Determining the Drivers of Acquisition Premiums in Leveraged Buyouts

Peter Connors Noonan Jr.

Dr. Ronald Leven, Faculty Advisor
Dr. Michelle P. Connolly, Faculty Advisor

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Abstract

This thesis analyzes factors that determine acquisition premiums paid by private equity firms in public to private leveraged buyouts. Building off of established literature that models the acquisition premiums paid in corporate mergers and acquisitions (M&A), this paper considers factors that influence a private equity firm's willingness to pay (referred to as reservation price) and the bargaining power dynamic between a target company and acquirer in leveraged buyouts. Specifically, multivariable regression analysis is used to quantify the impact of a target company's trading multiple, profitability, stock price as a percentage of its annual high, and number of competitors, a private equity firm's deal approach and payment method, and the financial market's 10-year US Treasury yield and high-yield interest rates at the time a transaction was announced. A sample of 320 public to private leveraged buyout transactions completed from 2000 to 2020 is constructed to perform this paper's regression analysis. Using 2008 as an inflection point, this thesis then applies the same regression model to the subperiods from 2000–2008 and from 2009–2020 to examine how these drivers have changed as a result of industry trends—increased competition, low interest rates, and new value creation investment strategies—as well as the 2008 financial crisis and US presidential election—two crucial events that caused tremendous change in the financial system and intense scrutiny of the private equity industry. From the same original transaction screen, a second sample of 659 transactions is used to perform a difference of acquisition premium means t-test to analyze how the absolute magnitude of leverage buyout acquisition premiums have changed across these two subperiods. The second sample consists of more transactions due the t-tests less data-demanding nature as a result of its fewer variables. Results of this paper's baseline model suggest that acquisition premiums are driven by a target company's trading multiple, profitability, and stock as a percentage of its 52-week high as well as the 10-year US Treasury yield and the US high-yield interest rate. Results also suggest that a target company's profitability and the transaction's sale mechanism have become significant determinants of acquisition premiums in the period from 2009–2020. Lastly, results underline that acquisitions premiums have increased over the past 20 years, but the true cause of this increase requires further exploration.

Introduction

The leveraged buyout (buyout) is integral to the private equity industry. A leveraged buyout is the main method private equity firms use to invest capital and generate profits (returns) for their investors. In a leveraged buyout, private equity firms purchase the entirety of a company (the target company), which includes the company's equity and existing debt. There are two primary types of buyouts: private to private buyouts and public to private buyouts. The former refers to when a private equity firm acquires a private company and keeps that company private. The latter refers to when a private equity firm acquires a public company and takes it private by delisting its public equity. The public to private leveraged buyout has been used to complete some of the private equity industry's largest investments. For example, in 1988 RJR Nabisco, an American tobacco and food conglomerate, was taken private for $25.1 billion by Kohlberg Kravis Roberts & Company (KKR), and in 2007 TXU Energy, a retail electricity provider, was taken private for $32.1 billion by The Blackstone Group (Mlyn, 2018). With such enormous and historic deals, the public to private leveraged buyout is viewed as an iconic transaction in the private equity industry.

When a private equity firm performs a buyout, it gains control of the target company—referred to as a portfolio company after acquisition—and uses its industry expertise and financial knowledge to enhance the business. Strategies for adding value to a portfolio company include improving operational efficiencies, divesting poorly performing assets, and growing revenue. If properly executed, these endeavors can grow the portfolio company's cash flows—thus increasing the company's value—which allows the private equity firm to eventually sell the portfolio company at a price greater than it originally purchased it for. Selling a portfolio company above its purchase price generates profits for both the private equity firm and the firm's investors. Clearly, the price a private equity firm pays to acquire a

company significantly impacts its ability to successfully generate a profit on its investment, so it is in a private equity firm's interest to pay as little as possible for a company.

Despite the motivation to pay a low acquisition price for a target company, private equity firms often pay sizeable acquisition premiums (above market price) for target companies in leveraged buyouts. In fact, this paper's data set indicates that private equity firms pay an acquisition premium as often as 94.23% of the time, and the typical (median) acquisition premium is about 22.47% in public to private leveraged buyouts. The goal of this thesis is to deepen the understanding of leveraged buyout acquisition premiums and answer the question: **What factors have driven private equity firms' payment of acquisition premiums over the past 20 years?**

Analyzing the drivers of acquisition premiums in leveraged buyouts is particularly appropriate today as the private equity industry has begun to mature and stabilize. When the private equity industry first took form in the 1980s, it was young and unproven. Terms for each transaction varied significantly, and the industry was generally viewed as a highly speculative form of alternative investment. By the year 2000, however, private equity firms managed $500 billion in assets collectively, according to EY and the Kenan Institute for Private Enterprise at the University of North Carolina at Chapel Hill, and by 2019, the private equity industry's collective assets under management amounted to $3.4 trillion, implying a compounded annual growth rate of 10.62%. Investment in the private equity industry has become incredibly commonplace.

Alongside the industry's ongoing maturation, the 2008 financial crisis and United States presidential election pose as events that have drastically impacted the industry. First, during the 2008 financial crisis, interest rates were set to record lows. Prior to the financial crisis, the average corporate high-yield bond rate was 10.26%, and after the financial crisis, the average corporate high-yield bond rate was only 7.38%, according to Bank of America's ICE High Yield Index. With the persistence of

these low interest rates following 2008, private equity firms have been able to raise debt for leveraged buyouts at unprecedented low costs. Second, Mitt Romney, co-founder of one of the largest private equity firms Bain Capital, and his 2008 presidential candidacy attracted fierce scrutiny on the industry for its alleged corporate greed, risky deals, and asymmetric distribution of rewards and losses. Treating 2008 as an inflection point, this thesis studies the private equity industry before and after 2008. In doing so, this paper discusses the question: **How have the magnitude and drivers of acquisition premiums in leveraged buyouts changed following 2008?**

To answer both questions, this paper considers factors that influence a private equity firm's willingness to pay (referred to as reservation price) and the bargaining power dynamic between a target company and acquirer in leveraged buyouts. More specifically, this paper examines the impact of a target company's trading multiple, profitability, stock price as a percentage of its annual high, and number of competitors, a private equity firm's deal approach and payment method, and the financial market's 10-year US Treasury yield and high-yield interest rates at the time a transaction was announced.

Overall, this paper's goal is to model the drivers of acquisition premiums in leveraged buyouts within the context of the *modern* private equity industry. To reach its goal, this paper relies on prior academic research, current industry trends, work experience, and intuition. The following literature review section examines the prior literature that lays the foundation for this paper's direction and analysis. The empirical specification section outlines the model established in this paper as well as the theoretical logic supporting it. The data section outlines how this paper's data sets are collected and the modifications made to them. The results and discussion section discusses the financial and economic findings of this study and their significance. The section also expands on this paper's interpretations and

implications, examines this study's limitations, and identifies potential areas of further exploration. Finally, the conclusion provides a summary of the study.

Literature Review

For such a young and privatized industry, there is a relatively strong base of academic literature on leveraged buyouts, but the academic literature on leveraged buyout acquisition premiums, specifically, is limited. Still, there is substantial prior research on corporate M&A, which shares significant overlap with leveraged buyout transactions. This paper's literature review begins by dissecting an established model explaining acquisition premiums in corporate M&A. It then discusses another established model on acquisition premiums in corporate M&A that adds greater depth to the preliminary model. This section concludes by reviewing the academic literature on acquisition premiums in leveraged buyouts. The research on corporate M&A provides a strong foundation for this paper's model and analysis, and the research on leverage buyouts builds on the foundation by introducing private-equity-specific factors.

Established Model I: Slusky and Caves (1991)

The empirical model proposed by Slusky and Caves (1991) posits that acquisition premiums arise in M&A transactions for two primary reasons: (1) an acquirer's willingness to pay due to potential increases in cash flow through the consolidation of two companies and (2) the bargaining dynamic between the acquirer and target.

(1) Slusky and Caves (1991) assert that the two primary mechanisms that can increase cash flows and consequently influence acquisition premiums in corporate M&A are synergies and majority equity ownership (Slusky & Caves, 1991). First, acquirers are willing to pay an acquisition premium for synergies because, by definition, synergies are increases in cash flow created through the integration of two companies. For example, two companies can enhance cash flow by consolidating corporate

headquarters into one building instead of two. Second, majority ownership (control of the target

company) is said to yield increases in cash flow because the acquirers may be able to enhance the target

company through superior management. For example, the acquirer's ability to design more effective

expansion plans and cost cutting initiatives can create significant value that would not have been

captured under the prior management's direction (Slusky & Caves, 1991).

(2) In addition to factors that increase cash flow, Slusky and Caves (1991) assert that an

acquirer's bargaining power contributes to the size of an acquisition premium. Slusky and Caves (1991)

claim that the primary factor of the bargaining function is the presence of competing bidders, which
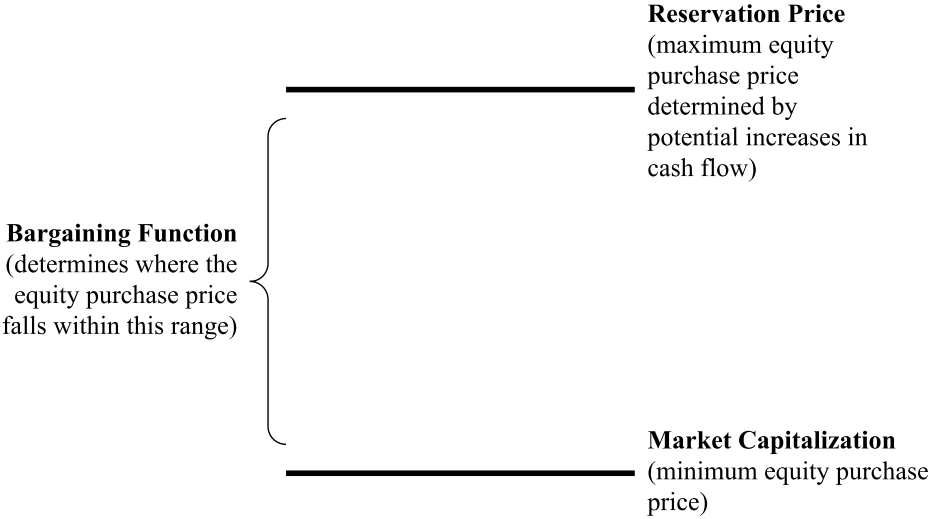
limits the bargaining power of the acquirer.

Combining the two drivers of acquisition premiums—factors that increase cash flow and the

bargaining function—Slusky and Caves (1991) derive the theoretical equation,

$$PREMIUM = (BRES[X_i]/MV)*B(Z_i)$$

for the acquisition premium in an M&A transaction (Slusky & Caves, 1991). In this equation, *BRES*

represents the acquirer's reservation price—the maximum value the acquirer would be willing to pay to

gain control of the target company. *BRES* is a function of the X_i factors that predict (1) increases in cash

flow as a result of the acquisition, such as majority ownership. *MV* represents the market value of the

target company's equity and the minimum value the target company's shareholders would be willing to

sell the target company for. *B(Z_i)* is the bargaining function, which represents the (2) bargaining power

of the acquirer. Bargaining power is a function of Z_i, which captures the factors that affect the

bargaining power of the acquirer, such as competing bidders. Ranging from zero to one, multiplying the

bargaining function by the reservation price determines the actual acquisition price (from the target

company's market value to the reservation price *BRES*). That is, *BRES[X_i]*B(Z_i)* represents the

acquisition price for the target company's equity. If a private equity firm has weak bargaining power, the

function will produce a value closer to one, and consequently, the acquisition price will be closer to the reservation price. If, on the other hand, a private equity firm has strong bargaining power, the bargaining function will produce a value close to zero, and the acquisition price will fall closer to the market value of equity. Dividing $BRES[X_i]*B(Z_i)$ by MV computes the transaction's acquisition premium. Note, the maximum possible premium is achieved when $B(Z_i)$ is one, and the minimum possible premium is achieved when $B(Z_i)$ is zero. In sum, the model from Slusky and Caves (1991) identifies that acquisition premiums arise for two primary reasons: the acquirer's willingness to pay due to increases in cash flow and the bargaining dynamic between the acquirer and target company. This analytical framework serves as the foundation for this paper's model.

Figure 1: Illustration of Reservation Price and Bargaining Function

Reservation Price
(maximum equity purchase price determined by potential increases in cash flow)

Bargaining Function
(determines where the equity purchase price falls within this range)

Market Capitalization
(minimum equity purchase price)

Established Model II: Varaiya (1987)

The model proposed by Varaiya (1987) agrees that potential increases in cash flow and the bargaining function are the two key drivers of acquisition premiums. However, Varaiya (1987) provides different factors that influence each of the two drivers.

With regard to potential increases in cash flow, which influence reservation price, Varaiya (1987) echoes the importance of control. Varaiya (1987) highlights that the undermanagement of a

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target company, referring to poor business direction under the prior management team, can significantly influence an acquirer's reservation price. This is because upon assuming control of an undermanaged target company, an acquirer can generate previously unrealized cash flow by implementing stronger business objectives and eliminating the undermanagement. Varaiya (1987) also introduces underpricing, referring to when a target company is priced at a discount—below its intrinsic value—on the public markets, as another factor that drives reservation price due to potential increases in future cash flow. Underpricing, which can occur from undeserved media scrutiny or general market panic, represents an opportunity for an acquirer. Since a company's intrinsic value is defined as the present value of all future cash flows it will produce, buying a target company below its intrinsic value will always generate additional cash flows as it is an investment with a positive net present value (Varaiya, 1987).

With regard to the bargaining function, the empirical model in Varaiya (1987) similarly underlines the importance of bidding competition by capturing bidding competition with a binary variable *COMP.* Short for competition, *COMP* is equal to zero when the acquirer is the only publicly known bidder, and *COMP* is equal to one when there is at least one other publicly known bidder competing to purchase the target company. All told, the model proposed by Varaiya (1987) differs from Slusky and Caves (1991) by noting the impact of undermanagement and underpricing on reservation price as well as by using a binary bidding competition variable to determine bargaining power.

From dissecting Slusky and Caves (1991) and Varaiya (1987), this thesis paper's model incorporates a target company's trading multiple and profitability as well as a transaction's sale mechanism into its analysis.

Factors that Determine Acquisition Premiums Paid in Leveraged Buyouts

This section of academic literature adds to the conversation by underlining factors that have been found to influence acquisition premiums paid in leveraged buyouts. This section categorizes each factor

under one of the two key drivers of acquisition premiums laid out by Slusky and Caves (1991): reservation price (determined by potential increases in cash flow) and the bargaining function.

<u>Factors that Influence Reservation Price</u>

To begin, Martos-Vila (2013) and Bargeron (2008) both find that private equity firms pay lower acquisition premiums than strategic buyers. The disparity in acquisition premiums paid is credited, in part, to the lack of synergies realized by financial acquirers.

Academic literature also discusses the role of a target company's profitability in leveraged buyout acquisition premiums. Vinten (2007) suggests that private equity firms are more willing to perform a buyout on companies with low profitability. The intuition is that private equity firms may have greater potential to create value for and enhance the profitability of target companies with initially low profitability.

<u>Factors the Influence the Bargaining Function</u>

Fidrmuc (2012) underlines an important relationship between a target company's sale mechanism and the acquisition premium paid by a private equity firm. It is found that the target company's choice between a formal auction, controlled sale, and private negotiation impacts acquisition premiums paid by acquirers (Fidrmuc, 2012).

Though the research on the factors contributing to acquisition premiums in leveraged buyouts is scarce, the findings from this category of literature are integral to this thesis. They result in the incorporation of a target company's profitability and the private equity firm's negotiation approach to the scaffolding provided by Slusky and Caves (1991).

In the end, this thesis aims to expand on the current literature surrounding M&A and leveraged buyout acquisition premiums to illustrate how characteristics of a target company, private equity firm, and overall transaction determine acquisition premiums paid in public to private leveraged buyouts.

Empirical Specification

Overview of Empirical Analysis

This paper uses multivariable regression analysis and difference of means tests to examine the drivers of acquisition premiums paid by private equity firms and how those drivers have changed over time in public to private leveraged buyouts. There are four sections of this thesis paper's analysis. In the first section, regression analysis is used to determine the drivers of acquisition premiums in public to private leveraged buyouts with transactions closed from 2000 to 2020. In the second section, an independent groups t-test is performed to identify whether the acquisition premiums have increased in the period from 2009–2020 and the period from 2000–2008. In the third section of this paper's analysis, the regression model is applied to both the period from 2000–2008 and from 2009–2020 to investigate how the drivers of acquisition premiums have change over time, and in the fourth section, exploratory analysis is conducted to further examine how acquisition premiums have changed over the past 20 years.

To perform the multivariable regression analysis in sections one and three, one model is built and applied to three time periods. This first period spans transaction closure dates from 2000 to 2020, the second period spans from 2000 to 2008, and the third period spans from 2009 to 2020. When applied to the first period, the linear multivariable regression model is intended to establish a benchmark for the drivers of acquisition premiums in leveraged buyouts. Applying the regression model to the second and third time periods allows this paper to analyze the changes in the nature of leveraged buyout acquisition premiums following the critical events of 2008 in greater detail.

Trends in the Private Equity Industry

Three key trends in the private equity industry are particularly pertinent in motivating the direction of this paper's analysis. The first is the fierce rise in competition in the private equity industry, the second is financial sector's record low interest rates, and the third is the rise in popularity of the

entrepreneurial buyout strategy. When the private equity industry began to formally take shape in the 1980s, following changes in financial regulation, few firms existed (Gordon, 2012). For the firms in operation, bidding competition for target companies was minimal and returns were high. With such attractive prospects and low competition, entrance into the private equity industry began. Even over the past two decades, the entrance of additional private equity firms has persisted. According to PitchBook, a research and technology company that specializes in the private capital markets, only 936 private equity firms existed in the United States in 2000 (PitchBook, 2015). By 2014, that figure more than doubled: 1,956 private equity firms operated in the United States (PitchBook, 2015). With so many private equity firms in the industry today, competition for target companies is fierce, and private equity firms are often interested in acquiring the same companies. When this is the case, an auction process may be organized by investment banks. Private equity firms then bid against each other in a formal process to determine the winner. During an auction process, private equity firms often drive up a target company's purchase price by repeatedly bidding and outbidding each other. Even though competition in the modern private equity industry is intense, a formal auction process is by no means required to complete a buyout. A target company may approach a single private equity firm themselves, request to be bought out, and strike a deal. In such a case, with little or no bidding competition, a target company may receive a lower purchase price. Therefore, the sale process a target undergoes can directly impact the acquisition premium paid by private equity firms. A crucial part of this paper's analysis focuses on the type of sale mechanism a target company selects.

The second trend that has impacted the private equity industry is the financial system's recent record low interest rates. During the great recession of 2008, the United States Federal Reserve set the Federal Funds Rate, the benchmark interest rate at which depository institutions lend reserve balances to other depository institutions overnight, to a target range of 0.00 to 0.25%. Just a year before, the Federal

Funds Rate sat at a range from 4.50 to 4.75% (Policy tools, 2020). Consequently, the cost of borrowing fell throughout the financial system. As of October 31st, 2019, the Federal Fund remains low, with a target range of 1.50 to 1.75% (Policy tools, 2020), and the influence of the Federal Reserve's low Federal Funds Rate target range is felt throughout the financial system. According to the Wall Street Journal's Market Data, for example, the 10-year US Treasury note's yield was 1.689% as of October 31st, 2019. Acting as benchmark rates for debt instruments, a low Federal Funds rate and 10-year US Treasury yield implies that private equity firms have been able to raise debt for leveraged buyouts at record low rates ever since the 2008 financial crisis. A fundamental portion of this paper's model will analyze how recent low interest rates have influenced private equity firms' willingness to pay acquisition premiums in leveraged buyouts.

The third trend in the private equity industry involves a shift in investment philosophy from the classic buyout strategy to the entrepreneurial buyout strategy. In the early days of the private equity industry, the classic buyout strategy dominated the private equity industry (Ayash, B., Bartlett III, R.P., & Poulsen, A.B., 2017). In a classic buyout, private equity firms highly emphasized cost cutting initiatives in the pursuit of value creation and cash flow improvements, but as the private equity industry received greater attention, particularly when Mitt Romney ran for the US presidency in 2008, it also faced intense scrutiny for its instances of mass cost cutting in the form of employee firings. Simultaneously, the industry's returns had been gradually falling over the years (Ilmanen, Anti, Chandra, & McQuinn, 2019). With the headwinds of both an image problem and declining returns, private equity firms gravitated towards a comprehensive solution, and the entrepreneurial buyout rose to prominence (Ayash et al., 2017). In an entrepreneurial buyout, private equity firms focus on revenue growth and business development to increase a target company's cash flows. Private equity firms implement a CEO-like mindset as they attempt to create value in their target companies. In a classic

buyout, undermanaged companies with relatively clear avenues for improvement in key financial performance statistics like profitability are sought after by private equity firms. This path towards value creation is of less focus in entrepreneurial buyouts. Therefore, to understand the drivers of acquisition premiums and how they have changed, this paper will consider the impact of a target company's profitability on acquisition premiums paid in leveraged buyouts. Overall, these three trends—increased competition, low interest rates, and the rise of the entrepreneurial buyout—motivate several of the explanatory variables included in this thesis's regression model.

Regression Model Dependent Variable: Acquisition Premium

To begin, the acquisition premium paid for target company i by private equity firm j is calculated as,

$$premium_{ij} = (equitypurchaseprice_{ij} - equitymarketvalue_i)/equitymarketvalue_i,$$

where *premium$_{ij}$* represents the acquisition premium paid for target company i by private equity firm j. Similarly, *equitypurchaseprice$_{ij}$* represents the purchase price paid for target company i's equity by private equity firm j, and *equitymarketvalue$_i$* represents the market value of equity for target company i one month prior to the announcement of the buyout. A private equity firm paying a purchase price for target company i (*equitypurchaseprice$_{ij}$*) that is greater than target company i's market value of equity (*equitymarketvalue$_i$*) creates a positive acquisition premium.

The explanatory variables used to describe the variation in *premium$_{ij}$* in this paper's regression model are split into three categories. The first category captures the variables that affect a private equity firm's willingness to pay (also known as reservation price—driven by potential increases in cash flow), and the second category captures variables that affect the bargaining function. A third category of variables is included in this paper to control for extraneous variables.

Regression Model Explanatory Variables: Reservation Price

This paper's model includes four explanatory variables that are hypothesized to influence a private equity firm's willingness to pay an acquisition premium in leveraged buyouts. The four variables describing reservation price are as follows:

- *tradingmultiple$_i$*: the EV/EBITDA ratio (enterprise value divided by EBITDA) for target company i. Derived from previous academic literature, this variable captures the market's valuation of target company i prior to the leveraged buyout performed by private equity firm j. That is, *tradingmultiple$_i$* indicates how many dollars investors are willing to pay for each dollar of EBITDA the company generates. *Tradingmultiple$_i$* is expected to be negatively associated with acquisition premiums because private equity firms should be willing to pay a higher premium for a target company with a lower EV/EBITDA ratio that appears to be trading at a discount.

- *EBITDAmargin$_i$*: the EBITDA/revenue ratio for target company i. Derived from previous academic literature and industry trends, this variable captures target company i's profitability for the last twelve months prior to the leverage buyout performed by private equity firm j. *EBITDAmargin$_i$* is expected to be negatively correlated with acquisition premiums because a private equity firm should be willing to pay a higher premium for a target company with significant room for improvement in operational efficiency (van der Hijden, 2016). This variable's coefficient is expected to be more negative in magnitude during the pre-2009 period than the post-2009 period as the private equity industry shifted more heavily towards the entrepreneurial buyout strategy following 2008.

- *10yearUSTreasuryyield$_{ij}$*: the 10-year US Treasury note yield the month private equity firm j announced the buyout of target company i. Derived from private equity industry trends, *10yearUSTreasuryyield$_{ij}$* is expected to be negatively associated with acquisition premiums because a lower 10-year US Treasury yield likely indicates that a private equity firm can raise the transaction's debt at lower, more cost effective rates.

- *UShighyieldindexrate$_{ij}$*: Bank of America Merrill Lynch's high-yield corporate bond interest rate the month private equity firm j announced the buyout of target company i. Derived from the private equity industry's trends and van der Hijden (2016), *UShighyieldindexrate$_{ij}$* is expected to be negatively associated with acquisition premiums because a lower high-yield interest rate would allow the private equity firm to finance the transaction at lower, more cost effective rates.

Regression Model Explanatory Variables: Bargaining Function

This paper's model includes three explanatory variables that are hypothesized to influence the bargaining function for acquisition premiums in leveraged buyouts. The three variables describing bargaining power are as follows:

- *stockpercentageof52weekhigh$_i$*: target company i's stock price as a percentage of its 52-week trading high. Derived from prior classroom experience, this variable is hypothesized to be negatively associated with the acquisition premium paid by private equity firm j. Equity trading at a high may be overvalued relative to the target company i's intrinsic value, so the company's shareholders may be more agreeable to a low acquisition premium offer from an acquirer.

- *natureofbid$_{ij}$*: a dummy variable that categorizes the manner in which private equity firm j placed a bid for target company i. Derived from previous academic literature and industry trends, this variable serves as a proxy for both the transaction sale mechanism and amount of bidding competition. It equals one if private equity firm j's bid was solicited and zero if private equity firm j's bid was unsolicited. *Natureofbid$_{ij}$* is expected to be negatively associated with acquisition premiums because an unsolicited bid means the target company did not anticipate selling itself and the private equity firm could also be facing intense bidding competition for the target company (Sell-side process, 2020).

- *sqrtcompetitors$_i$*: the square root number of competitors target company i has in its market. Derived from previous academic literature (Lynn, 1991), *sqrtcompetitors$_i$* is expected to be negatively associated with acquisition premiums because a unique, scarce, and differentiated target company with no competition likely commands a higher acquisition premium from private equity firms. A target company with

numerous competitors likely has lower bargaining power because it faces greater industry competition, and the private equity firm may have interest in purchasing one of the target company's comparable competitors instead.

Regression Model Fixed Effects

Sector fixed effects are included in this paper's model as control variables. The inclusion of sector fixed effects allows this paper to analyze the drivers of acquisition premiums in leverage buyouts across sectors. For a variety of reasons, certain sectors may naturally be more attractive to private equity investors and command higher acquisition premiums. Therefore, including sector fixed effects allows this paper's regression model to more accurately quantify the impact of the explanatory variables on acquisition premiums paid in public to private leveraged buyouts.

Assembled Regression Model

The empirical model employed is described below:

1) $premium_{ij} = \beta_0 + vectorofreservationpricevariables_{ij} + vectorofbargainingfunctionvariables_{ij} + \beta_8(Sector\ Fixed\ Effects_i) + \beta_{ij}$

where,

- $vectorofreservationpricevariables_{ij} = \beta_1 tradingmultiple_i + \beta_2 EBITDAmargin_i + \beta_3 10yearUSTreasuryyield_{ij} + \beta_4 UShighyieldindexrate_{ij}$

- $vectorofbargainingfunctionvariables_{ij} = \beta_5 stockpercentageof52weekhigh_i + \beta_6 natureofbid_{ij} + \beta_7 sqrtcompetitors_i$

Data

The transactions collected for the analysis in this thesis paper are a set of public to private leveraged buyouts with transaction close dates between January 1_{st} 2000 and February 17_{th} 2020. All transactions are collected from Capital IQ, which is a market intelligence platform designed by Standard & Poor's, an American financial information company that provides research and analysis on public and

private companies. The transactions in the data set for this study are filtered through Capital IQ's screening process with the following parameters: (1) leveraged buyout, (2) going private transaction, (3) all transactions closed from January 1st, 2000 to February 17th, 2020, and (4) total transaction greater than $200 million. The timeline range of 2000 to 2020 is chosen for three primary reasons. Number one, the years from 2000 to 2020 are the most recent years available to study, so the range includes the transactions that follow the characteristics of the three trends in the modern private equity industry that are relevant to this study. Number two, including 20 years of public to private leveraged buyouts in the data set returns a significant amount of transactions: 727, and number three, the range from 2000 to 2020 provides the data set with a balance of observations before and after 2009: 343 and 384, respectively.

From the 727 transactions in the screen, two data sets are created. The first data set is formed to analyze the differences in premium magnitude from 2000 to 2008 and from 2009 to 2020. The second data set is formed to apply the model proposed in the previous section. To create the first data set, 68 transactions are removed from the initial screen. Sixty-six transactions are removed due to missing acquisition premiums, and two outlier transactions are removed from the data set for having acquisition premiums greater than 500%, representing transactions with extremely unique circumstances. After filtering out the 68 transactions, 659 transactions remain in the first data set that include each transaction's acquisition premium and year, which are the required data points for the desired analysis. A total of 284 transactions are observed from 2000 to 2008, and 375 are observed from 2009 to 2020, providing the data set with an equal balance of observation across time periods.

To form the second data set, 407 transactions are removed from the original screen because they either lack the information necessary for this paper's regression model or have negative EBITDAs—representing an atypical candidate for a leveraged buyout. Each regressor removes roughly an equal

amount of transactions, and after removing the 407 transactions, 320 transactions remain, forming the second data set. Particularly for academic research on the private equity industry, where a data set of less than 100 transactions is common, this study has a sufficient amount of data and instances to run a proper multivariable regression model and draw meaningful inferences.

To create the variables necessary for the regression model, a myriad of data points are collected about the target company, the private equity firm, and the transaction itself. For a target company, its competitors, market capitalization (1 day prior to the transaction announcement), net debt (at announcement), LTM EBITDA (at announcement), LTM revenue (at announcement), stock as a percentage of its annual high, and sector are collected. For a private equity firm, its acquisition premium paid (1 month prior to announcement) and deal approach (unsolicited or solicited) are collected. Regarding characteristics of the transaction itself, the announcement date, closing date, total transaction value, and implied enterprise value to EBITDA ratio (IEV/EBITDA) are collected.

It is important to note that $premium_{ij}$ is calculated with target company i's market capitalization one month prior to the announcement of the transaction. Keown and Pinkerton (1981) show that large corporate transactions, such as acquisitions can distort the share price of the target company. Distortion effects typically begin up to 12 days prior to the transaction announcement date and should be avoided to accurately quantify the determinants of acquisition premiums in public to private leveraged buyouts. $Tradingmultiple_i$ is calculated with target company i's market capitalization one day prior to the transaction announcement due to limitations on Capital IQ.

Monthly data on Bank of America Merrill Lynch's high-yield corporate bond index and the 10-year US Treasury yield to maturity is collected from FRED Economic Data and multpl, respectively, which are two economic information databases. Each transaction is matched with the corresponding high-yield bond interest rate and 10-year US Treasury yield to maturity based on the month and year the

transaction was announced. After collecting this information, the data set necessary for the regression

analysis is complete.

Table 1: Summary Statistics of Acquisition Premiums in Data Set One

Time Period	Obs	Mean Acquisition Premium	Std. Dev.
2000–2020	659	30.24	40.74
2000–2008	284	25.31	34.46
2009–2020	375	33.98	44.60

Results and Discussion

Table 2: OLS Regression on Acquisition Premiums Results

VARIABLES	(1) 2000–2020 premium	(2) 2000–2008 premium	(3) 2009–2020 premium
Trading Multiple	0.33*	1.31*	0.23
	(0.18)	(0.76)	(0.18)
EBITDA Margin	-41.87**	-37.85	-42.48*
	(19.02)	(33.05)	(22.98)
US 10-Year Treasury Yield	-6.15***	-4.76	-0.99
	(2.17)	(8.43)	(4.48)
US High-Yield Index Rate	6.68***	5.03**	9.13***
	(1.36)	(2.26)	(1.79)
Stock as a % of 52-Week High	-0.52***	-0.66***	-0.41***
	(0.13)	(0.24)	(0.15)
Nature of Bid	-7.48	-6.45	-11.45**
	(4.55)	(10.24)	(5.03)
Square Root of Competitors	-0.59	0.21	-0.79
	(0.92)	(1.83)	(1.07)
Constant	49.10***	53.98	14.85
	(17.44)	(48.83)	(23.25)
Observations	320	130	190
R-squared	0.23	0.18	0.29
Adj. R-squared	0.18	0.07	0.22
Number of sectors	11	9	10

Standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 3: 2000–2008 and 2009–2020 Periods Independent Groups Acquisition Premium t-Test Finds a

Larger Average Acquisition Premium in 2009–2020 Period at a Statistically Significant Level

Results	Value
t-stat	2.718
p(|T| > |t|)	0.007
p(T > t)	0.003

As the empirical specification section notes, there are four parts of analysis in this paper: applying the regression model to the baseline period from 2000–2020, performing the difference of means test on the average acquisition premium from 2000–2008 and from 2009–2020, applying the regression model to the 2000–2008 and 2009–2020 periods, and performing the exploratory analysis on the change in acquisition premiums over the past 20 years.

Analysis Part I: Baseline Regression on Acquisition Premiums from 2000–2020

The results of the model when applied to the baseline time period from 2000–2020 are displayed in Table 2. Regression (1) lists the coefficients for each variable included in the regression, describing their effects on acquisition premiums in public to private leveraged buyouts. Each variable's standard error is listed in parenthesis below its respective coefficient.

Reservation Price Explanatory Variables

Trading Multiple

The trading multiple coefficient of the target company is significant at a critical value of 0.10 with a magnitude of 0.33, but the sign is opposite as expected. A target company's trading multiple may be positively associated with acquisition premiums because the EV/EBITDA multiple can be an indicator of growth potential. A private equity firm may be willing to pay a higher acquisition premium for a company with promising growth prospects because strong growth prospects could lead to multiple expansion and an increase in the target company's cash flow. Although it means a higher cost per dollar

of EBITDA, a high EV/EBITDA ratio may indicate the potential for a high sale value at the end of the investment horizon.

EBITDA Margin

The target company's EBITDA margin coefficient is significant at a 0.05 critical value with a magnitude of -41.87. The coefficient's sign is as expected. EBITDA margin is likely negative because a target company with initially low profitability may exhibit opportunity to meaningfully improve its operations and become more cash flow generative, as noted by van der Hijden (2016). Private equity firms are, therefore, often willing to pay higher premiums for companies with operational inefficiencies or a lack of cost discipline.

10-Year US Treasury Yield

The 10-year US Treasury yield coefficient is statistically significant at a 0.01 critical value with a magnitude of -6.15 and is in the predicted direction. The 10-year US Treasury yield is viewed as a benchmark security for other debt instruments (Chen, 2020), so a lower 10-year US Treasury yield places downward pressure on the interest rates of the debt instruments private equity firms use in leveraged buyouts. Namely, the 10-year US Treasury yield will influence bank-issued term loans, which often fund the majority of a private equity firm's debt raised in a leveraged buyout. With lower interest rates, the target company's debt will be less expensive. The company will produce higher cash flows, pay down debt faster, and consequently boost the private equity firm's returns. Private equity firms should be willing to pay a higher acquisition premium for a target company when they can borrow at more inexpensive rates.

US High-Yield Index Rate

The US high-yield index rate coefficient is statistically significant at a 0.01 critical value with a magnitude of 6.68. The coefficient's sign is opposite as expected. The fact that the US high-yield index

rate is positively associated with acquisition premiums is quite strange as a higher interest rate represents a cash flow consumptive expense. Van der Hijden (2016) finds the same result and is unable to justify the association. Currently this paper has no explanation for this association as well.

<u>Bargaining Power Explanatory Variables</u>

Stock as a Percentage of 52-Week High

The coefficient for the target company's stock as a percentage of its 52-week trading high is statistically significant at a 0.01 critical value with a magnitude of -0.52, which is in the predicted direction. This makes sense because a target company with its stock trading at a low percentage of its 52-week high would likely require a private equity firm to provide a sizeable acquisition premium to convince the target company's shareholders to sell the business. The target company's shares may only be trading at a low price due to negative media attention, an overblown idiosyncratic event, or general market panic. In such a case, the intrinsic value of the target company would likely remain constant and shareholders may be inclined to hold on to their equity ownership unless presented with a compelling offer. On the other hand, if the target company's stock is trading near its 52-week high, the target company's argument for demanding a large acquisition premium is far weaker. Due to its high trading price, the target company may be overvalued (or close to it). In such a case, the target company's shareholders may be inclined to sell the company at a low premium to realize the value of their equity appreciation.

Nature of Bid

The coefficient for the dummy variable for the nature of the private equity firm's bid (unsolicited or solicited) is not statistically significant, though it is in the predicted direction with a magnitude of -7.48. A private equity firm should be able to pay a lower acquisition premium when its bid is solicited

primarily because a solicited bid implies that negotiation talks are anticipated by the target and external competition for the target company could have been limited.

Square Root of Competitors

The coefficient for the square root of the number of competitors was statistically insignificant and minimal in magnitude, despite being in the predicted direction. A target company with a larger peer set likely has less bargaining power due to the higher competition it faces and its lower uniqueness as a business. Regardless, this intuition was not supported at a statistically significant level in this instance.

Overall, the results of regression (1) indicate that certain aspects of a private equity firm's willingness to pay, such as the target company's trading multiple and EBITDA margin and the financial market's 10-year US Treasury yield and high-yield index rate, influence acquisition premiums. Additionally, certain aspects of the bargaining function, particularly the target company's stock as a percentage of its annual high, are associated with the acquisition premiums a private equity firm pays for a target company.

Analysis Part II: Difference of Acquisition Premium Means Test

The difference of acquisition premium means t-test for the 2000–2008 and 2009–2020 periods is used to determine if broader industry trends—increased competition, low interest rates, and the rise of the entrepreneurial buyout strategy—as well as the 2008 financial crisis and presidential election lead to higher overall acquisition premiums in the private equity industry. The results of the independent means t-test appear in Table 3. The average acquisition premium from the pre-2009 period (25.31%) is less than the average post-2009 acquisition premium (33.98%) as predicted. Table 3 shows that the difference in magnitude is statistically significant with a 0.01 critical value.

The prediction was based on the three trends within the private equity industry today: the increase in competition, the financial sector's record low interest rates following the financial crisis, and

the rise in popularity of the entrepreneurial buyout strategy. As competition within the buyout space has grown over the years, auction processes have become more competitive, as interest rates have decreased, the cost of acquisition has become cheaper for private equity firms, and as the entrepreneurial buyout strategy has emerged, private equity firms have identified strategies to unlock greater value from their acquisitions. Because the first trend reduces a private equity firm's bargaining power and the second and third trends create potential for increases in the target company's cash flow (and, thus, increase a private equity firm's willingness to pay), all three trends should contribute to the higher acquisition premiums from 2009–2020. The next section of this paper's discussion will shed more light on the differences in acquisition premiums across the two time periods.

Analysis Part III: Regression from 2000–2008 and 2009–2020

The results for the model when applied to the periods from 2000–2008 and from 2009–2020 are displayed in Table 10. Regression (2) is formed by applying the model to the 2000–2008 period and regression (3) is formed by applying the model to the 2009–2020 period. Regressions (2) and (3) list the coefficients for each variable included in the regression, describing their effects on acquisition premiums in public to private leveraged buyouts. Each variable's standard error is listed in parenthesis below its respective coefficient.

Reservation Price Explanatory Variables

Trading Multiple

The target company's trading multiple coefficient is statistically significant at a 0.10 critical value in regression (2), but its sign is opposite as expected with a magnitude of 1.31.

EBITDA Margin

The target company's EBITDA margin coefficients are in the predicted direction for both regressions (2) and (3). However, the EBITDA margin coefficient is only statistically significant at a 0.10 critical value in regression (3) with a magnitude of -42.48.

10-Year US Treasury

The 10-year US Treasury yield coefficients are statistically insignificant in regressions (2) and (3) despite being in the predicted direction.

US High-Yield Index Rate

The US high-yield index rate coefficients are statistically significant in both regressions (2) and (3) at a 0.05 and 0.01 critical value, respectively. However, the coefficients' signs are opposite as predicted.

Bargaining Power Explanatory Variables

Stock as a Percentage of 52-Week High

The coefficients for the target company's stock price as a percentage of its 52-week trading high are statistically significant in both regressions (2) and (3) at a 0.01 critical value with magnitudes of -0.66 and -0.41, respectively. The coefficients are in the predicted direction.

Nature of Bid

The nature of the bid coefficients are in the predicted direction for both regressions (2) and (3). The nature of bid coefficient is statistically significant at a 0.05 critical value for regression (3) with a magnitude of -11.45.

Square Root of Competitors

The coefficients for the number of competitors are not statistically significant in either regression.

Overall, in regression (2), the target company's trading multiple, the US high-yield index rate, and the target company's stock as a percentage of its 52-week high are shown to be associated with acquisition premiums in leveraged buyout transactions. Regression (3) illustrates that the target company's EBITDA margin, the US high-yield index rate, the target company's stock as a percentage of its 52-week high, and the nature of the private equity firm's bid are shown to be associated with acquisition premiums in leveraged buyout transactions.

Compare and Contrast of Regressions (2) and (3)

Regressions (2) and (3) exhibit several important differences between each other, which can be used to draw inferences on how the private equity industry has changed as a result of broader industry trends and the 2008 financial crisis. The critical differences between regressions (2) and (3) are that the target company's trading multiple is associated with acquisition premiums in regression (2) and that the target company's EBITDA margin and the nature of the private equity firm's bid are associated with acquisition premiums in regression (3). Currently, this thesis is unable to identify a connection between the target company's trading multiple and any of the three trends in the private equity industry. Similarly, the significance of the target company's EBITDA margin seems to oppose prior research findings that the entrepreneurial buyout has become more prevalent over the past decade (Ayash et al., 2017). At the same time, the most recent year in the data set from Ayash et al. (2017) was 2013. Perhaps, then, this is evidence that the primary leveraged buyout strategy has once again evolved. Perhaps now a strategy that focuses equally on EBITDA margin improvements and revenue growth is the most common leveraged buyout transaction. Further research could be conducted on this question to identify if the primary buyout strategy has once again evolved. Though the first two distinctions between regressions struggle to connect with the private equity industry's recent trends, the significance of the nature of the private equity firm's bid in regression (3) does suggest that the high entrance rate of new

private equity firms has driven acquisition premiums higher as auction processes have become more

competitive. When a bid is unsolicited (nature of bid is equal to zero) the purchase offer is not

anticipated by the target company, and an auction process through investment banks is likely organized,

which induces a competitive process that increases acquisition premiums. In 2020, with more private

equity firms in the industry than ever, auction processes likely inflate acquisition prices to an even

greater extent than in the past.

Analysis Part IV: Exploratory Analysis on the Increase in Acquisition Premiums

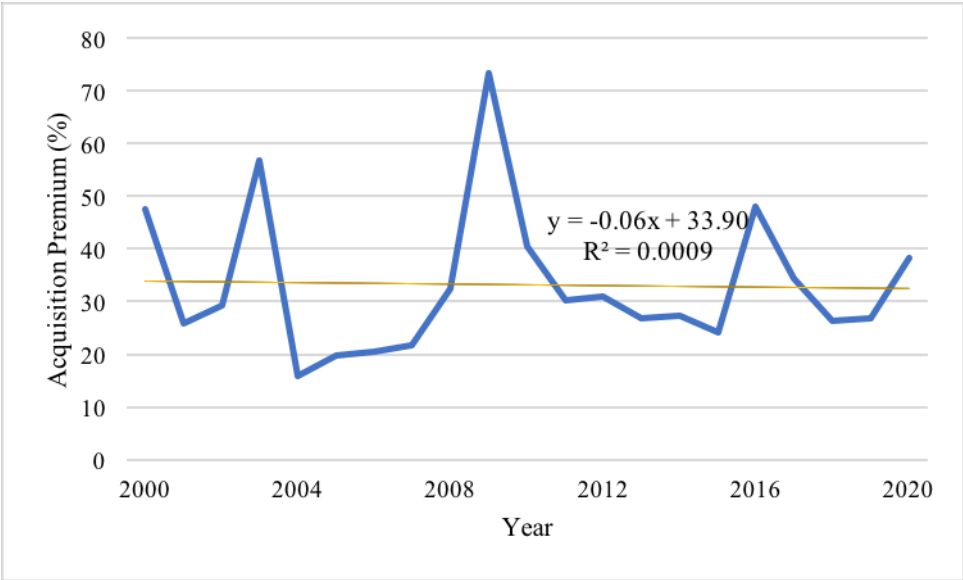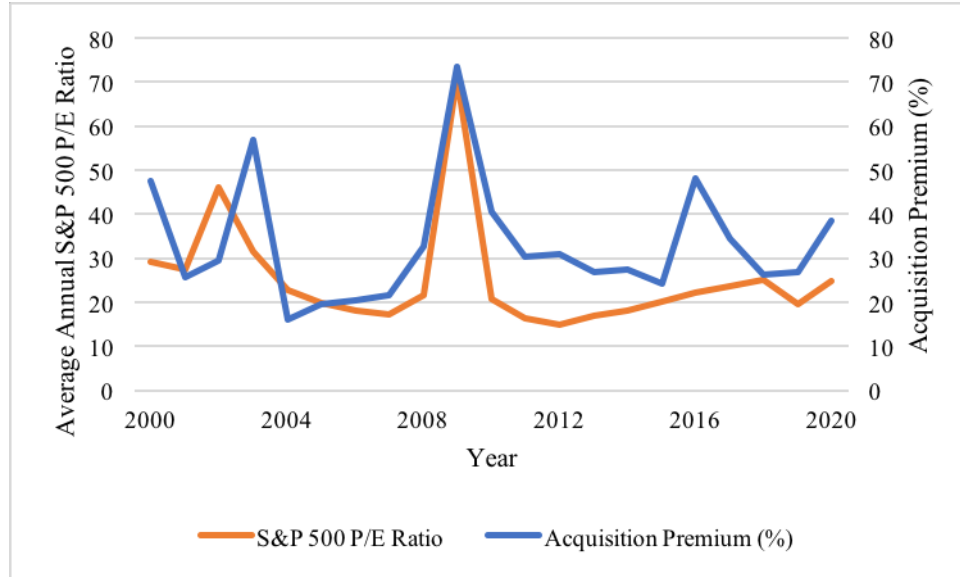Figure 2: Acquisition Premium vs. Year

Figure 3: Average Annual S&P 500 P/E Ratio and Acquisition Premium vs. Year

Though the analysis performed in section two indicates that acquisition premiums have increased over the past 20 years as a result of industry trends and the events of 2008, Figure 2 illustrates that the increase in acquisition premiums does not follow a robust trend line, which would be more characteristic of acquisition premiums increasing due to broader industry trends. Instead, historical average acquisition premiums follow a peak and trough pattern over the past 20 years. As depicted in Figures 3 and 5, acquisition premiums appear to be highly correlated with the performance of the equity market. This result is consistent with the findings of the regression analysis, too, because the target company's stock as a percentage of its annual trading high is statistically significant in all three regressions. This graphical representation of acquisition premiums over time hinders the hypothesized influence of the three private equity industry trends' influence on acquisition premiums, but further research could be conducted on periods of calmer equity markets to determine if the three industry trends influence acquisition premiums in leveraged buyouts in the absence of significant equity volatility.

Overall Implications

The significance of the target company's trading multiple and EBITDA margin in this thesis paper's baseline regression underlines a private equity firm's desire to identify and acquire target companies with promising future growth potential and operational improvements. The significance of the US 10-year Treasury yield, the US high-yield index rate, and a target company's stock as a percentage of its annual high also demonstrates a private equity firm's acute awareness of the financial capital markets. When benchmark debt instruments are at attractive rates, private equity firms are willing to pay more to complete a buyout. Private equity firms also understand the implication of a target company's stock trading history on acquisition premiums.

Additionally, from the perspective of a target company and its shareholders, this paper's analysis highlights that an auction process organized through investment banks can be an effective tool for sale price maximization, particularly in the today's hypercompetitive private equity industry. Private equity firms, on the other hand, should prioritize forming relationships with corporations and their management to minimize auction participation, create a noncompetitive deal-making process, and achieve lower acquisition purchase prices.

Finally, the analysis performed in this paper underscores a core element of all business negotiations: both sides must come to an agreement. A target company's shareholders must sign on the light which is dotted for the transaction to close. The significance of this point is underlined by the strong and consistent correlation between a leveraged buyout's acquisition premium and the target company's stock as a percentage of its 52-week high.

Interpretation of R-Squared Values

Each regression's R-squared and adjusted R-squared value is provided in Table 2. Model (3) has the highest R-squared value of 0.29. The R-squared values are low, which means that only a small

proportion of the variance in acquisition premiums is explained by the model constructed. Though the predictive capabilities for regressions (1), (2), and (3) are, in fact, low in terms of absolute magnitude, their R-squared values are relatively standard if not above average for alternative models describing M&A and leveraged buyouts—large, complex corporate transactions.

Limitations in Quantitative Data

Though this thesis paper gathers and develops a robust data set relative to other research performed on the private equity industry, it is not perfect. The nature of bid dummy variable, for example, served as a proxy for bidding competition. Having data on the exact number of bidders would have made for a stronger, more exact variable. A larger data set would have been beneficial too, particularly when analyzing acquisitions premiums in the subperiods from 2000–2008 and 2009–2020.

It would have also been interesting to include the percentage of debt used to finance the transaction and the proportion of intangible assets on the target company's balance sheet as drivers of acquisition premiums. A higher percentage of debt should be positively associated with acquisition premiums because a private equity firm would be required to invest less of its own capital. Similarly, a higher proportion of intangible assets should also be positively associated with acquisition premiums because intangible assets often carry tax benefits, which makes them cash flow generative.

Limitations in Qualitative Data: The Complexity of Leveraged Buyout Transactions

Leverage buyouts are incredibly complicated transactions. The lifetime of a transaction cycle is typically several months and involves countless hours of company due diligence, the counsel of law firms, and the second opinions of consulting firms. Though the information, variables, and model in this thesis provide explanation of the variation in acquisition premiums in leveraged buyouts, the analysis is, for the most part, unable to capture one of the most important aspects of leveraged buyout analysis: the qualitative data.

The analysis performed in evaluating the viability and prospects of a leverage buyout is often regarded as both an art and a science. It is a science because understanding the quantitative aspects of a leveraged buyout are critical, but the qualitative information, the art, is equally important, if not more important. Henry Kravis, one of KKR's founding members, once said in a Talks with GS interview that "[i]nvesting is a movie. It's a series of still shots. It is not a photograph" (Goldman Sachs, 2017). Kravis highlights that investing is an incredibly dynamic process, and a typical model, built primarily from static quantitative information only provides a single snapshot (Goldman Sachs, 2017). When determining purchase price, the deal landscape can change rapidly and negotiations scenarios can escalate quickly. Beyond the static quantitative information, the drivers of acquisition premiums are complex and dynamic, but they are still an essential part of the equation.

Porter's Five Forces, designed by Michael Porter, for example, is a famous framework used to analyze the qualitative aspects of a business (Figure 4). While, this thesis paper includes important qualitative-oriented data points such as the target company's number of competitors and the private equity firm's deal approach, there is always difficulty in quantifying qualitative information into a single number with absolute precision. Future research should further emphasize quantifying and incorporating qualitative information when studying the drivers of acquisition premiums in leveraged buyouts.

Figure 4. Graphical Representation of Porter's Five Forces

Bargaining Power of *Suppliers*

↓

Threat of → (*Industry*) ← Threat of
New Entrants   Rivalry   Substitutes

↑

Bargaining Power of *Buyers*
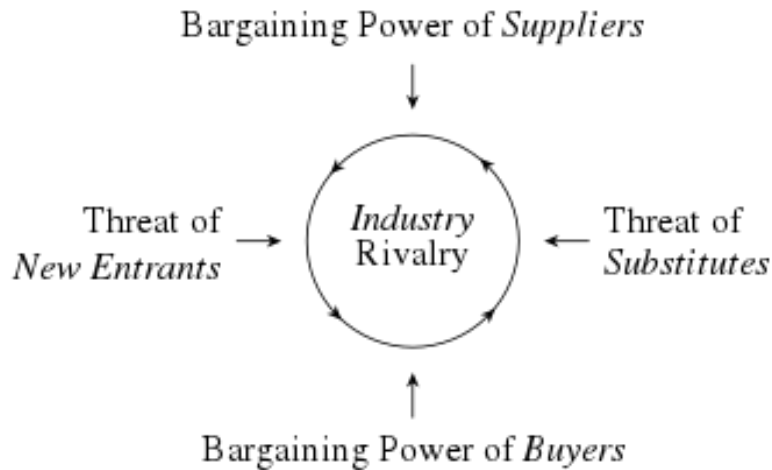
Conclusion

This paper analyzes factors that influence a private equity firm's willingness to pay (referred to as reservation price) and the bargaining power dynamic between a target company and acquirer in leveraged buyouts. Specifically, analysis is performed to quantify the impact of a target company's trading multiple, profitability, stock price as a percentage of its annual high, and number of competitors, a private equity firm's deal approach and payment method, and the financial market's 10-year US Treasury yield and high-yield interest rates at the time a transaction was announced on acquisition premiums from the year 2000 to 2020. Analysis is also performed on two subperiods from 2000–2008 and from 2009–2020 to identify how the magnitude of acquisition premiums have changed and how the importance of these drivers have changed over the past two decades. Existing academic literature studies the drivers of acquisition premiums in M&A transactions, but the literature on the private equity industry, particularly the drivers of acquisitions premiums in leveraged buyouts, is limited. This thesis paper constructs a data set of public to private leverage buyout transactions to answer these questions, examine the drivers of acquisition premiums, and understand how the drivers have shifted as a result of the 2008 financial crisis and election as well as broader industry trends.

This paper finds that the certain aspects of a private equity firm's willingness to pay (driven by potential increases in cash flow), such as the target company's trading multiple and EBITDA margin and the financial market's 10-year US Treasury yield and high-yield index rate, influence acquisition premiums. Additionally, one aspect of the bargaining function, particularly the target company's stock as a percentage of its annual high, is associated with the acquisition premium a private equity firm pays for a target company. Hypothesized to be a result of three key trends in the private equity industry, this paper also finds there to be a statistically significant difference between the average acquisition premium paid from 2000–2008 and from 2009–2020. Applying this paper's regression model to the periods from 2000–2008 and from 2009–2020 further underline some of the shifts in private equity firms' approach to performing a buyout. Namely, a target company's trading multiple is uniquely associated with acquisition premiums from 2000–2008, and a target company's EBITDA margin and the nature of a private equity firm's bid are uniquely associated with acquisition premiums from 2009–2020. The statistical significance of the nature of a private equity firm's bid from 2009–2020 suggests the influence of sale mechanism and bidding competition for target companies in leveraged buyout acquisition premiums. Nevertheless, the exploratory analysis performed highlights that acquisition premium increases over the past 20 years may be coincidental as they appear to be highly correlated with stock market performance.

Overall, several drivers of acquisition premiums are uncovered in this paper's analysis, but further research should be conducted to understand the true cause of the increase in acquisition premiums in the private equity industry over past 20 years.

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Appendix

Table 2: Summary Statistics of Continuous Variables for Baseline Time Period (2000 – 2020)

Variable	Obs	Mean	Std. Dev.	Min	Max
Trading multiple	320	11.32	11.96	0.73	148.06
EBITDA margin	320	0.17	0.12	0.00	0.79
US high yield index rate	320	7.74	1.87	5.48	18.47
10 year US Treasury yield	320	3.35	1.14	1.53	6.10
Stock 52 week high	320	82.50	18.10	3.13	100.00
Square root of competitors	320	4.17	2.35	1.00	15.59

Table 3: Summary Statistics of Continuous Variables for Pre-2009 Period (2000 – 2008)

Variable	Obs	Mean	Std. Dev.	Min	Max
Trading multiple	130	9.92	5.19	2.64	39.79
EBITDA margin	130	0.18	0.12	0.01	0.79
US high yield index rate	130	8.63	1.77	6.97	17.79
10 year US Treasury yield	130	4.57	0.44	3.57	6.10
Stock 52 week high	130	85.19	17.67	10.89	100.00
Square root of competitors	130	3.63	2.13	1.00	12.45

Table 4: Summary Statistics of Continuous Variables for Post-2009 Period (2009 – 2020)

Variable	Obs	Mean	Std. Dev.	Min	Max
Trading multiple	190	12.28	14.86	0.73	148.06
EBITDA margin	190	0.17	0.12	0.00	0.67
US high yield index rate	190	7.12	1.69	5.48	18.47
10 year US Treasury yield	190	2.51	0.58	1.53	3.85
Stock 52 week high	190	80.66	18.21	3.13	100.00
Square root of competitors	190	4.54	2.42	1.00	15.59

Table 5: Distributions of Categorical Variables for Overall Time Period (2000 – 2020)

Variable	Freq.
Nature of bid	
Unsolicited	220
Solicited	100
Sector	
Communication services	20
Consumer discretionary	72
Consumer staples	15
Energy	10
Financials	1
Healthcare	48
Industrials	45
Information technology	88
Materials	15
Real estate	2
Utilities	4

Table 6: Distributions of Categorical Variables for Pre-2009 Period (2000 – 2008)

Variable	Freq.
Nature of bid	
Unsolicited	109
Solicited	21
Sector	
Communication services	10
Consumer discretionary	37
Consumer staples	5
Energy	6
Financials	0
Healthcare	16
Industrials	17
Information technology	26
Materials	9
Real estate	0
Utilities	4

Table 7: Distributions of Categorical Variables for Post-2009 Period (2009 – 2020)

Variable	Freq.
Nature of bid	
Unsolicited	111
Solicited	79
Sector	
Communication services	10
Consumer discretionary	35
Consumer staples	10
Energy	4
Financials	1
Healthcare	32
Industrials	28
Information technology	62
Materials	6
Real estate	2
Utilities	0

Figure 5: Average Annual S&P 500 Inflation Adj. Index and Acquisition Premium vs. Year