The Impact of Corporate Stadium Naming Rights Agreements in Professional Sports on Short-Run Stock Returns

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The Impact of Corporate Stadium Naming Rights Agreements in Professional Sports on Short-Run Stock Returns

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The Impact of Corporate Stadium Naming Rights Agreements in Professional Sports on Short-Run Stock Returns

by

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Submitted to The Department of Economics

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I hereby recognize and pledge to fulfill my responsibilities as defined in the Honor Code and to maintain the integrity of both myself and the College as a whole.

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Acknowledgements

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Abstract

The purpose of this project is to outline the historical events surrounding the inception of corporate sponsorship of professional sports stadiums through the purchasing of naming rights. Some of the costs and benefits experienced by corporations when entering naming rights agreements is also taken into consideration. An analysis and explanation of some prominent economic theories regarding asset pricing of securities is given, namely Eugene Fama’s Efficient Market Hypothesis, investor sentiment and how an investor’s future expectations can affect asset prices, as well as Andrew Lo’s modernized adaptation of the Efficient Market Hypothesis which he calls the Adaptive Market Hypothesis. Finally, given the content outlined in the first two chapters, I report my empirical analysis of the initial announcement of the sponsorship on short-run stock returns. Considering the difficulties associated with identifying the impact an event had on the return of a stock, it is necessary to calculate the abnormal return for a given stock. These calculations were made using an implementation of the Market Model by predicting expected prices based off an individual stock’s reactiveness to the market in a recent reference period. The results of the empirical analysis found that companies typically experience positive abnormal stock returns in the four trading days prior to and following the sponsorship announcement. These findings are consistent with the Efficient Market Hypothesis in both its semi-strong and weak forms.
Introduction

Professional sports in North America generated $60.5 billion of revenue in 2014 alone, and this number is projected to increase to as much as $73.5 billion by 2019 (Heitner, D., 2015). It is quite clear that professional sports has grown to be a massive industry and still yields more profit opportunities. The NFL is the sports league that generates the most revenue, which was $4.28 billion in 2001 and rose to $12.16 billion in 2015 (Forbes, n.d.), a 2.84 fold increase. This trend of growth is something that has been consistently experienced by all the four major sports leagues in North America, which includes the NBA, NFL, NHL, and MLB. Due to the magnitude of revenue these sports leagues receive and the expectation that their value will continue to grow at steady rate, corporate branding has become a common practice in professional sports, most commonly through the purchase of stadium naming rights.

Intuitively it may seem that purchasing these naming rights as a means of advertisement is a rational investment, but taking into consideration how much a corporation typically pays per year one must consider if it pays off in the long-run. Most naming rights agreements exceed an annual cost of $1 million, with the most expensive contracts costing $20 million per year (Badenhauser, K., 2016). Furthermore, the purchasing of stadium naming rights is a relatively new practice that became prominent throughout the 1990s. Prior to the start of the 1994 MLB season there was only a single stadium who had a corporate sponsor, but 20 years later in 2014, only 9 stadiums were not sponsored by a corporation (Moran, C. 2014). With these two facts in mind, it is evident that this economic phenomenon has significance and presents a need to analyze it in depth. Therefore it is important to consider both the background information pertaining to the subject, and economic theories that helps determine the value of these contracts.
To be able to effectively determine the impact that these sponsorships have on corporations, a means of measurement must be established. By thinking about the sponsorship as news or information about the corporation that can send a signal to investors about the future, the impact of the sponsorship can be measured. One method of measuring this impact is to calculate how stock prices responded to the news compared to what the expected stock price theoretically would have been in an event where the news did not occur (Event Study Analysis, n.d.). This methodology will be followed to attempt to measure the effect, if there is one, that a corporation announcing the sponsorship of a professional sports stadium, through the means of purchasing its naming rights, has on the firm immediately and in the few trading days following the announcement.

The first chapter of this project elaborates more on the history that led to the explosion of corporate sponsors in professional sports. Also, an analysis of the pros and cons that corporations face when engaging in these agreements is given. Chapter 2 pertains to economic theories regarding investment in securities and how these assets are priced. More specifically, it focusses on the Efficient Market Hypothesis, which a classic economic theory suggesting that asset prices are always accurate, as in the price fully reflects all relevant information (Fama, 1970). Going alongside the Efficient Market Hypothesis, the concept of investor sentiment, a theory on how an investor’s future expectations can affect asset prices, is explained. Finally, a more recently developed variation of the Efficient Market Hypothesis, called the Adaptive Market Hypothesis, is explained to suggest compatibility between the Efficient Market Hypothesis and investor sentiment (Lo, 2007). Chapter 3 aims to quantify the impact that the sponsorship announcements have on the sponsoring firm’s short-run stock returns using an asset pricing model called the Market Model. This model predicts a corporation’s stock returns over a period based on that
corporation’s individual reactivity to changes in the market. The impact of the announcement can then be measured by taking the difference between the predicted return and what the firm experienced. Given the results found from the empirical analysis, final conclusions about the information presented in this research are summarized in the conclusion.
Chapter 1: Historical Context

Purchasing the naming rights to a professional sports team’s stadium is a very common practice done by corporations in the modern day, but this was not the case at the inception of most professional sports leagues. By looking at the historical trends over time, it is a relatively new practice with regards to the age of the professional sports organizations; who are signing multimillion dollar contracts to allow a given corporation the rights to name that sports organization’s stadium after themselves. Hence, it is interesting to consider some of the first instances in which stadium names were purchased, how this trend has changed over time, and finally how the magnitude of the contracts has changed over time as well. Also, this chapter examines theoretical justifications of advertising in this manner. Finally, this chapter will attempt to show the potential costs, benefits, and implications that can arise from advertising through stadium naming rights.

I. Overview of History

The first instance in which a stadium can be traced back to being named after a corporation occurred in 1912 when the owner of the Boston Red Socks named the stadium for his team Fenway Park. It is supposed that he gave the park this name because he owned a realty company that was named Fenway Realty and the park was constructed in a section of the town that was largely owned by his company; hence he could use the park name as an unofficial way to promote his properties. While it is not known for certain whether this was done intentionally, it is interesting to note the connection between the park’s name and the Fenway Realty Company (Jones, 2005, p. 45). Another similar situation arose in 1926 after the family that owned the chewing gum company Wrigley purchased the Chicago Cubs and changed the name of their park to Wrigley Field. Like the situation with Fenway Park, it is uncertain as to whether the name was
intended to indirectly be a means of promoting his company or simply it was named after the family, but an association with these corporations and their respective team was formed (Voigt, 2004). It is also important to note when considering these two stadiums that they are two of the most iconic and historically storied stadiums and sports teams giving the rights to name the stadium to a corporation has an enormous value.

The idea behind purchasing the naming rights of a stadium changed entirely in 1953 when the beer brewing company Anheuser-Busch acquired the St. Louis Cardinals. Following the acquisition of this baseball team, August Busch II desired to rename the Cardinal's stadium as Budweiser Stadium after his company's flagship beer. This name was disallowed due to the MLB not wanting the name to have a direct association with alcohol, therefore Busch opted to name the stadium after himself as Busch Stadium. To directly promote his beer brewing company, Anheuser-Busch began brewing and distributing a new line of beer that was named Busch Bavarian Beer (currently known as Busch and Busch Light) effectively creating a direct association between his baseball team and his brewing company (Kalb, 2013). While this situation can be cited as the first time a direct association with a stadium’s name and a corporation was intentionally made, the practice of this still did not begin to become common until much later.

It wasn’t until 1973 that a corporation made a direct purchase of a stadium's naming rights when the Rich Products Corporation made an agreement with the Buffalo Bills in which $1.5 million was paid over 25 years in exchange for the exclusive rights to name the stadium. The Bills said this was a favorable deal because the funds received for the rights offset the cost of constructing the newly named Rich Stadium (Ashley & O’Hara, 2001). In the following decades, more sports organizations and corporations began to make similar deals, making it a
common practice. Due to the increase in corporations’ demand for purchasing these rights and the increase in supply of stadiums to name from sports organizations’ willingness to sell these rights, the price that corporations had to pay increased astronomically. Kovatch (1997) states that the average price for a naming rights agreement was between $1-$2 million and span between 15-30 years in 1997 (the year before Rich Products Corporation’s original 25 contract was set to expire). Therefore, corporations were paying on average 16.66-33.33 times more per year than the original $60,000 per year that the Rich Products Corporation had agree to pay (Ashley & O’Hara, 2001).

The boom in stadium naming rights agreements occurred throughout the 80s, 90s and continued throughout the 2000s. Therefore, it is important to consider some of the reasons that may have influenced the increase in the number of agreements (Voigt, 2004). Carbot (2009) states that the base cause of the increase of these naming rights agreements stems from the fact that professional sports is not only an extremely competitive market but more importantly it aims at providing entertainment to its customers. Therefore, to remain competitive, the organizations must be innovative and provide the biggest and best experience to expand and retain its customer base. This has been a strong driving force in influencing the need to construct enormous and luxurious stadiums which also have exceptionally large price tags associated with them causing the sports organizations to seek financing from interested investors. This suggestion can be supported by looking more specifically into the evolution and history of stadium designs.

The first sports stadiums that were erected in the early 1900s, most frequently baseball parks, were typically small and simple in structure, and generally were designed to be constructed in areas of land that were already available and accessible. This is the exact opposite of modern day stadiums which are intended to be luxurious and enormous structures that are
often designed to be constructed in dense metropolitan areas in which adjacent structures are designed around the stadium. The shift towards modern styled stadiums was a result of large market cities beginning to acquire several different franchises in different and sometimes even the same professional sports leagues. This caused not only issues regarding land availability, but also issues regarding financing the construction of these buildings. The answer to this issue was the construction of multipurpose stadiums, which most prominently were built in the 60s, 70s, and even into the 80s and were designed to accommodate multiple teams, even ones of different sports. Following the inception of the multipurpose stadium design, several more mid-sized metropolitan markets could form more professional sports team (Carbot, 2009).

Due to the cost-effective nature of the multipurpose design and the large revenues brought in from professional sports teams, these stadiums were typically funded by the local municipality (Carbot, 2009). One of the major event that changed the way in which stadiums were designed occurred in 1985 when then owner of the Miami Dolphins, Joe Robbie, began the construction of a new stadium for his team which he had decided to finance himself after being denied multiple times for government financing. To pay for the construction costs, he first designed the stadium to be capable of hosting an MLB team with the hopes of acquiring or forming a team in the new future. The second and most critical component of his stadium design was aimed at making it a luxurious building which included club level seats and luxury boxes. Selling these expensive seats alongside private funding, long-term agreements with season ticket holders, and issuing bonds, Robbie could afford to construct his stadium for the 1987-1988 NFL season (Stadiums of Pro Football).

This new approach caused other owners of sports organizations to desire similar stadiums to remain competitive regarding the entertainment experience they provided, which resulted in
an enormous boom in stadium construction throughout the 90s and 2000s. Many owners felt that to remain competitive as a professional sports franchise it was necessary to have a sport’s specific stadium that hosted a single team, and had many of the amenities associated with their particular sport; for example, luxury boxes in football stadiums or close first row seating in baseball parks (Carbot, 2009).

The new demand for stadiums that were built to provide a more luxurious entertainment experience caused an even greater boom in stadium construction throughout the 90s in which teams were building single purpose more expensive stadiums. Also, considering that some stadiums that were as young as 15 years old were becoming obsolete, many municipalities refused to pay the construction costs for a new stadium (Carbot, 2009). This lead sports owners to find alternative means to finance the new stadium construction, resulting in the sale of the building's naming rights becoming common practice. This statement is supported by Voigt (2004) by reporting that 95 percent of stadiums constructed since 1990 have a naming rights deal (as of 2004) in which corporations pay amounts ranging from as little as $4 million and some exceeding $200 million with contract lengths ranging from 4-31 years. Corporations typically make payments periodically and on average pay $2 million per year, agreements that were made towards the end of the sample showed even higher cost per year with Kraft Heinz Corporation paying $2.5 million per year, Bank of America paying $5 million per year, and Invesco paying $6 million per year with each contract lasting for 20 years (Voigt, 2004).

II. Cost & Benefit Analysis for Corporations

Considering the astronomical amounts that corporations must pay for these deals and the fact that the data shows a trend of the price continuing to increase, it is essential to consider how these naming right deals are formed as well as the costs and benefits for the parties involved.
Therefore, the remainder of this chapter elaborates in more detail on what goes into making these agreements.

To determine what the associated costs and resulting benefits of these deals are, it is important to understand who is involved in making the stadium rights deal as well as how they are involved in the agreement. In each stadium naming rights agreement, there exists one party who is a private entity that seeks to purchase the rights to the name of some object, typically a publicly traded corporation (though some sponsors are privately owned). The other involved party is the sports organization who plays in the stadium, who may or may not own the building. In some situations, the local municipality is the one who owns the stadium or sometimes the land on which the stadium is built that is leased to the sports organization. Therefore, the terms of a specific naming rights agreement can be unique due to the complexities brought forward from ownership (Voigt, 2004).

When considering the costs that corporations face by making these agreements the most intuitive and largest cost is the price that must be paid to be given the naming rights. As explained previously, the price of these agreements has been steadily increasing in the past two decades which raises the question as to whether these multi-million dollar contracts could ever pay off, which per ESPN costs on average $3 million per year. The payment structure for these contracts can be made as either a lump sum or periodically over the course of the contract; in either case, opportunity costs are faced when allocating funds towards the purchasing of naming rights. For example, the same amount of money could be used to advertise in some other way, put toward research and development, or even used to increase employee’s salaries to attract the highest quality candidates. Also, the drafting of the actual contract and bargaining over specific details can lead to increased legal costs.
Also, there exist several less intuitive costs for these corporations that are difficult to quantify such as negative impacts resulting from association with a team that is performing poorly, becomes bankrupted or is purchased by a new owner, or even if the team relocates to a new city. In either of the cases mentioned, additional costs, small or large, may be experienced. Another costs that corporations often face, is that many people still associate the stadium with its previous name either knowingly and unknowingly; which clearly diminishes the effectiveness of purchasing the naming rights (Woisetchlager, Hasselhoff, Backhaus, 2013). Similarly, many broadcast services and media outlets have a policy to avoid naming corporate sponsors of stadiums by referring to previous/historical names or simply using the geographic location or team name. This is done because by referring to a corporation during a broadcast can be considered ambush marketing, a situation where advertisement occurs in an indirect or covert manner. (Tonwley, Harrington, Couchman, 1998)

A final cost that must be considered is situation where a corporation is the sponsor of more than one stadium. It is difficult to determine whether this leads to positive effects by providing economies of scale due to the increased exposure of the sponsor, or if it yields diminishing marginal returns that may cause additional sponsorships to be less effective and not worth the cost. For example, consider the 2006 NBA Finals when the Miami Heat faced the Dallas Mavericks in a series that took six games to decide a winner. Both teams were sponsored by American Airlines, which lead to either venue bearing the same name only differing slightly by being named American Airlines Center (Dallas Mavericks) and American Airlines Arena (Miami Heat). While this is the only time a professional championship series was played in two stadiums with the same sponsor, it is estimated that American Airlines had received approximately $10 million worth of advertisement value for each game (Hemlock, D. 2011).
This value was estimated by comparing the amount of advertisement received from signage inside the arenas and references made during broadcasts with the cost of purchasing the advertising by itself.

While the 2006 NBA Finals is a situation in which the purchase of the naming rights likely payed off, many economists remain skeptical as to whether the costs are exceeded by the benefits. This certainly is something that is difficult to measure, because the impact of advertisement is not easily quantifiable. Arguments in favor of these deals can be made when considering the cost of advertising during professional sporting events. For example, the average annual cost of a naming rights deal is very close to the cost of a 30-second super bowl commercial. Even considering a 30-second super commercial is one of the most powerful means of advertising, the advertisement by renaming a stadium lasts for an entire season and spans over many years (Hudson, 2016).

Some research has concluded that stadium sponsorship is very effective for corporations that already have some of the largest market shares in maintaining their dominance and growing even larger. It also has been found to be very effective to push regionally competitive corporations into competition on the national or global scope (Ashley & O’Hara, 2001). Like the negative impacts that can be experienced from association with a “bad” team, the “halo effect” considers the positive benefits that are experienced from association with a “good” or successful team (Beaudoin, 2015).

All the benefits that corporations experience from these deals are certainly positive influences on demand, but some of the most important and often unconsidered benefits are the specific amenities and ancillary benefits that are included in the “fine print” of these contracts. Some of these included but are not limited to pouring/concession rights, provision rights,
additional advertising within the stadium, information kiosks, free tickets and parking (typically luxury boxes and priority parking), and guaranteed broadcasting segments during media breaks. Amenities such as these can allow corporations to bring in enormous additional revenue streams as well as attract potential employees and new clients. For example, Pepsi’s sponsorship of the Denver Nuggets’ and Avalanche’s joint arena in which they received exclusive pouring rights which allowed only Pepsi’s line of soft beverages to be sold as well as exclusive concession rights in which only their subsidiary food companies could operate within the stadium. This allows Pepsi to create a monopoly within the stadium by being the only supplier and could charge whatever price it wanted. A similar situation occurred when Enron, an energy company, became the corporate sponsor for the Houston Astros. They were granted exclusive provision rights in which they supplied all the energy to the stadium and directly lead to an additional $20 million annually in revenue (Voigt, 2004).

III. Concluding Remarks

This chapter showed how professional sports organizations have evolved from small scale operations to multibillion dollar private corporations. This continual growth over time has been a direct influence on the evolution of stadium construction and design. Stadiums were initially simple in design and built cost effectively but eventually became the enormous and luxurious venues that are seen today.

As team owners began to build stadiums more frequently, several municipalities denied financing the cost of constructing new venues because they felt it was unnecessary. Therefore, team owners who felt the need to construct a new stadium turned to corporation in hopes of financing. Considering not only the extremely valuable advertising corporations receive but also some of the deal specific amenities that are included in these contracts, such as concession rights,
provision rights, and advertising within the stadium, there is quite clear as to why these agreements are made.

The next chapter of this research will turn its focus on economic theories pertaining to asset pricing and how investors can affect these prices given their expectations about future events. After the underlying principles of securities markets has been presented, a connection between the content of this chapter and the aforementioned theories can be drawn through the use of empirical analysis.
Chapter 2: Economic Theory

Many economists have studied how stock prices change given certain circumstances. One of the most fundamental theories on the behavior of the stock market was published in 1970 by Eugene F. Fama in his research, titled *Efficient Capital Markets: A Review of Theory and Empirical Work*. The theory he proposed is referred to as the Efficient Market Hypothesis (EMH). He proposes that capital markets are extremely efficient in a way that information about individual stock prices is reflected across the market so quickly that an investor cannot beat the market, meaning a portfolio comprised of similar risky stocks will generate comparable profits. Furthermore, this theory suggests that stock prices are entirely unpredictable, such that the only relevant information on what the change of a specific stock price from one day to the next is the news that occurs that same day.

Within the past few decades, countless numbers of research papers have been published that challenge this theory, suggesting that stock prices can be predictable to a certain degree, largely due to elements of behavior and psychology. One of the most influential theories that suggests there exists a predictable pattern of stock price changes is investor sentiment. This is a phenomenon in which an investor’s mood or overreaction/underreaction to news can affect the way in which they will invest. Many non-economic factors have been found to have a significant impact on an investor’s mood and subsequent investment decisions, thus giving the fluctuations in stock prices a small pattern of predictability. This concept directly goes against the theory of EMH, because certain information may allow specific investors the ability to gain a slight edge on the market within the time it takes for the stock to stabilize back to its accurate price.

As more research is becoming published that suggests there is a significant impact related to investor sentiment, new theories regarding the efficiency of capital markets have been
published as well. The most notable of which is the Adaptive Market Hypothesis (AMH), initially proposed by Andrew Lo in 2004 which suggests that investor sentiment is simply the reaction to certain news and therefore the market is still efficient as the EMH suggests, because investors are simply overreacting/underreacting to relevant news and the summation of these investment decisions ultimately balance out which results in an efficient market. Alternatively, he suggests that while EMH focuses on the inability to beat the market, his theory is focused on the fact that this is true but investors can easily lose to the market. To make this point clearer he presents an analogy to Darwin’s “survival of the fittest” theory, which implies different investors in a market simply need to continue to survive as the market evolves, and profits will be made periodically. The remainder of this chapter will explain and analyze these economic theories and provide evidence to support the validity of each theory.

I. Efficient Market Hypothesis

Fama’s Efficient Market Hypothesis (EMH) suggests that financial markets are extremely efficient in such a way that all relevant information is immediately and accurately reflected in the price for a stock at a given time. Under this assumption that prices “fully reflect” all relevant and available information, another assumption that no individual can ultimately “beat the market” or systematically generate profits based on information can be made, because these potential profits theoretically must have already been captured by someone else. This is due to the idea that any relevant information is fully reflected in the price of that stock. To better put this into perspective Lo (2007) tells a story about an economist and a friend who are walking down the street. During their walk through the city the economist’s friend notices a $100 bill that is laying on the sidewalk with no clear owner to it. Taking advantage of this lucky occurrence, the economist’s friend begins to reach down to pick up the bill, but before doing so the economist advises his
friend to not even waste his time for if that bill was true legal tender someone else would have picked it up already. This short story is a direct analogy to the concept suggested by the EMH stating that if there was to be any potential profits to be generated from new information, the relevant prices to this new information would fully reflect any changes and the profit opportunity would be immediately negated due to market forces and the extremely large number of investors constantly waiting to jump on top of any potential profit opportunity.

The theory of efficient markets goes on to suggest that the prices of stocks are an entirely random sequence of changes in prices, where the most efficient market would experience changes in prices that would be completely random and have no predictability to them. This occurs because many investors are likely to act on any new information about a stock so quickly that the new price will reflect this information immediately and eliminate the potential profit opportunity (Lo, 2007). Fama (1970) states that a market that is truly capable of fully reflecting all relevant information in market prices must be entirely “frictionless”, which requires the market to have three specific characteristics. First, there are no transaction costs associated with trading, second all information is available to every participant in the market and this information is costless to attain, and finally all participants agree on the impact the new information has on the current price as well as futures prices.

Market conditions such as these unfortunately do not exist in actual trading markets, but fortunately these conditions are simply sufficient conditions and not entirely necessary to fully reflect all information in prices (Fama, 1970). For example, even if large transaction costs exist, under the assumption that traders in this market are using all available information, then there is no implication that the market price does not fully reflect all relevant information. A similar argument can be made about the availability of information. If a significantly large enough
number of traders have access to all relevant information, the market price can still fully reflect all relevant information. Finally, only in a situation where traders cannot agree on the significance of new information on price fluctuations, but some individuals are capable of consistently making better evaluations of the impact of new information, will there be inefficiencies in a market. Overall, it can be concluded that while these characteristics may lead to inefficiencies in markets, the absence or partial failure of one characteristic does not imply there are inefficiencies within the market. Also, he notes that all real-life markets have some degree of “friction” to them, meaning that all three of these characteristics are not met to some degree.

The first basic component of the EMH is the concept of the random walk hypothesis. This is the fundamental assumption within the EMH that explains why price fluctuations for a given stock must be considered entirely random. Fama (1965) talks in depth about the mathematical concept of a random walk and applies it more directly to price fluctuations within stock markets. He goes on to state that some theorists suggest that studying historical stock prices can present certain patterns or trends of fluctuations under the assumption that “history tends to repeat itself”. These theorists are not sound in doing so because the price of a stock on two separate days are statistically independent, which implies historical prices have no effect on the changes in future prices. Given the fact that these two outcomes are statistically independent (under the assumption of EMH that all relevant information fully reflects the price of a given stock), it can be assumed that the value of price fluctuations are as predictable as the pattern of fluctuation among a series of random numbers. The mathematical concept of a random walk does not perfectly fit into the concept of stock price fluctuations, because in some cases there may be minor and insignificant statistical dependence on two stock prices at two different times,
but the overall concept fits well into how changes in stock prices are most likely to occur. Essentially the only information relevant to the potential fluctuation of a stock’s price at a given time, is any new information that was not previously known, which will then be immediately reflected in that specific stock’s new price.

Fama (1970) provides three variations of his EMH model that are based off different subsets of information, all of which agree with the implications of his hypothesis that capital markets are efficient. The first of which is the weak form model and is the situation in which the only historical prices are the known information about stocks. Therefore, in this model no new information or news will be released and all prices changes must be subject to the random walk hypothesis. Hence, in this model there would be no way to systematically beat the market because all changes are random and the market must be efficient. The second model is called the semi-strong form model, which models a situation where relevant information for price changes is subject to public news (for example earning reports, mergers, acquisitions, and other events of that nature) when adjusting stocks prices. In this situation, the market is still efficient because all investors have access to this information and therefore the only inefficiency would be agreement among the implications of this news on the future price of a stock, but due to the large pool of investors the summation of overreaction and underreaction will accurately price the stock; thus, this market is efficient. The final variation is called the strong form model where all information both public and private is reflected in stock prices, which leads to a situation in which all prices always reflect all possible relevant news. In a situation where every investor knows everything that is relevant, no one can generate long run returns because prices will always be accurate. A market such as this could not exist in a real economy due to barriers to private information and
laws the prohibit insider trading; therefore, this model variation is simply theoretical, but certainly efficient.

II. Investor Sentiment

While the EMH has been considered one of the most concrete economic theories due to its resilience towards evidence attempting to suggest it to be not entirely accurate, there have been thousands of research papers that have focused on refuting it since its publication in 1970. The most commonly debated concept that violates the EMH is the idea of investor’s overreaction or underreaction to news and how significantly individual investors will assume the price will change given this new information. Also, certain anomalies that will be explained in greater detail later in this subchapter have suggested that there are certain patterns in stock prices that can be identified and utilized to generate excess returns. In more recent years, some economists have suggested that there are significant behavioral and psychological implications on investor’s decisions which can lead to inefficiencies in capital markets. In either case, there is an evident split on how economists view these suggested implications and their true effect on the efficiencies of capital markets and the accuracy of the EMH.

Overreaction and underreaction to new information is clearly the greatest challenger to the validity of the EMH because one of its efficiency conditions is that all investors agree in the implication of news on the future price of a given stock. Therefore, if a large number of investors overreact or underreact to new information the new price of the relevant stock will not be accurately reflected and the market will be inefficient. Economists that argue in favor of the EMH, even in a situation of overreaction or underreaction, suggest that the market is indeed still efficient because those investors are acting irrationally and all rational investors create an efficient market. Alternatively, some economists argue that this is simply an inefficiency in the
market because an efficient market would not allow for this irrational reaction to new information (Lo 2007).

Another concept that challenges the EMH is anomalies in stock prices, or well-known and consistent trends that have been found in stock price fluctuations. Like overreaction and underreaction, there are two sides that economists take in which one side argues these trends can be used as information that can gain an edge on the market to generate excess returns, making the market inefficient. The adverse argument states that because these trends are well documented and therefore the information is accessible to the public, rational investors will use it when predicting future prices, thus the market is still efficient. Regardless of the implications of these anomalies, it is interesting to note that such trends can be consistently identified (Lo 2007). One of the most interesting of these anomalies is referred to as the size effect, that was found by Rolf W. Banz (1981), in which it was found that small capitalization stocks consistently have greater excess returns, less their risk, than large capitalization stocks. Going along with the size effect, another famous anomaly is the January effect, in which it has been found that many small firm excess returns occur within January. While it may be fascinating to consider that a unique trend such as this has been identified, one must next consider how it can continually occur each January. Reinganum (1983) empirically found that this is most likely due to investors selling stock at the end of December to prevent or lessen tax-loss due to capital gains received throughout the year. This causes the excess return of certain stocks, mainly small capitalization stocks, to rise in the following month, mainly the first five days of the year. Under the EMH it should be assumed that the efficient market would negate this effect, but this effect has been observed consistently in fifteen other countries. Considering that this anomaly can be consistently observed every calendar year, many economists argue the January effect to be a
valid refutation of EMH (Thaler 1987). This effect is a clear opportunity for investors to gain an edge on the market and must be considered when proving the EMH to true. With the consistency of this effect and the fact that it exists in many trading markets, it would take a large number of investor acting against it in order to balance out this arbitrage.

In recent years, the greatest challengers of the EMH are those who suggest concepts related to psychology and behavior have large impacts on how investors make decisions, rationally or irrationally. This has led to the development of behavioral finance which suggests the concept of investor sentiment, an investor’s emotion, opinion or mood that influences the decisions that individual will make. Some researchers suggest that by aggregating the sentiment of everyone to from a market sentiment, some insight and a possible edge can be gained on the market, mostly because there is much less available information. By measuring market sentiment, some researchers have attempted to explain why market bubbles and crashes occur (Chang, Yu, Reinstein, Churyk, n.d.). This is what is considered a bottom-up method for measuring investor sentiment because it focuses on measuring the effect of sentiment from individual investors and determines the aggregate effect of each individual investor’s impact on the entire market.

An alternative way to measure investor sentiment is by using a top-down method of measurement. The methodology of an approach such as this would take investor sentiment as an exogenous variable to measure the empirical effects that it has on stock pricing when sentiment is high or low as well as the impact it has on stocks with different characteristics such as size and potential for arbitrage (Baker & Wurgler 2007). Typical models for measuring investor sentiment at the individual level take the price of a given stock with its value under the random walk model and then add an individual investor’s opinion on how much the price will fluctuate
to determine what that individual deems the actual market price for the stock in the future (Lawrence, McCabe, & Prakash 2007).

Several research papers have concluded that investor sentiment certainly has a significant impact on stock pricing (Baker & Wurgler 2007), (Lawrence, McCabe, & Prakash 2007), but it is interesting to consider some of the reasons that investors’ mood can change and have a significant impact on stock prices. One important aspect is risk aversion, or how willing an investor is to take on risk. For example, an investor who does not take on many risks is more likely to expect lower excess returns than the average investor given news that would raise the price of a certain stock. Perhaps that same investor would expect larger negative returns than the average investor given news that would lower the price of a certain stock. Similarly, overconfidence can affect the frequency and risk of trades made by an investor (Lo 2007; Barber and Odean, 2001; Gervais and Odean, 2001). Finally, loss aversion has been found to have an impact on an investor’s sentiment toward stock prices. This is because some investors will not make a trade simply because they will receive a larger loss in marginal utility than they will receive from gains in marginal utility and therefore often due to trade rationally given the actual market prices. This is related to the idea behind prospect theory, in which people making decisions under risk tend to make choices given immediate gains or losses and not the final outcomes of sequential choices (Kahneman & Tversky 1979).

Given this concept of investor sentiment, countless numbers of research papers have attempted to identify certain non-economic factors that may influence an investor’s mood and subsequent decisions. One of the most interesting concepts of investor sentiment and the focus of this research is how significant sports performance can have on the returns of stocks because of investor sentiment. Edmans, Garcia, & Norli (2007) is the most famous research with regards to
sports sentiment by finding that there is a strong link between the performance of soccer teams in world cup matches, with the effect being stronger for small stocks (the size effect) and following more important games. They also found a loss effect for international cricket, rugby, and basketball; where winning did not have a strong positive impact on next day stock returns, but losing had a strong negative impact on next day stock returns.

Similarly, Eisdorf & Kohl (2015) studied specifically how the performance of a NFL team in important games, mainly Monday night, playoff, and upset home games; would affect the next day returns of the stock for the corporation that sponsored that team’s stadium. They found that there is a statistically and economically significant impact on stock returns in the following five days, with both positive and negative impacts for wins and losses respectively. Chang, Chen, Chou, & Lin (2012) also studied the effect of NFL team performance on next day stock returns and found the same type of important games, Monday night, playoff, and upset games had the same positive and negative impacts on wins and losses for Nasdaq corporations that were headquartered in the same geographic location as an NFL team.

Given the results of the several studies presented above, it seems that investor sentiment must have an impact on the pricing of stocks, which would violate the concepts outlined in the EMH. Specifically, it is interesting that sports performance can affect an investor’s sentiment towards stock pricing and thus the market price for that given stock on both the firm and industry level. With this evidence that shows inefficiencies in capital markets, the legitimacy of the EMH has been strongly questioned in the past few decades. The empirical chapter of this research will focus in depth on modeling the measurement of abnormal returns for corporate sponsors of
professional sports teams directly resulting from sponsorship announcements to support or refute the conclusions that have been drawn in previous research.

III. Adaptive Market Hypothesis

With the understanding that certain anomalies and other behavioral biases have significant impacts on stock prices, the EMH has been questioned by many economists and still many other economists still strongly support it. One researcher, Andrew W. Lo (2004, 2007), has made major contributions to the field of behavioral finance by suggesting his theory of the Adaptive Market Hypothesis (AMH). It suggests that the EMH is correct in saying that capital markets are efficient, but to be efficient it requires investors to continuously adapt or evolve to the current situation. Grossman and Stiglitz (1980) support the idea that a truly efficient market is impossible, because if all information is always available to every investor and prices fully reflect this information (strong form EMH) then there is no ability to generate long term profits and thus there is no reason to even partake in trading. Therefore, to incentivize investors to trade, the market must have some degree of inefficiency within it, and this degree of inefficiency will determine how much profit opportunity will exist in the market. This degree of inefficiency will also lead to the amount of trading and search costs that investors are willing to bear to seek profit opportunities.

In his AMH, Lo makes several analogies to better describe how actual markets work versus how a market theoretically works. First, he continues the explanation of the impossibility of a perfectly efficient market, stating that an engine’s energy efficiency is measured in the percent of energy that is not lost in use and that an engine with perfect efficiency can only exist in a theoretical frictionless environment. Therefore, an engine can be efficient by only losing say 25% or 30% of its energy. The same can be thought of for markets, perhaps its efficient if market
prices only reflect a certain amount of the relevant information until some benchmark, and the lack of information reflected in prices below a certain point forces the market to be inefficient (Lo 2007).

Next, Lo makes another analogy stating markets can be thought of as an environment in which the different species within the environment are different types of investors; for example, different risk preferences or different types of traders, and the food in this environment is the potential profit opportunities. This concept can then be related to the Darwinian concept of “survival of the fittest”, in which Lo rephrases this famous statement as “survival of the richest”. The idea behind this analogy is that the environment is constantly changing and if species do not effectively adapt to their environment, they can become extinct. Furthermore, it is not the goal of a specific animal in this environment to capture all the available food, but simply a sufficient amount to stay well fed. Considering this with respect to capital markets, Lo says that for a market to be efficient it must have innovative investors who are aware of the relevant information for stocks and the effect it may have on pricing. Given this information the goal is to gain profits from irrational investors who will have no capital or money to invest if they do not adapt to the situation and invest rationally. Thus, if these irrational investors, who make the market inefficient, are no longer able to invest they become essentially extinct, or consumed by rational investors, and therefore a new more efficient environment has been created. As time goes by certain changes in the market will occur and if those investors who are still able to invest do not adapt to these changes, they too will become extinct and a whole new environment will be formed once again (Lo 2007).

Essentially the main concept behind Lo’s AMH is that markets are not able to be perfectly efficient, though they may be sufficiently efficient. Also, the market is constantly
changing and therefore may be more or less efficient at two different times due to the rationality of current investors. Another concept he suggests is that the focus of EMH is on an individual’s ability to beat the market, where the focus should realistically be on the fact that individuals can certainly lose to the market. Thus, the goal should be surviving the market in hopes of eventually being the lucky person to find the $100 bill on the ground first. Therefore, markets cannot be determined as either efficient or inefficient in its entirety, but there are degrees of efficiency that exist within a market and that degree of efficiency is constantly changing with respect to the rationality of actions made by traders. Ultimately this rationality can certainly be impacted by several factors such as availability of information, mood, and opinion (Lo 2007).

This theory is still relatively new and does not have any empirical model to test it yet, and is more of a conceptual theory rather than a testable empirical theory at this point in time. Therefore, there it is hard to be able to test the differences between EMH and AMH. The implications of this theory are still very interesting and is something that should be considered when trying to validate or refute the implication of the EMH.

IV. Concluding Remarks

Given the understanding of the EMH proposed by Fama in 1970, he determined capital markets to be extremely efficient in “fully reflecting” all relevant information and news into the prices of stocks at all times. Throughout the next few decades, countless researchers have attempted to empirically prove or refute his theories with no one being able to entirely do either. As more research became published on the topic, certain concepts such as anomalies within price movements, investor sentiment, inefficiencies in trading due to risk preferences, and the linking of certain non-economic factors with individual’s decision making; have lead some economists to question the legitimacy of the EMH. While many economists still strongly support the EMH,
the amount of research suggesting that there exist imperfections within the theory cannot be ignored. To modernize the theory by considering each individual market as a different environment alongside the idea that efficiency is not an atomic characteristic but rather should be measured in degrees, new hypotheses have been formed, such as the AMH. The following chapter of this research will plan to analyze the empirical effects of corporate sponsorship of sports stadiums on stock market pricing to prove that certain inefficiencies do exist. This next chapter will outline the sample data, develop models for analysis, determine the statistical and economic impacts of any effects identified, and conclude by analyzing what these effects mean and why they are true.
Chapter 3: Empirical Analysis

Given the information that has been outlined in the two previous chapters regarding the history of stadium construction and its evolution that lead to corporation sponsorship, and the economic theories on securities markets and asset pricing, a connection between the two can be made using statistical analysis. Therefore, the purpose of this chapter is to analyze the relationship between the announcement of corporate sponsorship of a sports stadium and the immediate or short-run impact that this news has on that individual corporation’s stocks returns.

I. Statement of Research Question

The specific research question that is focused on in this chapter is what effect does announcements of corporate sponsorship of professional sports stadiums have on short-run stock returns? It is assumed that there must be some tangible benefit for corporations when making this expensive high profile agreement, hence it is important to consider what these benefits may be. Economics categorizes time horizons into two categories, the short run and long run. While neither time frame has a specified or standard length, short run is typically immediate or small periods following some event, whereas the long run focuses on what occurs much later into the future. The focus of this analysis will be the short run because announcements, such as multiyear naming rights agreements, can be considered significant news for that corporation and therefore under the implications of the EMH, should be reflected in that corporation’s stocks prices almost immediately.

Also, it is essential to define some general terminology that will be used throughout this chapter to assure an understanding of what is being analyzed, the most basic being what a stock return is. The return of a stock is a measurement of the percentage change from one period to another and is used to describe how much investors gained or lost on their investment. Payments
of dividends are typically also included when calculating a return on a stock, this focus is on the percentage change of prices. Equation 1 shows how to mathematically calculate the return of a stock

\[
\frac{P_2 - P_1}{P_1} \times 100
\]

Where \( P_2 \) represents the price of the stock at the end time and \( P_1 \) represents the price of the stock at the initial time. Next it is important to understand the concepts of a predicted stock return and an actual stock return. The predicted return of a stock is the theoretical or expected percentage change from the initial period to the end without any significant news or events occurring during the period being measured. Alternatively, the actual return on a stock is a measurement of what occurred and therefore can only be measured retrospectively. By taking the difference of what the actual return of a stock during a given period and what the theoretical return of a stock during that same period, a measurement referred to as the abnormal return of the stock can be measured. The abnormal return of a stock is therefore an effective way to measure the impact of a certain effect on the return of a stock and will be the focus variable that is used to answer the research question.

II. Statement of Initial Hypothesis

Given the implication of the EMH that were outlined in the previous chapter, it must be assumed that any relevant news for a given asset will be reflected in its price, depending on whether this news is public or private will dictate which form of the EMH is relevant. Considering the magnitude of advertising and the increase in brand awareness that results from a naming rights agreement one can expect this to have a positive impact on the expectation of the corporation’s future revenues, which should then have a direct impact on that company’s stock price. Under the assumption that investors will consider this be positive news or a good signal
for the stock, the EMH suggests that the price of the stock will increase because investors see it as more valuable after the signal is given. This leads to establishing an initial hypothesis that the announcements of corporate sponsorship of a professional sports stadium will lead to increased stock returns for that corporation in the trading days following the announcement that otherwise would not have occurred had the event not happened.

To test this hypothesis in a statistical model, a null and alternative hypothesis must be stated which then will be tested given a sample of data. For this model, the null hypothesis will be that no changes in stock prices occur following the event or that the abnormal returns will be equal to zero. The alternative hypothesis is what was outlined previously under the assumption of the EMH such that the sponsorship announcement will have a positive impact on short-run stock returns; in other terms, the abnormal return of a corporation following a stadium sponsorship announcement will be greater than zero. These hypotheses can be expressed as:

\[ H_0: \mu = 0 \]
\[ H_A: \mu > 0 \]

Where the Greek symbol, \( \mu \), represents the mean value of abnormal stock returns across the population. It is also important to note that there is a potential that the analysis finds the average abnormal stock return to be less than zero, but that case fails to prove the hypothesis that the announcement will have a positive impact on stock return and therefore is still grounds to fail to reject the null hypothesis. Finally, the time window that is of focus was defined to be 5 trading days before and after the sponsorship announcement (11 days total including the day of the announcement). It was determined important to analyze the few trading days preceding the announcement to identify if private information, or news that is only known to a select few
people, had any effect on stock returns. This concept is a direct example of Fama’s semi-strong form of the EMH that was described in the previous chapter.

III. Methodology

Now that the topic that is in question has been stated and explained, and the initial hypothesis regarding the research question has been established, the methodology that will be used to answer the research topic will be explained. The main subtopics for the analytical methodology include the process of data collection which focuses on what data was selected for the sample, where it was obtained from, and why it is relevant. Then some basic characteristics about the sample data are analyzed. Finally the economic model that is used to analyze the data and the results are explained.

A. Data Collection

First, to begin the empirical analysis of the research question, a decision on what variables were sample data needed to be collected and organized. The first step in doing so was selecting which firms would be included in the analysis. For the sake of consistency, a few restrictions were utilized to determine if a firm qualified for the analysis. These restrictions were that the firm needed to be the current sponsor of a professional sports stadium for a team that belongs to either the NBA, NFL, NHL, or MLB. This implies that previous corporate sponsors would not be included in the sample (i.e. sponsors who had a naming rights contract with a professional team that expired and were not renewed or were outbid by another company would not be included), this allows for a maximum sample size of 122 corporations due to there being 32 team in the NFL and 30 teams in each of the other 3 leagues. Also, since stock price movements are the focus of this research, any corporate sponsor that is not publicly traded was not included. Due to a large majority of the companies being traded on the New York Stock
Exchange (NYSE), for the sake of consistency any corporate sponsor traded on another exchange was not included. Next, to be included in the sample a company must have been traded on the NYSE for at least one year to allow the price of the corporation’s stock to stabilize from the volatility that is related to initial public offerings. Finally, only corporations in which a specific date that the announcement was initially made public information could be identified would be included in the sample.

The first variable is the date of the sponsorship announcement, which was used to determine the time period that would be analyzed for each corporation. Information regarding the date of these announcements was not easily found and therefore multiple different sources were utilized to determine the date. One major source used to find this data was ballpack.com, which contains historical information and other characteristics about each stadium among all the professional sports teams. While this source did provide the announcement dates for some stadium sponsors, it did not provide information for all of them. Therefore, various news articles from major media outlets including league websites, team websites, ESPN, and other major news companies to determine what the announcement date was. This date was verified when more than one article with the same publishing date could be identified. In situations where a clear date could not be identified, the corporation was not included as per the sample restrictions that were previously stated. The website where the announcement date for each corporation was found is included in the references appendix.

The second variable is closing stock price for each qualifying corporation for every day within the focus period. These prices were found using Google Finance, which allowed for the data to be downloaded into a spreadsheet and be manipulated as needed for analysis. Finally, the closing price for the S&P500 market index for each day in a qualifying corporation’s relevant
time period is used to determine the general market trends that occurred on each day throughout the period. This information was found using Yahoo Finance which allowed for the information to be downloaded into spreadsheets. Yahoo Finance was used for obtaining data for the S&P500 because Google Finance did not allow the S&P500 data to be downloaded directly into a spreadsheet.

B. Sample Characteristics

Following the collection of all relevant data, a single spreadsheet was compiled using Microsoft Excel in a structure that allowed the information for each individual corporate sponsor to be put on its own sheet, with a single master sheet used to structure the important data points for analysis. Some of the important characteristics of the sample data were as follows. The number of qualifying sponsorships for the sample was 43. Some of these sponsorships included corporations that sponsored a single stadium for multiple teams, for example MetLife sponsors the stadium shared by both the New York Giants and New York Jets from the NFL and Wells Fargo sponsors the stadium for the Philadelphia 76ers from the NBA and the Philadelphia Flyers from the NHL; there were 4 sponsorships of this nature and were treated as normal. Another situation occurred where the same sponsor had purchased the naming rights to more than one stadium, for example FedEx sponsors both the Washington Redskins from the NFL and the Memphis Tigers from the MLB; there were 4 sponsors with multiple naming rights and each stadium was treated as a different observation. The earliest sponsorship announcement included in the sample occurred in 1996 and the most recent sponsorship announcement occurred in 2016, giving the sample a span of 20 years. Also, sponsors from all 4 of the major North American sports leagues were represented in the sample and sponsors from North America, Canada, and England were represented in the sample (still traded on NYSE). Some situations arose where
corporations sponsored on the brand-level and not the corporate level, for example Procter & Gamble named the New England Patriots stadium Gillette Field after one of their subsidiary companies; these corporations were still included in the sample and the stock returns of the parent company were analyzed the same way as corporate-level sponsorships.

C. Market Model

After all the relevant sample data was collected and organized into spreadsheets, the empirical analysis of the sample could be conducted. To do this, an empirical framework needed to be constructed to measure the impact that the sponsorship announcements had on a corporation’s stock returns. Some of the commonly used models for event study analysis are the Market Model (MM), the Capital Asset Pricing Model, the Means Adjusted Returns Model (MAR), and the Means Adjusted Returns Model or Index Model (IM) (Cable, Holland; n.d.). The model that was selected for conducting this study was the Market Model (MM) and was selected for several reasons. The first being the simplest model of the four previously listed, but also has been found to be quite accurate. In Cable and Holland’s study of the four models, the MM was found to be significant at measuring a firm’s return with regard to the market return in all qualifying observations for their study. Furthermore, the under the assumptions of the model a linear relation between an individual firm’s expected return given the return of a market index can be formed, which allows for predictions about future returns to be made as well as calculate abnormal returns retrospectively.

Under the MM, the risk associated with a corporation can then be divided into major two components. The first is unsystematic risk, which is the component of a corporation’s predicted return that is independent of the market index or performance of other firms. Influences on the unsystematic risk of a firm is typically related to things such as internal changes such as new
management or business models, payments of dividends, or announcements. The other is the systematic risk which is the component of a corporation’s predicted return that is directly related to the performance of the market index but could also be influenced by things such as interest rate or changes to input prices (Tong, L., 2010).

1. Equations and Variables

This subsection addresses the mathematical equations related to using the MM and the process that is used to analyze data and measure the impact of a given event on stock price. First to fully understand the MM and its implications, the basic equations used to calculate a firm’s predicted return need to be explained.

\[ 2 \quad R_{i,t} = \alpha_i + \beta \cdot R_{m,t} + \varepsilon_{i,t} \]

Where \( R_{i,t} \) represents the predicted return of stock \( i \) at time \( t \), \( \alpha_i \) represents the unsystematic risk of stock \( i \), \( \beta \cdot R_{m,t} \) represents the systematic risk of stock \( i \), with \( R_{m,t} \) being the return of market index \( m \) at time \( t \) and \( \beta \) is a coefficient that measures the dependency or reactiveness of stock \( i \) to the return of market \( m \). Finally, the term \( \varepsilon_{i,t} \) simply represents the statistical margin of error for stock \( i \) at time \( t \) (Reiser, Breuer, & Wicker; 2012). Given the predicted return of a certain stock, the abnormal return of the stock can be measured using the following equation.

\[ 3 \quad AR_{i,t} = r_{i,t} - R_{i,t} \]

Where \( AR_{i,t} \) represents the abnormal return of stock \( i \) at time \( t \), \( R_{i,t} \) is the predicted return of stock \( i \) at time \( t \) (calculated using equation 2), and \( r_{i,t} \) represents the actual return of stock \( i \) at time \( t \). Essentially equation 3 states that the abnormal return of a stock is simply the difference between the expected value of a stock’s return at a given time and what the return actually ended up being at the time.
To be able to calculate the values of the predicted and abnormal return for a stock at a certain time, the model parameters and must be calculated. This is done by first gathering a reference time period of stock returns for the firm of focus and some market index, S&P500 is typically the standard index that is used when measuring abnormal returns for NYSE traded stocks. The reference period that is selected can be of any length, but a period that is sufficiently large is generally used to assure more accurate values for the model parameters. For this analysis, a period of 120 trading days prior to the sponsorship announcement was used, but some studies use periods as great as 3 or 5 years. The period length of 120 trading days was selected, because first the focus of this analysis is on the short-run effects and therefore a reference period of as much as 3 years may present too much “noise” in the calculations. In order words, a period that large is likely to have a relatively large variation which may not accurately represent the value for predicted returns in such a small window, where returns are unlikely to fluctuate that significantly. Therefore, it was determined that a period length of 120 trading day which is approximately 6 months would be sufficiently large enough to measure a given stock’s systematic risk but small enough to be an accurate representation of that given stock’s responsiveness to the market more recently to more accurately depict short-run price movements.

After determining the proper reference period with respect to the question that is being analyzed, the actual values can be calculated by running a simple linear regression. The form of a linear regression is shown in equation 4.

\[ Y = mX + b \]

Comparing equation 4 with equation 2, a similar structure can be seen, where \( \alpha \) is the same as the b constant, \( \beta \) is the same as the coefficient \( m \), and \( R_{m,t} \) is the same as the value for \( X \). Therefore, by running a simple linear regression values for \( \alpha \) and \( \beta \) are given from the resulting
intercept and coefficient, respectively. Next by using equation 1 with the values found for the model parameters from the output of the simple linear regression, predicted returns for the each of the 43 qualifying corporations in the sample could be calculated for the time window in focus (5 trading days before and after the sponsorship announcement). Then by using equation 2, the abnormal returns for each corporation were calculated for each of the 11 trading days in estimation window.

Calculating the abnormal returns does describe a lot about each firm during the estimation window surrounding the sponsorship announcement, but to truly measure the total effect of the sponsorship several other calculations need to be made about both individual firms and the entire sample. The only other equation needed that considers only individual firms is a measurement of the cumulative abnormal return (CAR), which is simply the sum of abnormal returns over a period of time. This is often considered an effective way to measure the impact of certain news because abnormal returns consider the difference between the actual return that was witnessed and the return that was theoretically expected without the impact resulting from new information (NASDAQ). The equation for calculating the CAR is as follows.

\[
CAR_{i(t_1,t_2)} = \sum_{t=t_1}^{t_2} AR_{i,t}
\]

Where \( t_1 \) is notation for the initial time in consideration and \( t_2 \) is the end time in consideration, and \( CAR_{i(t_1,t_2)} \) is the cumulative abnormal return for stock \( i \) from \( t_1 \) to \( t_2 \). Another important metric to use when measuring the total impact that a specific event has on stock returns is average abnormal return. This measurement is simply the arithmetic average of the abnormal returns across all firms and thus is a means of describing the entire sample. The equation for this is as follows.
Where $AAR_t$ is the average abnormal return for all stock in the sample at time $t$. This is an important measurement to consider because it describes how each firm in the sample reacted to the effect of the news with respect to each to the firm’s systematic and unsystematic risk. The AAR of an individual firm across the event period can also be calculated by dividing the CAR of that firm by the number of days in the event period. Given the AAR, the cumulative average abnormal return (CAAR) can then be calculated in a similar way that CAR was found, except the summation of AARs are used. The equation for calculating the CAAR is as follows.

$$CAAR = \sum_{i=1}^{N} AAR_i$$  \hspace{1cm} (7)

By calculating the CAAR for the sample will show on the expected abnormal return the firm’s will experience over a certain time period. Finally, the last equation needed is used for standardizing the results found to test their significance by computing a t-statistic. This is done by multiplying the square root of the number of observations in the sample by the mean of the sample, divided by the standard deviation of the sample (Tong, 2010). The equation for calculating the t-statistic is as follows.

$$t = \sqrt{\frac{1}{N} * \frac{\bar{\mu}}{\sigma}}$$  \hspace{1cm} (8)

Where $N$ is the number of observations in the sample, $\mu$ is the average value that is being measures, for example the AAR of the entire sample or the CAAR of a certain time period, and $\sigma$ is the standard deviation of the sample, which was computed using the standard deviation function in excel. Equation 8 can be used to standardize the calculations of the AAR on a given day in the estimation window as well as the CAAR over any defined period of trading days. By
using a confidence interval of 95% with 42 degrees of freedom a t-statistic of a value that is greater than $\mu$ is the average value that is being measured, for example the AAR of the entire sample or the CAAR of a certain time period, and $\sigma$ is the standard deviation of the sample. Equation 8 can be used to standardize the calculations of the AAR on a given day in the estimation window as well as the CAAR over any defined period of trading days. By using a confidence interval of 95% with 42 degrees of freedom (degrees of freedom is equal to N-1) a t-statistic of with a value that is greater than 1.628 would prove to be statistically significant and is grounds to reject the null hypothesis.

IV. Results and Interpretation

The model can now be used to analyze the selected sample data to test the hypothesis that abnormal returns are equal to 0; this analysis was conducted using Microsoft Excel. The standard process to conduct an event study was followed and included the following steps that are outlined in Tong (2010). The first step is to select a calendar date to represent the date of the event, which in this experiment was the date that the sponsorship announcement was made. Second the length of the estimation and event period need to be determined, in which 120 trading days prior to the announcement was chosen for the estimation period and 5 trading days prior to, including, and following the announce is selected as the event period. The third step is to collect and organize the data which was explained in section A of this chapter. Next daily returns were calculated given the closing stock prices for each firm and the S&P market index for everyday in the estimation and event periods. Next using a simple linear regression, the estimated values for $\alpha$ and $\beta$ were calculated. Using the values of the actual returns and the predicted return values, the abnormal returns were calculated. Finally, the statistical significance for these abnormal returns were calculated to verify the values that were found.
Table 3.1 shows the results that were found for each trading day in the event window, 5 trading days before the sponsorship announcement (denoted day -5) through 5 trading days following the sponsorship announcement (denoted day 5). Table 3.1 has the values for the AAR and the CAR across all 43 of the firms in the sample for each day, t-statistics are given for the AAR, the last column represents the average of each value from trading day -5 to trading day 5. As suggested by the literature on event study analysis, there is not much statistical significance for individual trading days (Muller, S., 2015). This is because a single trading day is only one return for each firm, therefore the results are more likely to not create a normal distribution and can be random. At the 95% confidence interval, none of the trading days were found to have statistical significance, but at the 90% confidence interval trading day -5 and -1 were found to have statistically significant negative and positive returns respectively. Day -5 had an AAR of -.5607% and Day -1 had a AAR of .5591%. It is interesting that these two effects nearly balance one another out suggesting that there may be a relationship between the price movements experienced on these two trading days. It was unexpected to see a consistent negative return on trading day -5 because there is theory suggesting that there should be negative abnormal returns at a specific time before an announcement, but a consistent positive return on day -1 is consistent with the implication of the EMH in semi-strong form. Due to a select group of investors having access to the information regarding the announcement of the sponsorship that will be publicly announced the next day, one would expect the price of the stock to increase due to the expectation of the announcement having a positive impact on the stock, but as the information becomes public the news will be immediately reflected in the price of the stock and therefore will not have significant deviations and consistent price movements. Finally, by looking at the CAR for the entire event window, days -5 to 5, an overall return of -3.9916% was experienced
by the sample. Figures 3.1 and 3.2 graphs out the values of AAR and CAR for each day in the event window.

**Figure 3.1 Average Abnormal Return for Each Individual Trading Day Within the Sample**

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<thead>
<tr>
<th>Day</th>
<th>Day -5</th>
<th>Day -4</th>
<th>Day -3</th>
<th>Day -2</th>
<th>Day -1</th>
<th>Day 0</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>AVG (-5, 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAR</td>
<td>-0.5607</td>
<td>0.0163</td>
<td>0.0645</td>
<td>0.1056</td>
<td>0.5591</td>
<td>0.0678</td>
<td>0.0477</td>
<td>-0.1900</td>
<td>0.1570</td>
<td>-0.0271</td>
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<td>-0.0084</td>
</tr>
<tr>
<td>AAR T-stat</td>
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<td>0.0456</td>
<td>0.1801</td>
<td>0.2947</td>
<td>1.5607</td>
<td>0.1892</td>
<td>0.1331</td>
<td>-0.5304</td>
<td>0.4382</td>
<td>-0.0756</td>
<td>-0.9296</td>
<td>-0.0236</td>
</tr>
</tbody>
</table>

**Figure 3.1 Average Abnormal Return for Each Individual Trading Day Within the Sample**
It is interesting to consider the impact that the sponsorship announcement may have on individual trading days, the cumulative effect over a specified period of trading days within the event window yields significant results that suggest a profit opportunity that may violate the implications of the EMH. Table 3.2 reports the values of CAR and CAAR over various trading windows throughout the event window. By analyzing the CAR of single trading days throughout the event window reported in Table 3.1, a trend in which significant negative abnormal returns occurred on both trading day -5 and 5, and not on any other trading days. This suggests that the private information about the sponsorship announcement does not affect the price until 4 days before it actually occurs, and the information has become public and reflected in the price of the stock as suggested by the EMH by the fifth day after the announcement. Therefore, it was determined to be important to analyze the trends that were related to trading windows that did not include these days. By not including trading day -5 in trading periods, all abnormal returns were found to be positive. Also, every trading window tested that only considered the event window as trading days -4 to 4 was statistically significant at the 95% confidence interval, except
for the trading period of trading days -1 to 2 which was significant at the 90% confidence interval. Figure 3.3 also shows the values for each CAAR value that was computed in graphical form.

**Table 3.2 Average and Cumulative Abnormal Returns for Various Trading Windows**

**Within the Event Period**

<table>
<thead>
<tr>
<th>Trade Window</th>
<th>CAR(t1, t2)</th>
<th>CAAR(t1, t2)</th>
<th>CAAR T-stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-4, 4)</td>
<td>34.4364</td>
<td>0.8008</td>
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<td>(-3, 3)</td>
<td>34.8985</td>
<td>0.8116</td>
<td>2.2656</td>
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<tr>
<td>(-2, 2)</td>
<td>25.3746</td>
<td>0.5901</td>
<td>1.6473</td>
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<tr>
<td>(-1, 1)</td>
<td>29.0054</td>
<td>0.6745</td>
<td>1.8830</td>
</tr>
<tr>
<td>(-1, 0)</td>
<td>26.9545</td>
<td>0.6268</td>
<td>1.7499</td>
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<tr>
<td>(-1, 2)</td>
<td>20.8353</td>
<td>0.4845</td>
<td>1.3526</td>
</tr>
<tr>
<td>(-1, 3)</td>
<td>27.5854</td>
<td>0.6415</td>
<td>1.7909</td>
</tr>
<tr>
<td>(-1, 4)</td>
<td>26.4208</td>
<td>0.6144</td>
<td>1.7152</td>
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<tr>
<td>(-1, 5)</td>
<td>12.1011</td>
<td>0.2814</td>
<td>0.7856</td>
</tr>
<tr>
<td>(-4, 5)</td>
<td>20.1168</td>
<td>0.4678</td>
<td>1.3060</td>
</tr>
</tbody>
</table>

**Figure 3.3 Cumulative Abnormal Return Over Various Trading Periods**

Given the results outlined above some conclusions can be made about the hypothesis of this paper. First the analysis failed to reject the null hypothesis that a corporation who announced the purchase of a professional sports team’s stadium naming rights who experience statistically significant abnormal returns on any of the individual trading days on the day of the
announcement or any of the next 5 trading days following. There was enough statistical evidence to reject the null hypothesis when considering the cumulative abnormal returns over a period of time throughout a time period of up to 4 days prior though 4 days following the announcement; of the several windows tested, the only window that was not found to be statistically significant at the 95% confidence interval chosen was the window of trading day -1 to trading day 2 (it was significant at the 90% confidence interval). While the null hypothesis was rejected when considering trading period within 4 days prior to and following the announcement, this is still consistent with the implications of the EMH because the new information is being reflecting in the price of the asset over this period of time and by the fourth fifth and days following the announcement the abnormal return is negative suggested the new information has been reflected in the price.

V. Concluding Remarks

Considering the results that were reported above, there is indeed an effect that is both statistically and economically significant, though it does not exist strongly for individual days. This is likely due to the efficiency of security markets as suggested by Fama in his EMH. It was found that the cumulative average abnormal return for various windows within 4 days prior to or after the announcement to be both economically and statistically significant. Therefore, there exists a possibility that stock prices do not fluctuate that rapidly and therefore it may take a couple of trading days, not immediately as suggested by the EMH, for all relevant information to be fully reflected in prices. An interesting trend that was identified in the results was a consistent increase in stock prices in the few trading days prior to the announcement which is consistent
with the semi-strong form of the EMH which implies some individuals may have access to information that others do not.

The slight upward trend of abnormal returns from 4 days before the announcement until the day before the announcement where abnormal returns were exceptionally large suggests that investors view these sponsorships as a positive impact on the corporation’s value, at least immediately. For this reason, it would be interesting to extend this research in the future such that it takes into consideration some of the long-run impact on corporations. Another consideration to strengthen this research would be to include more sports such as soccer or collegiate level competition to make the sample size larger. With a sample size of only 43, outliers had a relatively strong impact on the overall results and may have had an impact on the statistical significance of individual trading days. Finally, by expanding the empirical calculations to analyze the profitability of buying and holding the stock over a certain trading window may give greater insight on the significance on these findings.
Conclusion

The overall goal of this research was to determine if announcements regarding corporate sponsorship of a professional sports stadiums had any significant impact on the expected stock returns in the 5 trading days before and after the date of the announcement to test the semi-strong form of the Efficient Market Hypothesis proposed by Eugene Fama in 1970. To do this, I first presented an understanding of why corporate sponsorship of professional sports stadiums became prevalent. This entailed analyzing other deal specific incentives that are added into these agreements such as exclusive concession rights, provision rights, or additional in stadium advertisement. By taking into consideration the historical context, a baseline comprehension of the economics driving these deals was established.

To fully understand the economic phenomenon that is occurring, a theoretical understanding of how securities prices function needed to be established. This included the Efficient Market Hypothesis which implies security markets are efficient, such that all relevant information is fully reflected in asset prices immediately. This theory exists in three different forms, which vary by the availability of information to all parties. The form that most strongly related to this situation was the semi-strong form, in which some individuals may have access to information that others do not. For example, employees of the sponsoring corporation are likely to be aware of the sponsorship before it becomes public news. Another theory that was taken into consideration was the concept of investor sentiment, which explains the many ways that investors’ mood, opinion, future expectations, etc. can affect asset prices when aggregated on the market level. Finally, a more modern version of the EMH, called the Adaptive Market Hypothesis, was described. Using an analogy to Darwinism, this theory suggests that investors
can’t necessarily “beat that market” but they can certainly lose to it. Also, it suggests that securities markets are efficient, but efficiency is not a binary attribute, meaning efficiency could be prices only reflecting a certain percentage of the relevant information, but enough that it is still priced efficiently.

Finally, given both the baseline understanding of the parties involved in these agreements as well as their incentive to partake in the deal, alongside the theoretical understanding of investors impact on asset prices, an analysis of the impact that these announcements have was conducted. Using the Market Model and the S&P500 index as a reference, predicted returns for each sponsor’s stock were computed to be able to calculate abnormal returns for each day within the time period of focus. The results of this analysis showed that there are abnormal returns on each individual trading day surrounding the announcement, but they lack statistical significance. This implies that any abnormal returns on these individual trading days were random. It was then determined that perhaps a single trading day is not long enough for a stock to have significant changes in its price, so further analysis was conducted on various time periods within the 4 trading days before and after the event (5 days before and 5 days after were found to have large negative returns). Using this methodology nearly every trading window was found to be significant both economically and statistically. With the most profitable trading window occurring from 3 days before the announcement to 3 days after the announcement where a cumulative abnormal return of 34.8189% and cumulative average abnormal return of .8116% was seen.

The findings of this paper are compatible with both the semi-strong and weak form of EMH by showing that there are positive abnormal returns across the trading days prior to the
announcement. This is due to the private information of the announcement where the entire public does not know about the sponsorship and a select group of investors are able to gain slight profits from it. Following the announcement positive abnormal return can still be seen, but they are smaller than those that occurred before the announcement date, suggesting that because this news is now public information more investors are able to gain profits from the new information. In the few trading days following the announcement these abnormal returns decrease until they become insignificant suggesting that the price of the stock has stabilized because the new information is now reflected in its price, which is what the EMH suggests when new information is released.

Some considerations for advancing this research further were identified at the end of the empirical chapter. The first of which was to expand the sample to include other sports such as soccer, automobile racing, or cricket to get a larger sample. Another possibility would be to use a reference period larger than 120 days to more accurately depict each company’s reactivity to the market. Another way to possibly strengthen the results would be to not restrict past sponsorships from the sample to be able to make it larger. Finally, expanding the empirical calculations to include measuring the profitability of a buying and holding a stock around the event period may also improve showing the effect that the sponsorship has on the price of the company’s stock.
Appendix A

This table gives each sponsor, the date of the sponsorship announcement, the alpha and beta values calculated from the linear regression, the average abnormal return across the event period, and the cumulative abnormal return across the event period. Sponsors with a * designates a sponsorship in which the stadium hosts more than one team but is still a single sponsorship and were treated as a single event. Sponsors with a ** designates that corporation sponsors more than one stadium and were treated as separate events.

<table>
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<tr>
<th>Sponsor</th>
<th>Announcement Date</th>
<th>Alpha</th>
<th>Beta</th>
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<th>CAR</th>
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<td>0.3028</td>
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<td>-0.0755</td>
<td>-1.0948</td>
<td>-12.0427</td>
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<td>-1.0215</td>
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<td>M&amp;T Bank</td>
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<td>Toronto-Domion Bank*</td>
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<tr>
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</table>
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doi:10.1007/s11002-008-9064-z

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Barclay's Center

KeyBank Center
   http://investor.key.com/Cache/1500091489.PDF?O=PDF&T=&Y=&D=&FID=1500091489&iid=100334

Scotiabank Saddledome

Bank of America Stadium
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PNC Arena

Great American Ball Park
   http://www.ballparks.com/baseball/index.htm

FirstEnergy Stadium
   date: http://www.cleveland.com/browns/index.ssf/2013/01/firstenergy_expected_to_get_na.html

Progressive Field
   http://www.ballparks.com/baseball/index.htm
AT&T Stadium: date and figures

Ford Field: date and figures

Comerica Park: date and figures

Rogers Place: date and contract length, monetary value not disclosed
   http://edmonton.ctvnews.ca/naming-rights-for-new-downtown-arena-purchased-by-rogers-communications-1.1572537

NRG Stadium: date, cost, acquisition and name change information

Toyota Center: date

Minute Maid Park: date, figures
   http://www.ballparks.com/baseball/index.htm

EverBank Field: date, figures

BMO Bradley Center: date, figures are approximate

Miller Park: non-specific date, figures
   http://www.ballparks.com/baseball/index.htm

U.S. Bank date, and figures
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Xcel Energy Center: date and figures

Target Field: date and figures
Bell Centre date and figures
http://www.cbc.ca/sports/hockey/molson-centre-renamed-bell-centre-1.323185

Gilette Stadium date and figures

MetLife Stadium

Citi Field: date and figures
http://www.ballparks.com/baseball/index.htm

Chesapeake Energy Center: date and figures
http://basketball.ballparks.com/NBA/OklahomaCityThunder/index.htm

Wells Fargo Center date, figures are complicated due to mergers and acquisitions

Citizens Bank Park
figures
http://chronicle.augusta.com/stories/2003/06/18/bas_378746.shtml#.WLjUCfnyu00

Chase Field
good info about merger and first naming rights https://law.marquette.edu/assets/sports-law/pdf/MLB.15.pdf
date

Heinz Field date and figures
https://www.newspapers.com/newspage/93300452/

PPG Paints Arena date and figures

AT&T Center date
figures https://law.marquette.edu/assets/sports-law/pdf/NBA.15.pdf
SAP Center date and figure
   http://www.bizjournals.com/sanjose/news/2013/06/05/confirmed-sap-center-new-name-for-hp.html

CenturyLink Field date and information about Qwest acquisition
   http://football.ballparks.com/NFL/SeattleSeahawks/newindex.htm

Busch Stadium date, figures were not disclosed
   http://www.bizjournals.com/stlouis/stories/2004/08/02/daily43.html

Raymond James Stadium
   figures http://football.ballparks.com/NFL/TampaBayBucs/index.htm

AT&T Park date and acquisition information
   http://www.ballparks.com/baseball/index.htm

Globe Life Park in Arlington: date and figures

Rogers Centre information about team and stadium acquisition in November 2004
   http://edmonton.ctvnews.ca/naming-rights-for-new-downtown-arena-purchased-by- rogers-communications-1.1572537

Rogers Arena date and figures
   http://hockey.ballparks.com/NHL/VancouverCanucks/index.htm
About the Author

Gary Miller is a computer science and economics double major at Allegheny College and a member of Greek life on campus as a brother of Theta Chi Fraternity. My plans after graduation are to find employment as either a software developer or data scientist with a focus on business and finance. Also, I plan to further my education after gaining a few years of work experience by studying for either an MBA or a masters of computer science.