams from the same league in the same market – as potentially correlated variables.

Due to the fact that financials of professional sports franchises are difficult to obtain since they operate as private firms, Humphreys and Mondello (2008) aimed to predict the determinants of franchise values using a Hedonic Price Model. A Hedonic Price Model identifies factors according to the premise that price is determined both by internal characteristics of the good being sold and external factors affecting it. The authors built off of previous studies from the likes of Alexander and Kern (2004), Vine (2004), Fort (2006), and Miller (2007), except with a further analysis of the impact of intangible assets and fundamental determinants beyond the typical tangible ones such as stadiums and capital resources.

In this study the authors used the hedonic price index method to analyze the prices paid for professional sports franchises based on their estimated value according to the observable characteristics of their assets. The data for this study came from Rod Fort's Business Data website, BEA, and ballparks.com. However, compared to previous studies, the authors here used actual franchise sale prices from the period 1969-2006 rather than the estimated values given by *Financial World* and *Forbes Magazine*.

The results of this study indicated that the average price of NFL franchises is the highest, followed by MLB and NBA which are equal, and NHL which are the lowest. It is found that franchises in larger markets command a premium, while the population parameter suggested that for each additional 1% increase in metro area population the franchise sales price increases by 0.67%. Both of these ideas are ones that I will consider in my analysis, though using the estimated value rather than actual sale prices during initial regressions. For all sales since 1990, when *Financial World* started publishing estimated team values, the estimated value averages $31.6 million less than the actual sale price. While previous analysis would suggest that this difference stems from on-field success and facility age, this hedonic price model does not support these findings. There also may be a correlation between sale value and multiple franchises competing in the same study, though further analysis of this variable must be done before reaching a conclusion. Lastly, the average annual rate of increase of this index was over 20% for the period 1969-2006, signifying owners earned significant capital gain over this period – and potentially a reason why owners are willing to pay far above the estimated value. While the results of this analysis were limited in scope since the hedonic price model depends critically on a specified model and does not account for cross-league effects of changes in sale prices,

these shortcomings also represent opportunities for further research on intangible variables in the future.

As suggested at the end of his previous research on factors that affect actual sale prices in professional sports, Humphreys and Lee (2010) aimed to price models on franchise value by using the repeat sales method and a hybrid model that includes both repeat sales and single transactions rather than a hedonic price model. Originally used for calculating changes in the sales price of the same piece of real estate over time, the authors used this method to instead analyze the change in franchise sales prices from one sale to the next to account for the hedonic characteristics of franchise prices. The rationale behind performing this research was to build upon previous theories of the effects of observable variables such as transaction prices, markets teams play in, and facilities teams play, as well as provide an offset for hedonic shortcomings in unobservable variables related to perceived quality of a franchise due to reputation, city status, and other intangible benefits.

As with Humphreys' previous study, data came from Rodney Fort's Sports Business Data website, though this time franchise sale prices were evaluated over the time period 1960-2009. The results of this study showed some interesting features not seen in previous studies. While the repeat sales method showed great fluctuation in the correlation of sales prices on a year-to-year basis, over the long term there was no apparent upward trend in the index. The trend line for this data rose incrementally over the first 30 years before reaching a peak in the 1990s and then declining at the turn of the century. However, when accounting for single sales in the hybrid model, an entirely different appeared. The results of the hybrid model showed incremental increases over the first 30 years but then a substantial increase in franchise values that began in the early 1990s and continued into the

2000s. The only positively significant variable present in both of these models was population.

In comparing both of Humphreys' studies, it is important to note four possible reasons for observed differences in prices between his hedonic, repeat sales, and hybrid models: (1) some important characteristics of each franchise changed between transactions, while the repeat sales method assumes these remain unchanged, (2) the prices of hedonic attributes change over time, while the repeat sales approach holds them constant, (3) the franchises that are bought and sold in the sample are not representative of the entire population of franchises, and (4) the hedonic and hybrid approaches miss-specify the functional form of the model and omit important hedonic characteristics.

As previously stated, the repeat sales method showed no significant upward trend over time. Essentially, changes in the quality of individual franchises appear to drive increases in the value of professional sports franchises. However, the upward trend – especially in the 1990s and early 2000s – seen in the hybrid model suggested that the main factors associated with franchise quality and value are market income and population, facility characteristics, and on-field success. The difference in these results provides room for further investigation into the effects of market-related factors, especially when considering actual financials provided from Forbes rather than estimated prices using theoretical economic models.

Section 3.2: Franchise Values Determined by Financial World and Forbes

Another way in which economists have approached this topic more recently is by looking at the impact of various internal and external factors on a team's value as calculated by *Financial World* and *Forbes*. Since both companies began estimating team values at the

beginning of the 21st century, economists used this data, along with other factors readily available to them such as relocation, venue data, team nomenclature, and other metropolitan area statistics to estimate which factors were positively correlated with the overall rise in team values.

Given the vast evolution and developments across the professional sports landscape in the years and decades leading up their research, Alexander and Kern (2004) decided to examine the effects of team nomenclature, team relocation, and new stadiums on franchise values across the four major professional sports. In particular, the authors aimed to examine the economic incentives motivating team relocation and new stadium construction from the standpoint of managerial efficiency. They use a payoff strategy to determine the value that each of these changes provides to the individual firm or team rather than the economy as a whole.

In evaluating the effect that team nomenclature (whether a team takes the name of its metropolitan area or its state) has on franchise value, Alexander and Kern treated each of the four leagues separately since each has different rules and customs which may affect that economic value. A major emphasis to support this distinction is revenue sharing – whether through ticket sales, broadcast revenue, team luxury tax revenue sharing, or other. An interesting feature found in collecting the data was that different teams in the same location – and even in the same city – have adopted regional identities, such as teams from Minnesota, Colorado, Tampa Bay, New Jersey, Florida, and others. In each of these scenarios the reasons behind such a nomenclature can be explained from trying to differentiate itself from another adjacent large city (New Jersey vs New York) or in smaller market trying to capture fans from a larger radius (St. Paul vs Minnesota). There is also

very little evidence of teams changing names while remaining in the same city, while relocation or expansion presents an opportunity to change an identity and thus establish a new fan base.

The empirical model used by Alexander and Kern consists of a pooled, cross-sectional, time-series panel of team for teams from each of the four major professional sports leagues from 1991-1997. Franchise value for each team acts as the dependent variable, with data for these values coming from *Financial World* magazine. It is interesting to note that the authors also compared the estimated value to the prices paid for various franchises sold during this time period, and found that the estimates were typically lower than the transaction prices – though this could reflect the "winners curse" in bidding competition for a franchise (Scully, 1995). This economic theory is one of the drawbacks of my own study because the estimated values from *Forbes* are not real sales values, and they differ systematically. Continuing with this study, however, independent variables in the model included: per-capita income, city population, previous season final standings, regional identity, new facility or not (built in 1990 or later), change in franchise location, change in team nomenclature, and expansion team.

The empirical results generally confirmed the author's hypotheses. Market size, team performance, and the presence of a new facility were all positively correlated to franchise value. On the other hand, team relocation, new stadiums, and regional identities had little-to-no effect on franchise values, though this can be attributed to increased costs and revenues of such changes, as previously studied by Noll and Zimbalist (1997) and Hamilton and Khan (1997). Two interesting ideas for future research that Alexander and

Kern touch on only briefly is the interaction of regional identity with population, as well as whether a regional vs. city identity has any effect on a franchise's economic value.

Although various economists had studied the effects of stadium construction and the type of financing involved on franchise values, Miller (2007) wanted to modernize this analysis with a specific approach to Major League Baseball – a league in which many teams drastically upgraded facilities at the turn of the 21st century. While many of these past studies concluded that the benefits of the new stadium to both the team and the surrounding market did not outweigh the construction and other external costs, the author challenged these ideals with the hypothesis that a new stadium will increase the franchise value of teams regardless of how construction was financed due to the increased value involved with the capital investment.

Building off previous analysis, including that from Alexander and Kern (2004), this study examined the effect of private financing for new stadiums on team franchise values and measured the impact of the age of a team's home stadium on its franchise value – a more accurate measure of the "newness" of the facility. All of this helped explain the determinants of franchise values and the lobbying efforts of team owners in seeking public subsidies for construction. Independent variables tested for projected correlation with market value included: metropolitan statistical area, per capita income, population (as controls), winning percentage for current and previous year, and age stadium. The data for this model, obtained from various sources for both ballpark and market information, covered MLB teams during the period 1990-2002.

The empirical results of this model suggested that a 1% increase in population increases team franchise values by between .09 and .12. In dollar terms, a team valued at

$200,000,000 would see a $200,000 rise in value corresponding to this 15 increase in population. Additionally, in regards to winning percentage, current year's team quality is more important in terms of franchise value growth than last year's team quality. As far as the impact of the stadium, a team playing in a brand-new stadium realizes an increase in its franchise value. A team playing in its own stadium has a higher value than a team playing in a public stadium, though the differences are not substantial enough to support the increased costs of constructing a new private stadium. Also, a team playing in a privately financed and owned stadium experiences an increase in value over time, while a team playing in a publicly owned and financed stadium sees its value fall over time as the stadium ages. While these results provide a good indication of whether or not a team will finance the construction of a new stadium, it suggests that in determining the impact of stadium construction on franchise values, private funding is the best alternative to public funding or no funding at all in both the short- and long-run.

Building upon his previous research on private financing and franchise values in Major League Baseball, Miller (2009) expanded this study to include specific variables such as facility age and ownership on team franchise values. Given prior background knowledge about the relationship between private firms and capital investments, the author hypothesized that if a team owns its playing facility, it capitalizes the value of the facility in the team franchise value, thus driving the value higher. This would back previous work done by Alexander and Kern (2004) as well as by Miller (2007), while also supporting the motives behind such investment projects and ownership decisions. The empirical model in this analysis accounted for franchise valuation as it depended on variables such as winning percentage for previous and current year, facility age, and ownership status of the facility,

while controlling factors of population, income, and number of seasons in a city for other external factors that could affect results.

The author found that local per-capita income was positively correlated with a rise in franchise value, while population was not. Team quality mattered more in lower revenue leagues such as the NBA and NHL than it did in the NFL. As for the initial hypothesis, the author found evidence for facility capitalization in the MLB, NHL, and NFL but not in the NBA. Economically speaking, it is more valuable for teams in each of those three leagues to own its own stadium or facility in order to capitalize on the value it brings to the franchise. This can have major implications on public vs. private financing of future stadiums, the rate at which facilities are built, and the overall economic impact that a new facility could have not only on the franchise valuation, but on the surrounding metro area as well.

While much of the previous research and analysis on determinants of professional sports firm values focused solely on North American teams, this study by Scelles et. al (2013) pulled in the international aspect of European soccer as well. While the major distinction between the North American sports industry and the European one is based on private vs. public ownership, in recent years North American firms have begun to adopt aspects of the European model of professional sports: a transition from the traditional to the contemporary with less emphasis on gate receipts, subsidies, and sponsors, and greater emphasis on vertical integration through a corporate structure that promotes maximizing merchandising and TV revenues. The major question that the authors considered throughout the analysis was: Does the comparison of the determinants of professional sports firm values in North America and Europe contribute to a better understanding of the

differences between American and European models? (Though inherently different, they are slowly becoming ever-closer in both style and approach). In order to answer this question, the authors used an empirical model and regression analysis with franchise value as the independent variable and dependent variables such as city population and income, facility age, and sports performance measured from 0-6 (not making playoffs to winning a championship title). As with previous studies, data for this analysis came from Forbes, BEA, Statistics Canada, Eurostat and Population Data, among others.

While the results from this regression indicated that franchise income had a significantly positive impact for European soccer and not for any American sports, this can also suggest that it is more important to be in a league that generates high revenues (and thus high revenue sharing) than in an area where population incomes are high. Population and attendance were positively significant throughout the four major North American sports. Facility age was negatively correlated in the NFL and European soccer, not at all in the NBA, and positively in MLB and the NHL – most likely due to historical value placed on antique stadiums and ballparks. Private ownership was positively significant throughout except for the NBA, while sports performance was positive in the NBA and soccer but nowhere else. In all, there were major differences between the North American and European sports industries except for private ownership and historical sports performance.

My study will specifically build on these earlier findings. While previous authors estimated the impact of more qualitative variables such as team nomenclature, on-field performance, and venue age on a franchise's value, they did not have access to quantitative data such as a team's revenue, costs, and other market-related factors. As such, much of this analysis will focus on how financial and numerical data – both within the team as well

as within the metropolitan area market – may contribute to the recent rise in franchise valuation, and how it might be a good indicator of the future of the professional sports industry as a whole.

CHAPTER FOUR

DATA

Section 4.1: Forbes Dataset

A majority of the data comes from *Forbes*, as the company provided five years' worth of data on every team in each of the four major North American sports leagues. This dataset includes many variables such as Forbes's calculation of estimated team value, costs, revenues, ticket sales, and more than fifteen other associated factors. Rather than receive five consecutive years, such as 2012-2016, I instead use alternating years from 2008-2016. Although this may cause a greater standard error over a broader range, I want greater variance in the independent variables, which is more important to control for. Additionally, with the exponential rise in valuation coming over the last decade, I thought it would be more appropriate to analyze these factors according to this longer time period of increased value – rather than just focus on the last five years – with the hope that it will provide a more realistic depiction of economic and market trends, and thus better overall results. Lastly, all of the variables that *Forbes* provided are fit with five years of data with the exception of four: Debt-to-value %, Gate Receipts, Revenue per Fan, and Average ticket price, which only have observations for 2016 because that is when the company started collecting information on these variables, and thus they will not be included in any of the regressions.

Section 4.2: Forbes's Value Determination

Forbes calculates this estimated team value using a cost-revenue analysis. *Forbes* gathers this data from the teams, any public documents, sports bankers, credit rating agencies, network executives, and media experts (Forbes Methodology, 2016). Revenue is the value of the team based on current stadium deal[3] without deduction for debt[4]. Operating income is net of stadium revenues used for debt service. Additionally, revenue from non-sport events such as concerts or tours in included only when the revenue is pocketed by the team owner or an entity the owner controls. The overall team value is then calculated as the enterprise value[5] based on the multiple of revenue of historical transactions, as well as current offers to buy and invest in the teams. These values are then adjusted – to the extent that the change in economics is understood and applicable – for teams moving into new stadiums. Additionally, this valuation often coincides with the sum of four different segments that are attributable to the franchise value: sport, market, stadium, and brand. Sport is the portion of the franchise's value attributable to revenue shared among all teams. Market is the portion of franchise's value attributable to its city and market size. Stadium is the portion of a franchise's value attributable to its stadium, and likewise brand is the portion of a franchise's value attributable to its brand.

Other variables that Forbes uses in estimating a team's value also have specific characteristics to take note of. EBIT is as economically defined – earnings before interest, taxes, depreciation, and amortization. Debt/value includes stadium debts, player expenses includes benefits and bonuses, and gate receipts includes club seats. Win-to-player cost

[3] Unless a new stadium is pending
[4] Other than annual stadium debt
[5] Calculated as equity plus net debt

ratio compares the number of wins per player payroll relative to the rest of the league. Playoff wins count twice as much as regular season wins. A score of 120 means that the team achieved 20% more victories per dollar of payroll compared with the league average during the given season. Lastly, revenue per fan is calculated as local revenues divided by metro population with populations in two-team markets divided in half, and the annualized change is defined as the current team value compared with the latest transaction price.

Section 4.3: Other Data and Variables Collected

The rest of the data for this regression analysis comes from a variety of different sources. Metropolitan area populations for all teams in the United States came from the *U.S. Census Bureau* while populations for teams in Canada came from *Statistics Canada*. Metropolitan area GDP for all U.S. teams was acquired from the *Bureau of Economic Analysis*. GDP data for Canadian teams was taken from *Statistics Canada* as well, and then converted to USD by multiplying the GDP value by the purchasing power parity value between the USD and the Canadian dollar. To then calculate the metropolitan are per-capita income, the metro area GDP was divided by the metro area population. Additionally, various other data such as historical purchase data and prices, relocation dates, venue changes, and others were collected from the affiliated websites for each of the four leagues, their corresponding hall of fame web pages, and *Wikipedia*.

I added other variables that were thought to potentially be correlated with a rise in franchise values were added to the dataset for regression analysis as well. *MetroTeams* accounts for multiple teams across the four leagues belonging to the same metro area, and is assigned a value, 1-9, based on the total number of teams in that area. Similarly, *MetroTeamsSame* is assigned a value 1-3 to tell whether there are multiple teams from the same league in the

same metropolitan area.[6] *YrPurchased* indicated the last year in which a team was purchased, and *PricePaid* tells how much that team was sold for. These variables are especially useful in comparing recent real transaction prices to estimated values for further analysis. The venue variables, *VenueYrOpened*, *VenueCap*, and *VenueCost* correspond to the when a team opened (or renovated) a venue, how many people it holds, and how much that team spent on the construction. Additionally, the venue dummy variable implies 0=same venue, 1=renovation/reconstruction in that year, 2=new venue in that year. If construction occurred in an odd year, it is counted as the next even year, and for this analysis, since naming rights are not a measure of market being studied, venue name is only changed if the entire venue changed, not just if the sponsorship naming rights changed. *FranchStartYr* and *FranchCurLocYr* provide information on the age of the franchise and if that team relocated to the metropolitan area in which they currently reside. League dummy variables were created to show that holding all else constant, changes in the value of one league do not correspond to exactly the same changes in another league. For each league's dummy, its value=1, or else the value=0. Lastly, a country dummy variable was created to control for the national location of a team, with 0=U.S. and 1=Canada.

Section 4.4: Specific Metropolitan Area and Other Notes from Final Dataset

For clarification and continuity purposes, there are some specific metropolitan area factors to note from the final dataset that could have an impact on the regression results. The Rams moves from St. Louis to Los Angeles for the 2016 season, which is indicated by

[6] Only one league/metropolitan area has 3 teams associated with it: NHL/New York, which includes the New York Islanders, New York Rangers, and New Jersey Devils

a change in the metropolitan area variables between the 2014 and 2016 data. San Francisco, Oakland, and Golden State teams have all been included under the same metropolitan area for all of those data observations, as well as Los Angeles and Anaheim being considered from the same metropolitan area. The Raiders are considered from Oakland for all data since they did not move to Las Vegas until the 2017 season[7]. The *Current Location* variable is defined at the metro area name, and not necessarily the location of the stadium or venue that the team plays in. The Florida Panthers are based in the Miami metro area. All teams in Arizona are based in the Phoenix metro area, while all teams in Colorado are based in the Denver metro area. The Indiana Pacers are considered from Indianapolis, the Carolina Panthers from Charlotte, but the Carolina Hurricanes from Raleigh. The Texas Rangers are grouped with all of the Dallas teams, the New England Patriots with all of the Boston teams, and the Tennessee Titans with the Nashville teams. The Utah Jazz are considered to be from Salt Lake City.

Figure 11 beow lists all of the professional sports teams that have been sold over the last decade, as well as corresponding estimated value for that sale year, real transaction price, and the difference in value between the two. Given the relatively wide range of differences in value between estimation and sale across the four leagues, it is fair to make a few assumptions about the buyer's investment decision-making process, and how these decisions may have affected the overall market. First, it is fair to assume that, on average, investors have the necessary tools and data to determine the estimated value of the team prior to purchase, and thus will pay not beyond what economic theory would suggest as

[7] And 1995 for year in current location since they moved to Los Angeles for 15 years from 1980-1995

Section 4.5: Comparison of Estimated Values vs. Real Transaction Prices

Figure 11: Estimated vs. Real Value Differences since 2008[8]

Team	League	Year Sold	EV ($M)	Sale Price ($M)	Value Difference ($M)
Los Angeles Clippers	NBA	2016	$2,000	$2,000	$0
Golden State Warriors	NBA	2010	$315	$450	-$135
Brooklyn Nets	NBA	2010	$269	$365	-$96
Toronto Raptors	NBA	2012	$382	$400	-$18
Washington Wizards	NBA	2010	$313	$551	-$238
Sacramento Kings	NBA	2013	$525	$534	-$9
Detroit Pistons	NBA	2011	$360	$325	$35
Atlanta Hawks	NBA	2015	$825	$730	$95
Memphis Grizzlies	NBA	2012	$269	$377	-$108
Charlotte Hornets	NBA	2010	$278	$175	$103
Philadelphia 76ers	NBA	2011	$330	$287	$43
Milwaukee Bucks	NBA	2014	$405	$550	-$145
New Orleans Pelicans	NBA	2012	$285	$340	-$55
Los Angeles Dodgers	MLB	2012	$1,401	$2,000	-$599
Chicago Cubs	MLB	2009	$700	$700	$0
Texas Rangers	MLB	2010	$451	$593	-$142
Houston Astros	MLB	2011	$474	$465	$9
San Diego Padres	MLB	2012	$458	$600	-$142
St. Louis Rams	NFL	2010	$779	$750	$29
Miami Dolphins	NFL	2008	$1,044	$1,100	-$56
Jacksonville Jaguars	NFL	2012	$770	$770	$0
Cleveland Browns	NFL	2012	$987	$987	$0
Buffalo Bills	NFL	2014	$935	$1,400	-$465
Montreal Canadians	NHL	2009	$339	$575	-$236
Toronto Maple Leafs	NHL	2012	$1,000	$1,000	$0
Dallas Stars	NHL	2011	$230	$240	-$10
Edmonton Oilers	NHL	2008	$175	$170	$5
Minnesota Wild	NHL	2008	$217	$225	-$8
New York Islanders	NHL	2016	$385	$485	-$100

[8] For teams sold in odd years, estimated value was found on Forbes.com

Winnipeg Jets	NHL	2011	$164	$170	-$6
New Jersey Devils	NHL	2013	$320	$320	$0
St Louis Blues	NHL	2012	$130	$180	-$50
Tampa Bay Lightning	NHL	2010	$145	$93	$52
Buffalo Sabres	NHL	2011	$173	$165	$8
Arizona Coyotes	NHL	2014	$225	$305	-$80
Florida Panthers	NHL	2013	$240	$160	$80

fair value market price. This is in fact somewhat true, as the average buyer paid about $62 million above estimated value at year of purchase.[9] While $62 may seem like a large amount, it is small compared to teams now valued at and selling for over a billion dollars. Second, it is also fair to assume that transactions in which the buyer paid far beyond the estimated value[10] were done so as a response to prior transactions in that respective league as well as hedging a bet that values would continue to rise over the long-term and turn it into a positive investment (which recent data would confirm was a good bet). Lastly, a large portion of the teams that sold below their estimated value are from small metropolitan areas[11], meaning their potential for future growth is much more limited compared to that of a team from a large city such as New York or Los Angeles.

Section 4.6: Descriptive Statistics Table

Table 1 below gives the unit, mean, and standard deviation for all 25 variables used in the regression analysis to follow.

[9] Calculated as a total value difference of $2,339 million/36 teams sold
[10] Examples include Washington Wizards (2010), Los Angeles Dodgers (2012) and Buffalo Bills (2014)
[11] Examples include Atlanta Hawks, Charlotte Hornets, Florida Panthers

Table 1: Descriptive Statistics of All Variables Used in Regression Analysis

Variable	Unit	Mean	Std. Dev
Team Value	$M	777.71	619.16
Revenue	$M	191.50	90.02
OpInc	$M	22.91	34.70
WtpCost	#	100.01	36.47
PlayerExp	$M	101.68	43.97
MetroPop	M	5.45	4.95
MetroGDP	USD	328680.80	324494.70
MetroInc	USD	58473.76	11917.79
MetroTeams	#	3.59	2.06
MetroTeamsSame	#	1.20	0.46
YrPurchased	Year	1993.44	19.08
VenueYrOpened	Year	1995.96	14.33
VenueCap	#	38606.60	22437.78
VenueCost	$M	271.53	240.58
VenueD	#	0.06	0.31
CountryD	#	0.07	0.26
FranchStartYr	Year	1957.34	32.29
FranchCurLocYr	Year	1966.25	30.06
NBAD	#	0.246	0.431
NFLD	#	0.262	0.440
NHLD	#	0.250	0.431
MLB2016	#	0.049	0.216
NBA2016	#	0.049	0.216
NFL2016	#	0.053	0.223
NHL2016	#	0.049	0.216

CHAPTER FIVE

REGRESSION RESULTS

The following regressions and accompanying results will answer the proposed question of how market demographics and financial statistical can be determinants of the large rise in sports franchise values over the last decade. The dependent variable used in the regression analysis will be the estimated franchise value for a specific year (or range of years) as calculated by Forbes. The independent variables for this analysis will mostly

include the financial data provided by Forbes and relevant metropolitan area statistics, with other venue and team history factors used to provide additional information. The first regression, which looks at the effects of different metro area variables on team value, will be used as a comparison to previous studies conducted by economists on this subject. That will then be followed by a regression with strictly financial data obtained from *Forbes*, which represents the new aspect to this study as most other researchers did not have access to such data at the time of their studies. The third regression will combine both the metro area and financial data in order to see if the existence of variables in one category makes those in the other more or less significant. After that, a fourth regression will be run using all of the variables collected for the complete analysis of this study, such as team history and venue data. Even previously insignificant variables will be included in order to view the significance of the entire dataset as a whole. This regression will also act as the basis for the final regression, which will test the correlation of only the previously significant variables. All of the following regressions will have five other variables in common: @trend, year=2016, nbad, nfld, and nhld. The league dummy variables control for the fact that some leagues might be more popular than others, or perhaps more expensive. The year=2016 variable looks for the bubble in 2016, as shown in the background section for three of the four leagues, while the trend term is there to show that the bubble will not be found just because values are rising steadily over time. Additionally, one other regression will show the importance of the interaction terms for each league in regards to the franchise value bubble in 2016, which was more broadly defined in the first five regressions as the variable year=2016.

Section 5.1: Metropolitan Area Regression Results

Equation 1 regresses franchise value on metropolitan area demographics.

$$teamvalue = \beta_0 + \beta_1 * metropop + \beta_2 * metroinc + \beta_3 * metrogdp + \beta_4 * metroteams + \beta_5 * metroteamssame + \beta_6 * trend + \beta_7 * year2016 + \beta_8 * nbad + * \beta_9 * nhld + \beta_{10} * nfld + \varepsilon$$

The results from this first regression equation can be seen in Table 2 below.

With t-statistics of -5.29 and 3.61 respectively, metroteamssame and metroGDP are the only two metro area demographic variables that are statistically significant at the 95% confidence level. A coefficient of -266 implies that having multiple teams in the same metro area in the same league leads to a decrease in team value of around $266 million for each franchise. This makes sense theoretically as multiple teams will be competing for fans, players, and other sources of value that would otherwise be consumed by only one team in a different scenario. As one would expect, increased competition leads to a lower overall valuation as it decreases profits, ticket prices, and TV revenues, among

Table 2: Metropolitan Area Regression

Dependent Variable: TEAMVALUE
Total panel (unbalanced) observations: 610

Variable	Coefficient	Std. Error	t-Statistic	Prob.
METROPOP	-29.91507	23.16639	-1.291313	0.1971
METROINC	0.001974	0.001681	1.174311	0.2407
METROGDP	0.001289	0.000357	3.615587	0.0003
METROTEAMS	-7.936334	16.22787	-0.489056	0.6250
METROTEAMSSAME	-266.2864	50.29895	-5.294075	0.0000
C	444.3843	117.7996	3.772377	0.0002
@TREND	79.58225	13.34464	5.963613	0.0000
YEAR=2016	473.0842	46.01912	10.28017	0.0000
NBAD	-136.9350	37.68255	-3.633910	0.0003
NHLD	-383.2890	37.72375	-10.16042	0.0000
NFLD	678.7132	36.90319	18.39172	0.0000

R-squared	0.735111	Sum squared resid	61842969
Adjusted R-squared	0.730689	F-statistic	166.2328
S.E. of regression	321.3156	Durbin-Watson stat	0.593700

other things. Additionally, while metroGDP is significant and positively correlated, it has a very minimal effect on team value as a $1 increase in GDP leads to only a $1,300 increase in value. One variable that is not statistically significant but is interesting to note is that of metroteams. One would expect that having another team in the same metropolitan area but in a different sport would matter by bringing in more fans and revenue in general, but in this regression that is not the case. The trend and year variables are both statistically significant, implying that (1) there is an overall upward trend in team value over this ten-year time period (as expected), and (2) that there is a substantial spike in values between 2014-2016, which will be discussed in more detail in later regressions. The dummy variables are also statistically significant here, indicating that the value rise in teams from each sport are all independent of each other. Lastly, an R-squared value of 0.73 signifies that the independent variables, in general, are decently well-correlated to the dependent variable.

Additionally, the results from this regression compare interestingly to those of previous analyses performed by economists on this topic. Most previous authors measured market size are metropolitan area population, which in this regression is insignificant, but will become significant in later regressions. This would support findings by both Alexander and Kern (2004) and Miller (2007) that suggest the size of the market, which can lead to many other changes, does have an impact on team value. However, beyond this many authors failed to examine the effects of metropolitan market measured as GDP or per capita income, multiple teams in the same market, or even the same market and the same league, which the rest of this analysis will dive into a bit further.

Section 5.2: Financial Data Regression Results

The second regression estimating the impact of financial data on franchise value can be written as Equation 2:

$$teamvalue = \beta_0 + \beta_1 * revenue + \beta_2 * opinc + \beta_3 * wtpcost + \beta_4 * playerexp + \beta_5 * trend + \beta_6 * year2016 + \beta_7 * nhld + \beta_8 * nbad + \beta_9 * nfld + \varepsilon$$

The results from this second regression can be seen in Table 3 below.

In terms of the financial data variables, revenue is the only statistically significant one that has an impact on team value. A coefficient of 6.9 implies that a $1 million rise in revenue corresponds to a $6.9 million increase in franchise valuation. Although the other three financial variables are insignificant, their coefficient signs are interesting to decipher as well. Holding all else constant, a higher operating income would lead to a decrease in franchise value of about $180,000. However, this is a bit surprising as one would expect more income to increase value, even if revenue does not change. Likewise,

Table 3: Financial Data Regression

Dependent Variable: TEAMVALUE
Total panel (unbalanced) observations: 610

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REVENUE	6.901559	0.496529	13.89961	0.0000
OPINC	-0.179857	0.665891	-0.270099	0.7872
WTPCOST	-0.229019	0.213455	-1.072916	0.2837
PLAYEREXP	-1.158843	0.811176	-1.428596	0.1536
C	-685.6629	50.17387	-13.66574	0.0000
@TREND	-4.716575	8.032243	-0.587205	0.5573
YEAR=2016	317.6174	27.13320	11.70586	0.0000
NHLD	298.4850	29.89860	9.983244	0.0000
NBAD	376.8908	26.88719	14.01748	0.0000
NFLD	253.3025	26.88991	9.419983	0.0000

R-squared	0.912247	Sum squared resid	20487404
Adjusted R-squared	0.910931	F-statistic	693.0451
S.E. of regression	184.7855	Durbin-Watson stat	1.277253

the two cost variables – win-to-player cost and player expenses, both exhibit a negative relationship with team value. The negative coefficient on win-to-player cost implies that more wins per player payroll leads to a decrease in value. In the same sense, the negative beta on player expenses signifies the effect of spending more on players while holding revenue constant. As such, one would expect franchise values to decrease if strictly costs rise, but in this case that value is insignificant. However, the extra costs in both scenarios are recaptured by more value being given back to the franchise in terms of wins and popularity since better players are typically more expensive. While the trend variable is not significant (and is also negative) in this regression compared to the previous estimation, a bubble in 2016 still exists. Holding financials constant, team values are $317 million higher in 2016 than in other years. Additionally, compared to the previous regression in which the coefficients for the NBA and BFL dummy variables were negative and significant, here all three leagues are positive and high significant. Lastly, an R-squared value of 0.91 compared to 0.73 implies much better correlation between the dependent and independent variables when using financial data rather than metropolitan area demographics.

Section 5.3: Financial/Metro Combined Regression Results

The third regression looking at the impact of both financial data and metropolitan area demographics on franchise value can be estimated as Equation 3:

$$\begin{aligned} teamvalue = {} & \beta_0 + \beta_1 * revenue + \beta_2 * opinc + \beta_3 * wtpcost + \beta_4 * playerexp \\ & + \beta_5 * metropop + \beta_6 * metroinc + \beta_7 * metrogdp + \beta_8 \\ & * metroteams + \beta_9 * metroteamssame + \beta_{10} * trend + \beta_{11} \\ & * year2016 + \beta_{12} * nbad + \beta_{13} * nfld + \beta_{14} * nhld + \varepsilon \end{aligned}$$

The results from the combined financial data/metropolitan area regression can be seen here in Table 4.

In combining the metro area and financial data, revenue is the most statistically significant variable, albeit now with a lower coefficient of 5.68 compared to 6.90 before. An extra $1 million of annual revenue raises team value by $5.68 million, on average. As in the previous regression, the other three financial variables remain insignificant. However, holding everything else constant, opinc and playerexp now exhibit positive coefficients, which would support that theories that higher income as well as spending more on better players would result in more wins, and thus a higher overall value. Metropop and metroGDP are both statistically significant now, though having multiple teams from the same league in the same metropolitan area is not. Every additional 1 million people in a metropolitan area causes team value to decrease by $33 million,

Table 4: Combined Financial Data/Metropolitan Area Regression

Dependent Variable: TEAMVALUE
Total panel (unbalanced) observations: 610

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REVENUE	5.684286	0.533763	10.64945	0.0000
OPINC	0.930116	0.685860	1.356130	0.1756
WTPCOST	-0.167591	0.208467	-0.803921	0.4218
PLAYEREXP	0.044011	0.828362	0.053130	0.9576
METROPOP	-33.65539	13.15047	-2.559254	0.0107
METROINC	-0.000473	0.000956	-0.494423	0.6212
METROGDP	0.000666	0.000205	3.253711	0.0012
METROTEAMS	6.925519	9.131232	0.758443	0.4485
METROTEAMSSAME	-53.05130	29.26173	-1.812993	0.0703
C	-560.9873	81.51870	-6.881701	0.0000
@TREND	-2.648321	8.013926	-0.330465	0.7412
YEAR=2016	321.0383	26.45309	12.13614	0.0000
NBAD	334.7420	27.67817	12.09408	0.0000
NFLD	263.9292	26.87076	9.822172	0.0000
NHLD	248.2269	31.00651	8.005637	0.0000

R-squared	0.917412	Sum squared resid	19281564
Adjusted R-squared	0.915469	F-statistic	472.1046
S.E. of regression	180.0166	Durbin-Watson stat	1.324399

which supports the idea that more people does not necessarily mean a higher value – those people must be attracted by a winning team, or other external factors. Additionally, a $1000 increase in metro area GDP results in only a $666 increase in team value. While significant, this value is almost negligent. The year and dummy variables remain highly significant and contribute substantially to increased valuations, further supporting the possibility of some other outside factor contributing to the large rise seen over the last decade. The year=2016 variable supports the idea of a $321 million rise in team value, on average, between 2014 and 2016. Lastly, an increase in R^2 from 0.912 to only 0.917 between the previous regression and this estimation raises the correlation value between the independent and dependent variables only trivially, thus suggesting that most of the variation in the model is driven by the statistically significant financial variables.

Section 5.4: Regression Using all Statistical Variables

In order to test the viability of all the variables from the dataset that have 5 years' worth of observations, and subsequently determine which ones are viable for a "final" regression, a fourth equation estimated as Equation 4 and the corresponding regression

$$\begin{aligned} teamvalue = {} & \beta_0 + \beta_1 * revenue + \beta_2 * opinc + \beta_3 * wtpcost + \beta_4 * playerexp \\ & + \beta_5 * metropop + \beta_6 * metroinc + \beta_7 * metrogdp + \beta_8 \\ & * metroteams + \beta_9 * metroteamssame + \beta_{10} * venuecap + \beta_{11} \\ & * venuecost + \beta_{12} * venued + \beta_{13} * venueyropened + \beta_{14} \\ & * franchcurlocyr + \beta_{15} * franchstartyr + \beta_{16} * yrpurchased + \beta_{17} \\ & * trend + \beta_{18} * year2016 + \beta_{19} * countryd + \beta_{20} * nbad + \beta_{21} \\ & * nfld + \beta_{22} * nhld + \varepsilon \end{aligned}$$

results in Table 5 can be seen below.

As expected, most of the other variables under the venue and franchise history categories added to this regression and not seen in any previous regression are insignificant with the exception of one: venueyropened. The implications for this variable state that, holding all else constant, for every year older a team's venue is, its overall value decreases by about $2 million. This makes sense theoretically and is supported by previous research in this subject, in which both cases newer venues tend to increase value by attracting more fans and better talent, while older venues (or as venues age without receiving significant upgrades) with worse facilities will lead to a decrease in value. However, it is also

Table 5: All Variables Regression

Dependent Variable: TEAMVALUE
Total panel (unbalanced) observations: 610

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REVENUE	6.080535	0.551030	11.03485	0.0000
OPINC	0.599888	0.695888	0.862047	0.3890
WTPCOST	-0.147999	0.213432	-0.693421	0.4883
PLAYEREXP	-0.619150	0.852670	-0.726130	0.4680
METROPOP	-39.68089	13.75140	-2.885588	0.0041
METROINC	-0.000870	0.000983	-0.885186	0.3764
METROGDP	0.000798	0.000218	3.660146	0.0003
METROTEAMS	1.794721	9.873663	0.181769	0.8558
METROTEAMSSAME	-70.79475	30.54979	-2.317357	0.0208
VENUECAP	-0.001165	0.001609	-0.724035	0.4693
VENUECOST	0.008474	0.055351	0.153099	0.8784
VENUED	43.01403	26.55857	1.619592	0.1059
VENUEYROPENED	-2.007373	0.689503	-2.911332	0.0037
FRANCHCURLOCYR	0.634560	0.439965	1.442294	0.1498
FRANCHSTARTYR	-0.561133	0.444401	-1.262673	0.2072
YRPURCHASED	-0.498056	0.489959	-1.016527	0.3098
@TREND	-1.732899	8.119632	-0.213421	0.8311
YEAR=2016	319.1849	26.45458	12.06539	0.0000
COUNTRYD	-16.68777	33.47822	-0.498467	0.6183
NBAD	314.1889	46.71182	6.726111	0.0000
NFLD	290.7501	50.44577	5.763617	0.0000
NHLD	236.4433	48.22683	4.902734	0.0000
C	4379.383	1676.448	2.612299	0.0092

R-squared	0.919582	Sum squared resid	18775119
Adjusted R-squared	0.916568	F-statistic	305.1055
S.E. of regression	178.8431	Durbin-Watson stat	1.349812

important to note that in some cases historical value of a venue might actually increase a team's value (e.g. Fenway Park, Wrigley Field), though that significance goes largely uncaptured in this study except for the venue dummy variable. Even though it is insignificant in this regression, the venue dummy variable places a large value on a new venue (2), a medium value for a venue that was renovated sometime over this ten-year time period (1 – Madison Square Garden), and no value (0) for any team whose venue has not changed at all. Besides the year in which a venue was opened or renovated, theory and research support the fact that historical date variables do not have much impact on current data. As such, this leaves revenue, metropop, metrogdp, metroteamssame, year=2016, and the league dummy variables – along with venureyropened – as statistically significant for the final regression.

In order to determine that the rest of the variables from this regression were acceptable to drop for the final regression, performing an F-test will show that these variables are collectively insignificant. The results from this test can be seen in Table 6 below. Given that the F value of 1.29 is less than the critical value of 1.73, it is acceptable

Table 6: All Variable Regression to Final Regression F-test

Measure	Value
SSR-R	19312701
SSR-UR	18775119
N	610
K-R	10
K-UR	23
F	1.29287569
P	0.212142345
CV	1.736843013

to drop all of the statistically insignificant variables from Equation 4 above in order to produce an adequately refined regression model that can be seen in Equation 5 to follow.

Section 5.5: Statistically Significant Regression Results

Paring down the results from the previous regression containing all of the variables, one last regression was run using only those that were statistically significant in order to determine which factors can be attributed to the rise in franchise values over the last decade. The estimated equation can be seen at Equation 5 below, with the accompanying regression to follow in Table 7.

$$teamvalue = \beta_0 + \beta_1 * revenue + \beta_2 * metropop + \beta_3 * metrogdp + \beta_4 * metroteamssame + \beta_5 * venueyropened + \beta_6 * year2016 + \beta_7 * nbad + \beta_8 * nfld + \beta_9 * nhld + \varepsilon$$

As expected, all of the variables in the final regression are significant at the 95% confidence level. Revenue represents the most strongly correlated variable with team value,

Table 7: Final Regression with Only Statistically Significant Variables

Dependent Variable: TEAMVALUE
Total panel (unbalanced) observations: 610

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REVENUE	6.060637	0.159865	37.91098	0.0000
METROPOP	-31.04548	8.808430	-3.524520	0.0005
METROGDP	0.000661	0.000140	4.725345	0.0000
METROTEAMSSAME	-60.24441	28.73619	-2.096465	0.0365
VENUEYROPENED	-1.418480	0.523988	-2.707088	0.0070
YEAR=2016	312.7068	20.75446	15.06697	0.0000
NBAD	364.8105	24.75419	14.73732	0.0000
NFLD	272.6627	23.11592	11.79545	0.0000
NHLD	281.8866	27.07524	10.41123	0.0000
C	2178.750	1048.626	2.077719	0.0382

R-squared	0.917279	Sum squared resid	19312701
Adjusted R-squared	0.916038	F-statistic	739.2549
S.E. of regression	179.4097	Durbin-Watson stat	1.332012

as a $1 million increase in revenue leads to a $6.1 million rise in team value. Although one would expect metropolitan population to have a positive coefficient, here it is negative. This implies that for every additional 1 million people in a metro area, team values fall by about $31 million. Having multiple teams from the same league in the same metro area is also negatively correlated, though this was expected as competition will force fans to choose a team, which, in theory, will drive down income, revenue, and overall value. Here, every additional team subtracts about $60 million from estimated value of each team in that same league and area. The year in which a venue opened is also negatively correlated with team value, exhibiting a decrease of $1.5 million for every additional year that a venue ages. While metropolitan area GDP is positively significant, the coefficient value is almost negligible. A $1,000 rise in GDP only increases team value by about $660. The league dummy variables are all highly significant with large coefficients as well, further supporting previous evidence that the rise in team value in each league is independent in terms of popularity, cost, or other factors. As for the year=2016 variable seen in all five regressions, the high coefficient value associated with the variable and its strong significance presents a more interesting case as to the exact causes of the recent spike in franchise values. In this regression, the coefficient of 312 corresponds to a rise in team value, on average, of $312 million between 2014-2016. One economic theory that could help explain this spike is that of the economic bubble theory. Clearly since 2014 there has been an irrational rise in values lying far outside the "true" range of asset values throughout the professional sports industry, although less-so in the NHL than in the other three leagues. The existence of this trend term helps control for the fact that assets such as professional sports franchises have a long history of increases in value, but cannot act as a 20- or 30-

year bubble because bubbles do not last that long. As such, this variable provides evidence that team values grew even above the trend in 2016. Part of this bubble can also be explained by the mirrored rise in TV and broadcasting revenue – a major source of revenue for the leagues as a whole and teams individually. Big market teams such as New York and Los Angeles will reap the rewards of large contracts, while smaller-market teams still benefit through league revenue-sharing models. Another contributing factor lies in the combination of interest in professional sports, especially as a long term investment, and a lack of supply since teams rarely hit the market.

Section 5.6: 2016 Bubble Regression

Given that the year=2016 variable showed a large and statistically significant spike in franchise values for all of the previous regressions, further analysis aimed to investigate whether this phenomenon occurred in all four sports leagues between 2014-2016, and if so, which leagues were impacted more than others, holding all else constant. In order to estimate that impact, four interaction terms that define teams in each league based strictly on 2016 values were added to the final regression estimation (except for the year=2016 term), as seen in Equation 6 below.

$$\begin{aligned} teamvalue = \ & \beta_0 + \beta_1 * revenue + \beta_2 * metropop + \beta_3 * metrogdp + \beta_4 \\ & * metroteamssame + \beta_5 * venueyropened + \beta_6 * mlb_{2016} + \beta_7 \\ & * nbad + \beta_8 * nfld + \beta_9 * nhld + \beta_{10} * nfl\_2016 + \beta_{11} * nba\_2016 \\ & + \beta_{12} * nhl\_2016 + \ \varepsilon \end{aligned}$$

Table 8 shows the corresponding results.

As the results from the below regression show, large and significant bubbles were present in the MLB, NFL, and NBA for 2016, while a relatively small and insignificant rise existed

in the NHL. MLB teams averages a rise in value of about $251 million between 2014-2016, while NFL team values rose about $490 million, and NBA team values an astounding $548 million over that same time period. Meanwhile, NHL teams averaged only about an $11 million increase in team value during this two-year timeframe – a small enough increase that it was not significant in regards to the theory of an economic bubble. The remainder of the variables were relatively unaffected in coefficient value or sign even when adding these interaction terms, indicating that, all else constant, they are all still significant for both the 2014-2016 bubble as well as the entire 10-year period analyzed in this study.

An F-test was also performed to show that, in contrast to the previous test where it was acceptable to drop all of the insignificant variables from the "all" to "final" regression, here none of the variables between the 2016 bubble regression and final regression can be

Table 8: 2016 Bubble Regression

Dependent Variable: TEAMVALUE
Total panel (unbalanced) observations: 610

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REVENUE	5.787318	0.148359	39.00881	0.0000
METROPOP	-35.53321	7.812326	-4.548352	0.0000
METROGDP	0.000759	0.000125	6.094275	0.0000
METROTEAMSSAME	-70.76478	25.46535	-2.778866	0.0056
VENUEYROPENED	-1.475897	0.463686	-3.182965	0.0015
MLB_2016	251.5094	33.95766	7.406558	0.0000
NFLD	242.9708	21.99456	11.04686	0.0000
NBAD	283.0595	23.55686	12.01601	0.0000
NHLD	300.4416	25.33241	11.85997	0.0000
NFL_2016	489.3740	35.47452	13.79508	0.0000
NBA_2016	548.3236	32.91345	16.65956	0.0000
NHL_2016	11.06986	32.77372	0.337766	0.7357
C	2370.940	928.3333	2.553975	0.0109

R-squared	0.935634	Sum squared resid	15027401
Adjusted R-squared	0.934340	F-statistic	723.1730
S.E. of regression	158.6554	Durbin-Watson stat	1.284077

Table 9: 2016 Bubble Regression to Final Regression F-test

Measure	Value
SSR-R	19312701
SSR-UR	15027401
N	610
K-R	10
K-UR	13
F	56.74798323
P	2.7654E-32
CV	2.619828457

dropped. In comparison to the previous F-test that produced an acceptable result, here an F-value of 56.74 that is much larger than the critical value of 2.61 implies that it is not acceptable to think that the bubble is the same in all of the leagues. This result of this test does, in fact, support the regression results from Table 8 as a bubble only exists in 3 out of the 4 leagues, and the coefficient value for each of the league_2016 variables exhibit a different value increase during this year.

CHAPTER 6

CONCLUSION

Section 6.1: Summary of Findings

As a result of this study, I discovered that revenue, metropolitan area population and GDP, the year that a venue was opened or renovated, and having multiple teams in the same metropolitan area are all correlated with team franchise value. Revenue and metro are GDP were both positively correlated, as expected, while venue year, same metropolitan area/teams, and metro area population were all negatively correlated – the former two which were expected while the latter was not. More specifically, these results answer the

question of how financial data can be an indicator of the recent spike in franchise valuations, with revenue increases acting as the main driver. One of the major reasons behind the recent rise in revenues that will continue into the foreseeable future is the rights fees to televise live sporting events (Adgate 2018). Despite declining television ratings, analysts expect media rights to surpass gate receipts as the largest source of revenue during this current year, with the rise of streaming services helping to offset this decline in TV viewership. Additionally, and potentially much more interesting in terms of the economics behind these results, the regression analysis supported the previously stated background information that the rise in team values suggests some type of economic bubble in professional sports valuations since 2014. On average, franchises from the four major sports leagues rose by $316 million between 2014-2016. However, as seen in the final regression looking at the size of the bubble in each league specifically for 2016, the value presents a much wider range of results. NHL teams rose by only $11 million on average – not exhibiting any bubble at all – while MLB teams rose $251 million, NFL teams $490 million, and NBA teams $548 million on average. Clearly, the factors affecting each league cause them to act independently of one another. While there are potentially many different explanations behind the growth of this bubble, given the formation and exclusivity of the professional sports industry, it does not seem to be in danger of bursting anytime soon like previous economic bubbles such as the dotcom boom, and more recently, the housing crisis.

Section 6.2: Suggestions for Future Research

Given additional time and resources, it is interesting to consider how this study can be improved upon in future research. In looking at the slopes of the lines for the background

graphs in Chapter 2, one could hypothesize that bubble started between 2012-2014 rather than 2014-2016 – at least for teams in the NBA and NHL. Testing this hypothesis using a year=2014 variable could provide further insight into both the factors contributing to the bubble as well as potentially how long the bubble might last considering that bubbles typically do not exist for more than a decade at most. Further evidence that supports this bubble theory recently became available with the release that every NBA team is now worth at least $1 billion as of 2018, which continues the sharp rise in values since 2014. This represents a 22% rise year-over-year, with the largest driving forced being the league's international growth prospects (Badenhausen, 2018). Not only has the influx of international talent from Europe and elsewhere broadened the NBA's appeal, but so has the league's investment in itself by playing games in other countries and forming NBA China – a development program in one of the world's largest markets. It is arguable that the NBA now has the greatest international appeal of all four major North American sports leagues. Additionally, domestic growth has surged with a new TV broadcasting deals set to begin, the ability to advertise on uniforms, and an overall increase in merchandise sales. However, the regressions in this study control for revenue from these and other sources, meaning these factors are likely causing the rise in the revenue variable but not in the bubble, unless they are having some type of speculative effect that is unsustainable in the long run.

As a result of this study, it is interesting to consider how estimated franchise values as well as real transaction prices will continue this upward trend in the coming years, and at what pace they will do so. While revenue is certainly a strong variable to use in forecasting the future, there must be other explanations as well. Beyond the variables used in this analysis, another possibility for future study based on these recent findings could be

the impact of outside factors such as broadcasting-specific revenue variables and international attraction on team value, potentially measured in viewership or otherwise.

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