What Determines Leverage in Leveraged Buyouts?
An Examination of U.S. LBO's and Capital Structure

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Abstract

This paper examines leverage in United States private equity led LBOs. The dataset used is a unique, self-constructed sample of 45 United States private equity sponsored buyouts completed between 2006 and 2014. Through a series of regressions, I find that classical capital structure theories and debt market liquidity do not explain leverage in LBO's. Due to limitations the data set that I constructed proved to be not large enough to come to any significant conclusions. The only significant variable that determines leverage multiples in U.S. LBO's is the ratio of fixed assets to total assets. This thesis finds that the signs and coefficients are similar to previous empirical research, but they are all insignificant in terms of the regression analysis. It could be concluded that there are too many variables and external factors that determine the leverage multiple in leverage buyouts.

KEYWORDS: Leveraged buyout, leverage, leverage multiple, private equity

JEL CLASSIFICATION: G32 - Financing Policy; Financial Risk and Risk Management; Capital and Ownership Structure; G24 - Investment Banking; Venture Capital; Brokerage

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ON MY HONOR, I HAVE NEITHER GIVEN NOR RECEIVED
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Signature

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Introduction

In the world of leveraged finance, little is known regarding what determines the amount of leverage a firm takes on during a leveraged buyout (LBO). This paper examines what potential, if any, variables that determine the amount of debt a firm acquires in a leveraged buyout. The objective of this paper is to provide new evidence on the drivers of leverage in U.S. private equity sponsored LBO's between the years 2006 to 2014. In this paper I try to explain the leverage multiples in LBO deals with variables that represent firm size, collateral value of assets, profitability, growth potential, which for the purpose of this paper we will refer to as the classical capital structure theory, and debt market liquidity. Furthering previous empirical research, I intend to come to conclusive results about the potential drivers of leverage in LBO deals.

The findings of this paper reveal that only one variable is statistically significant when explaining leverage in U.S. private equity sponsored leveraged buyout deals. The ratio of fixed assets to total assets, indicates that the more assets a firm has the higher the leverage multiple will be when completing an LBO. The regression results indicate that this variable is negatively related to leverage, which contradicts previous findings. All other variables that are considered drivers of leverage, classical capital structure and debt market liquidity, do not have a statistically significant effect on leverage. The statistically insignificant variables could be attributed to the fact that the data set that was uniquely constructed was not large enough to come to any significant conclusions to reject the null hypotheses. It could also be said that there are no specific company financial drivers that can explain leverage multiples in LBO deals. Although the regressions proved to be insignificant, the signs of the coefficients tell us something about the data.

All of the findings in this paper proved to be statistically insignificant and fail to reject any null hypotheses. I find that leverage multiples are higher for secondary LBO's rather than primary ones. I find that leverage levels are higher for deals where the lead sponsor group is in the top 50 private equity groups in the world based on the amount of capital raised by the firm. I also find that leverage multiples for the years during the recession of 2007 are in fact higher than deals completed after the recession. In regards to leverage levels across different industries, I find that leverage levels in healthcare, industrials, materials and consumer staples differ from each other and that healthcare can attract the highest leverage levels. As stated before, these findings are statistically insignificant due to the limitations provided from the dataset.

A leveraged buyout is when a company is taken from the public market to the private sector through an acquisition, with the transaction being mostly financed with debt. Appendix A contains a table of key words and a road map of a typical LBO that will make this paper easier to understand. Financing decisions for every company is different because each company operates differently and has specific finances to the firm that determines different leverage multiples. The financing for a typical U.S. LBO is primarily funded with 60 to 70% debt and 30-40% equity, hence the name leverage buyout. Axelson, Jenkinson, Stromberg and Weisbach (2010) find that the average deal in their sample raises 69% of its capital through debt of various forms and has ratios of debt to EBITDA at 6.9 times, representing the average amount of in an LBO. The various forms of debt are leveraged loans, high yield bonds and revolving credits, which are used to refinance the capital structure of the target LBO company. The major groups are involved throughout the LBO process: the target company and or acquiring company, the

sponsor(s) group who funds the equity portion, and the investment bank(s) who fund the debt portion of the deal. All of these groups play an important role in the capital structure decisions of a company that completes a leveraged buyout.

The leveraged buyout transaction is different than a typical management buyout due to its use of high leverage. A company leverages itself through assets, by way of borrowed funds, which is the debt portion of the deal. Most companies that complete an LBO have a credit rating that is non-investment grade, which means any rating below a BB+ according to Standard & Poor's rating agency (Standard & Poor's). The reason proper leverage multiples is so vital to an LBO deal, is that the leverage needs to be representative of the amount of debt a company can pay back under their current operating conditions. For example, if company X takes on too much leverage, it may not be able to repay the debt under their current payment plan and operations, running the risk of filing for bankruptcy. This paper will examine the potential drivers of leverage in U.S. private equity sponsored leveraged buyouts.

Over the past 35 years, the LBO market has been experiencing trends in the amount of debt financing a deal requires and the capital structure choices a firm makes. Leveraged buyouts were first brought to the market in the early 1980's because the public market issued high yield bonds, which gave way to the financing of the debt portion of the deal. During this era, debt was actually almost at 100% and not the 70% we have come to know today, indicating a shift in the LBO market. Mehran and Peristiani (2013) find that average deal sizes of LBO's continued to grow over time as the size of LBO's stretched from $359 million to $1.5 billion in 2000 and 2006 respectively. The volume of deals has gone down since the 1980's due to specific rules and regulations that deterred

financial sponsors from providing funds for transactions. Until around mid 2007 however, growth in LBO activity was primarily due to an effect of favorable macroeconomic conditions, low global risk-free interest rates and the abundance in market liquidity. Mehran and Peristiani (2013) find that the emergence of asset-based securitization changed the funding of LBO's from high yield bonds a combination of the later and syndicated leveraged loans. The shift of funding is attributable to the fact that companies are now collateralizing their loans against their own assets, so they now have to be careful when taking on too much debt, which could be detrimental to the business. Current market conditions for leverage buyouts are bouncing back to where the market was before the recession of 2007. During the recession of 2007 and 2008, the LBO market was no different than any other market in the fact that the market declined until about 2009 when the economy started to regain its health.

Financial research on the capital structure of companies is widely studied due to its complex and historically useful nature. However, what this thesis examines is relatively unexplored, as only three empirical studies about the drivers of leverage levels in LBO's exists. Brinkhuis and Maesenerie (2007) examine the drivers of leverage in leveraged buyouts from a European point of view. The idea for this thesis is a continuation of their work as my thesis applies similar methods and variables to distinguish potential drivers of leverage in U.S. LBOs.

I intend to explore new areas of research and expand on old areas as well. Along with classical capital structure and debt market liquidity, I am interested in seeing the difference in leverage levels across different areas. First, I want to explore whether or not the lead private equity sponsor in the deal has an effect on leverage. I will also investigate

whether the type of deal, primary or secondary, has an effect on leverage multiples. Lastly, I will be exploring to see if leverage levels differ depending on the industry and whether multiples differ depending on whether the company completed an LBO during the recession or not.

This paper proceeds as follows. Section 2 presents the literature review. Section 3 outlines the research methodology and data. Section 4 discusses the empirical results that are presented and section 5 is the conclusion.

Literature Review

There have not been many studies done on what determines leverage in leveraged buyouts, more specifically in the U.S., due to data availability. Brinkhuis and Maesenerie's (2007), try to determine what drives leverage in European deals according to classic capital structure theory, debt market liquidity and private equity involvement. The authors find that firm size, profitability, growth potential and collateral asset value all have a significant effect on firm leverage in their peer group of companies. For the author's regression results for LBO leverage and the same classical capital structure determinants as their public peer group, they find that no variables have a significant effect. Their regression of LBO leverage on classical determinants reported an R square of .1006, or 10%, and all variables were negatively related to leverage. When running the regressions for debt market liquidity as well as the classical determinants of capital structure, the R square value is .1022 with all data still being negatively related to leverage levels. The regression is more significant as a whole with the added variable of debt market liquidity. Brinkhuis and Maesenerie's (2007) conclude that with the inclusion of debt market conditions, the non-significant influence of the classical capital structure determinants on LBO leverage do not change. Instead, they do however show that the leveraged loan spread has a significant effect on leverage and that capital structure choice in LBO's is affected by prevailing debt market conditions.

Brinkjuis and Maesenerie's (2007) results show that average debt multiple levels change over time and that the capital structure choice in LBOs is affected by prevailing debt market conditions, which is supported by Demiroglu and James' (2007) findings. Brinkhuis and Maesenerie (2007) have support for their findings as their results show that

the leveraged loan spread had a significant and negative relationship to LBO leverage and the high yield bond spread had a insignificant negative relation to LBO leverage. Axelson et al. (2007) also tries to understand leverage levels in terms of debt market liquidity and classic capital structure theory by running a regression with the two. Axelson, Jenkinson, Stomberg and Wesibach (2010) consider that pricing in buyouts is related to high yield spread. The spread has a negative and statistically significant impact on the pricing and leverage of LBOs. They also find that leverage and pricing in buyouts are highly correlated, which does not have that much significance to this paper but is still interesting when considering LBO financing. In summary, debt market conditions, rather than firm specific factors are the primary driver of leverage in buyouts. The results show that the high yield spread was the only variable that had statistical significance when determining leverage, (Axelson, Jenkinson, Stomberg and Wesibach, 2010).

It will be interesting to determine whether or not the more reputable private equity firms will be able to offer higher leverage than less reputable firms. Brinkhuis and Maesenerie (2007) determine whether a firm is reputable or not by the total amount of capital raised. The top 50 firms are assigned a dummy variable that represents whether or not the firm is reputable by this measure. They find that the private equity party involved in the transaction has an effect and that the more reputable firms can attract higher leverage levels. Kaplan and Stromberg (2008) find empirical evidence that private equity firms do provide assistance to companies through capital structure changes, management incentives and corporate governance. In the regressions for their thesis they find that for the 1980's, the ratio of operating income to sales increased by 10 to 20%, and the ratio of cash flow to sales increased by roughly 40%. In another study, Demiroglu and James

(2007) examine whether the reputation of the acquiring private equity group has any relationship to the financing structure and valuation of leveraged buyouts. They find that buyouts sponsored by high reputation private equity groups pay narrower bank loan spreads, have fewer and less restrictive financial loan covenants, use less traditional bank debt and borrow more and at a lower cost from institutional loan markets.

Along with the reputable nature of the private equity firm involved in the transaction, this paper will explore whether leverage multiples differ for primary or secondary deals. Brinkhuis and Maesenerie (2007) find that leverage levels are significantly higher for secondary deals rather than primary ones which contradicts Axelson's et al.'s (2007) previous findings that there were no differences between primary and secondary deals. All the variables mentioned above would be interesting to look at in terms of determining the drivers of leverage multiples in LBO deals.

Free cash flow (FCF) is a potential driver of leverage that banks look at when considering an LBO candidate. As a determinate FCF indicates the amount of cash a company is able to generate after using all the money to maintain or grow their asset base. FCF is vital to an LBO candidate because the company needs sufficient free cash flow in order to repay the debt. Nikoskelainen (2006) explains that low volatility is important when looking at free cash flow because banks and sponsors can determine whether or not the company will be able to repay the debt and that the free cash flow reported on the cash flow statement is not random. Lehn and Poulsen (1989) find that free cash flow is positively related to a firm's decision to do an LBO indicating it is an important factor when considering an LBO and leverage. Free cash flow, otherwise known as liquidity, provides a company with the ability to explore investment

opportunities and other strategic options. The more free cash flow that a company generates, the more debt that the company is likely to take on.

Leverage multiples differ across industry due to certain industry characteristics. Some industries are heavily reliant on assets, while others with little overhead aren't. An asset dependent company would be in the industrials industry, as they manufacture a good that requires heavy machinery and equipment. Bradley et al. (1984), Harris and Raviv (1991) both show that firms within the same industry have and hold on to specific leverage levels over time.

Capital structure choices for firms have been a topic that is studied by scholars for some time. Along with the previous empirical research provided in this section, I intend to expand on the topic of leverage determinates in U.S. private equity sponsored leveraged buyouts.

Data & Methodology

Data

All data used is from CapitalIQ.com, an online financial database. The sample size is 45 US companies that underwent either a primary or secondary leveraged buyout between the years 2006 and 2014. This number differs from Brinkhuis and Maesenerie's 124-sample size because they had the ability to look closely at deals through private banks' information; more data was available to them. I believe that the dataset is somewhat representative of the leveraged buyout market in the United States due to the size and industry differences of the companies. Arriving at the 45 companies was not easy, as information for LBO deals in the U.S. was limited. Most companies do not report their financial information during their private takeover, so this is why the sample size is smaller than what I had anticipated. In order for a company to be used in this unique dataset, all financial information needed to be reported to complete the dataset and the transaction needed to be a public to private transaction (PTP). To understand how a typical LBO deal works with it's moving parts, there is a road map located in the appendix that demonstrates the different parts to the complex financing takeover with is a leveraged buyout.

I constructed the dataset by running a screen for the companies using CapitalIQ.com, which had unique criteria. The company needed to be a United States company and trade on either the NYSE or NASDAQ, both before the deal and after the deal was completed. Companies considered then needed to be either a primary or secondary LBO between the years 2006 and 2014. Brinkhuis and Maesenerie's (2007) data set is from the years 2000 to 2007 which differs than mine. I wanted to see what

LBO activity has been like in the most recent years as opposed to the years before the most recent recession because it is more relevant to investors today. Using a dummy variable that represents if an LBO deal was completed during the recession or not, I will be able to examine the effect a recession has on leverage levels. Mehran and Peristiani (2013) state that buyout activities have reemerged over the last few years and that the LBO market has performed considerably better after the most recent financial crisis than it did in any other downturn.

I proceeded to complete my dataset by filtering a screen to find companies that were in four different industries: consumer spending, materials, healthcare and industrials. These four industries are representative of the market as a whole because the industries that were chosen are not similar to one another. The reasoning for specifying the industry is to determine whether the leverage levels in different industries are higher than other industries. Brinkhuis and Maesenerie (2007) did not report different drivers of leverage with respect to industry, which is why I wanted to go on and expand the data further.

The screen generated 2000 companies that were potential candidates for the dataset. In excel, I was able to filter the list by deleting companies who did not have either their EBITDA or Total Debt amounts reported for specific years. The EBITDA and Total debt are important numbers because this is the leverage of a company, EBITDA over total debt. The companies who did have enough financial information to fill out the dataset were chosen along with all the criteria mentioned above. The list shrank to 110 companies, which were then cut down to 45 companies due to the availability of financial information.

On CapitalIQ.com, I began collecting data based on the year the company went from a public company to a private one through a LBO. By looking at when a company went private, we can gather the financial data needed from financial statements for the company. The data for what determines leverage levels were all done on the first marking period before the company went private. Then the variables that make up leverage, debt and EBITDA, were collected after the transaction because the fundamental purpose of the paper is to find the drivers of the leverage after the transaction was finalized. This was calculated for the marking period after the deal was completed when the company is taken private. The variables used for the linear regressions are firm size, profitability, growth potential, collateral value of assets, free cash flow and debt market liquidity. For information on the income and cash flow statements, the last twelve months data was collected for a specific variable, and I reported the quarterly data for items located on the balance sheet.

For the information on private equity firms, I recorded whether or not the LBO was a primary or secondary transactions, to see what the difference is in terms of leverage multiples. I applied a dummy variable to determine if the deal was either primary or secondary, using a 0 and 1, respectively. I also wanted to see if the private equity firms involved in the transaction that are considered more reputable can attract higher leverage multiples than firms that are not as reputable. From CapitalIQ.com, I was able to record the lead private equity firm for that specific LBO transaction. Then, I ranked the firms that were in the dataset by the amount of capital raised for their fund. I sorted this data by using a dummy variable, 0 if the firm was in the top 50 private equity firms in the world,

and 1 if they were not. I use capital raised because the more money a firm has, the more influence and assets the firm has to help a company grow.

I also applied dummy variables to the industry classification and the year that the LBO was completed. For industries, dummy variables were assigned for healthcare, consumer staples, industrials and material companies with a number from 0 to 3, respectively. Also I assigned dummy variables to the year that the LBO was completed, meaning when the company went from PTP. A dummy variable with the value of 0 represents a company that completed the transaction during the years from 2006-2009, representing the years of the recession, and a value of 1 represents companies that completed an LBO after 2009.

The last section of data that is needed to complete the data set is the high yield spread to mimic the conditions in the debt market. Data for the spread for high yield bonds is collected from FRED (Federal Reserve Economics Database). I collected the daily spread of high yield bonds for the years of 2006-2014. I was unable to collect data regarding the leverage loan spread, due to data availability. Brinkhuis and Maesenerie (2007) find a significant negative relation between the leveraged loan spread and leverage.

Model

For this paper I will be running a linear regression to determine the drivers of leverage in a U.S. private equity sponsored leveraged buyouts. The model for this thesis is based off of Brinkhuis and Maesenerie's (2007) model for determining leverage in European buyouts. To test the hypotheses presented in this thesis, the model is:

$$LeverageMultiple = \beta_0 + \beta_1 ROA + \beta_2 FirmSize + \beta_3 PBRatio + \beta_5 FreeCashFLow + \beta_6 CVA + \beta_7 DebtMarketLiquidity$$

Hypotheses

The hypotheses for this paper have been derived from previous empirical work and from new areas of research that this thesis explores.

Primary hypothesis.

1. Classical capital structure theory and debt market liquidity do not explain leverage multiples of LBO companies.

Secondary hypotheses.

2. *Leverage multiples are not the same in recession and post recession deals.*

3. There is no difference between the leverage multiples of primary and secondary LBO deals.

4. No difference will be recorded for leverage multiples of companies in different industries.

5. Leverage multiples are the same across industries.

The rest of this section will outline the variables chosen for the model and will explain why they were chosen. The select set of variables in this study comes from prior research and from industry professional valuation methods.

Description of Variables

Dependent variable

Leverage multiple.

The EBITDA multiple, or leverage multiple, is a great proxy of leverage for LBO practitioners. Debt divided by EBITDA or the leverage multiple is representative of the

companies ability to meet its financial obligations, which includes repaying debt. This is an industry standard that banks and sponsors use during the deal process of LBOs. Brinkhuis and Maesenerie (2007) use this number as one of their dependent variables in their model.

Independent variables

Firm size.

The firm size is used as a driver of leverage because firm size relates to the size of a company according to its sales. The larger a company is the lower the transaction cost is when issuing debt, which will lead to higher leverage levels (Warner, 1977). The most common proxy for firm size is sales, which is what this paper will use.

Collateral value of assets.

I proxy the collateral value of assets (CVA) of a company by using the ratio of fixed to total assets. The proxy is based off of previous work, which has found that there is a positive relation between collateral and leverage (Long and Malitz, 1985). The CVA proxy determines the security that creditors have in case a company defaults or goes bankrupt and is unable to pay its debt (Jensen and Meckling, 1976). The more collateral a company has, the more debt it can take on because they are putting their assets up against the debt they take out.

Growth potential.

Growth potential of a company is represented by the price-to-book ratio (P-T-B ratio) of a company. Empirical work has found a significant negative relation between a firms growth opportunities and its leverage (Demiroglu and James 2007). In many LBO's the banks involved in the deal will have financial covenants that the target company needs to follow. Some restrictions may limit the investing opportunities of a company, as well as require the company to pay back the debt with any profit that the company generates. The negative relationship to leverage is especially true with firms that have high P-T-B ratios because they are more financially distressed and are expected to take on less debt. P-T-B ratio is use to compare a stock's market value to it book value. A low P-T-B ratio may mean that the stock is undervalued at the time of the acquisition. Investors in leveraged finance use the measure of undervalued stocks as a good indicator that a company will be a successful LBO candidate.

Profitability.

The profitability variable is crucial when determining a good LBO candidate because a firm needs to be profitable in order to repay the debt that is used to finance the transaction. Return on assets (ROA) is used as a proxy for a firm's profitability, which indicates how profitable a company is relative to its total assets. ROA indicates how well a company is converting the money it has to invest into net income. The higher the ROA of a company is, the better because the company is earning more money on less investment. Previous empirical work has found a negative correlation between profitability and debt financing (Titman and Wessels, 1988). I use this as a proxy, as well as free cash flow, to assess the firm's ability to generate good business.

Free cash flow.

I decided to add free cash flow (FCF) because when a firm is considered for an LBO, analysts look at different financial information such as free cash flow to determine the company's ability to generate cash (Lehn and Poulsen, 1989). Cash is very important in an LBO deal because it is used to pay back the debt that was issued. The higher the amount of free cash flow a company has, the more debt they will be able to take on. I am using the ratio of free cash flow to total capital to make this variable relative across companies and industries.

Debt market liquidity.

I use debt market liquidity to represent activity in the debt markets. A proxy for this is the spread of high yield bonds because this is one of the variables that trade on the debt market. Since I was unable to collect data regarding the leverage loan spread, high yield bonds will be the proxy used. Longstaff et al. (2005) finds that credit spreads, stem from the liquidity in capital markets, making the high yield spread an appropriate proxy. The proxy for debt market liquidity has been used in previous empirical studies by Brinkhuis and Maesenerie (2007), Axelson et al. (2007) and Demiroglu and James (2007).

Private equity firm reputation.

The private equity (PE) firm involved in the transaction has great value when it comes to determining leverage. More reputable firms will be able to offer companies more leverage based on the amount of capital they have and the expertise of the firm. More

experienced and deeper pocketed firms should be able to make the companies they invest in more successful than before the LBO, which will allow the company to repay larger amounts of debt. Kaplan (1989) and Brinkhuis and Maesenerie (2007) find empirical evidence that the operating performance of companies purchased through a leveraged buyout is largely positive when a reputable private equity group is involved. A dummy variable is assigned to deals where the lead arranger was one of the top 50 private equity groups in the world.

Primary vs. secondary deals.

Brinkhuis and Maesenerie (2007) distinguish primary and secondary buyouts as former LBO firms that are bought out by another private equity firm. It will be interesting to see if primary deals and secondary deals differ in leverage levels as practitioners believe that leverage levels in secondary deals are on average higher. The reasoning behind this is that the first private equity group realized much of the returns and the only way for the second private equity firm to make a profit is to maximize leverage. A dummy variable is assigned to a company depending on the type of LBO deal it was, either primary or secondary.

Recession vs. post recession deals.

A dummy variable will be used to represent whether a company completed an LBO either during or after the recession. I believe that the leverage levels for companies that

completed an LBO after the recession of 2007 are higher than levels of companies that were completed during the recession because the economy is growing and regaining it's health.

Industry classification.

Empirical evidence has stated that leverage multiples differ among industries. Bradley et al., (1984) Brinkhuis and Maesenerie, (2007) Harris and Raviv (1991) all show that firms within the same industry have and hold on to specific leverage levels over time. Industries vary in leverage levels because some industries may be more capital intensive than others. A dummy variable is created to represent the four different industries in this thesis, healthcare, industrials, materials and consumer staples.

Going along with classical capital structure theories and debt market liquidity, the variables above should be able to accurately determine what drives leverage in U.S. LBO's. Classical capital structure theory explains all of the variables listed above except debt market conditions and the dummy variables that will be applied to different regressions.

Once the model and hypotheses were established, I ran a series of linear regressions on the program STATA, which is standard when running regressions with regard to capital structure (Brinkhuis and Maesenerie, 2007, Demiroglu and James, 2007). Correcting for heteroskedasticity, I ran a robust linear regression. Running regressions to test my hypotheses was simple, but when I was running the regressions the data set proved to be two small. I was unable to bi-sort the data, due to data limitations,

which can control for the dummy variables that represent the different variables I am testing with respect to LBO leverage levels. Since I was unable to bi-sort, I had to tabulate the dummy variables to test them against leverage levels of LBO's and see how they compare to the other dummy in the same category. The results to the regression analysis are reported in the next section of this paper.

Results

Statistics

The fundamental model of this paper is tested using linear regressions, and uses the leverage multiple as the dependent variable. Testing for multi-collinearity problems first, a correlation matrix for the variables and indicates that no variables were highly correlated to one another.

Table 1.
Correlation Matrix of Variables

	Debt/ EBITDA	Sales	PTBratio	FixedAssets/ TotalAssets	ROA	FCF/ TA	Hyspread
Debt/EBITDA	1.000						
Sales	0.219	1.000					
PTBratio	-0.068	-0.263	1.000				
FixedAssets/ TotalAssets	-0.246	0.442	-0.222	1.000			
ROA	0.196	0.563	-0.271	0.105	1.000		
FCF/TotalAssets	-0.161	-0.086	-0.043	0.036	0.045	1.000	
Hyspread	-0.042	-0.019	0.028	-0.075	0.219	0.002	1.000

Notes: Above is a correlation matrix of the variables that are used in the model. Debtebitda is the leverage multiple and represents the leverage multiple of a firm after an LBO. Sales are recorded as revenue and represents the size of the firm. Ptbratio is the price-to-book ratio and represents the growth potential of a firm. Fixedassets is the ratio of fixed assets to total assets and represents the collateral value of a firm's assets. Returnonassets is the ROA of a firm and represents the profitability of a firm. Hyspread is the spread on high yield bonds in the debt market and represents debt market liquidity. Fcf/ta is the ratio of free cash flow to total assets and represents the amount of free cash flow that a firm has.

The dataset that was collected for this thesis proved to be too small because there was no conclusive evidence from the linear regression results. Some coefficients had similar signs to previous empirical works but the p-values and t-statistics proved that the information was statistically insignificant. Table 2 lists out the summary statistics for variables of the collected data for the 45 observations.

Table 2.
Summary Statistics of Variables

Variable	Obs.	Mean	Std. Dev.	Min	Max
Debt/EBITDA	45	6.3562	2.7355	1.21	16.04
Sales	45	0.0424	0.0632	-0.18	0.20
PTBratio	45	4.8809	37.7512	-74.82	240.05
FixedAssets/TotalAssets	45	0.2144	0.1826	0.01	0.71
ROA	45	0.0402	0.0639	-0.07	0.30
FCF/Total Capital	45	3614.9290	7343.9170	56.80	43841.00
Hyspread	2129	6.4262	3.5600	2.41	21.82

Notes: Above is a table that summarizes the data collected by the independent variables. Debtebitda is the leverage multiple and represents the leverage multiple of a firm after an LBO. Sales are recorded as revenue and represents the size of the firm. Ptbratio is the price-to-book ratio and represents the growth potential of a firm. Fixedassets is the ratio of fixed assets to total assets and represents the collateral value of a firm's assets. Returnonassets is the ROA of a firm and represents the profitability of a firm. Hyspread is the spread on high yield bonds in the debt market and represents debt market liquidity. Fcftotalassets is the ratio of free cash flow to total capital and represents the amount of free cash flow that a firm has.

The mean leverage multiple for the dataset is 6.3 times debt/EBITDA. The rest of this section outlines the results from the hypotheses that were stated earlier in the paper.

Discussion

Classical capital structure theory and debt market liquidity and the relationship to LBO leverage.

Table 3 is the regression analysis of the classical capital structure theory and debt market condition as potential drivers of LBO leverage. Brinkhuis and Maesenerie (2007) find that classical capital structure theory has explanatory power with respect to leverage of a control group of public companies. The authors also find that none of the classical capital structure determinants exhibit a significant effect on leverage multiples in LBO's. This is similar to the findings of this thesis that the classical determinates and debt market liquidity is not statistically significant enough to either reject or accept the null hypothesis. For this regression, we fail to reject the null due to data limitations and statistically insignificant coefficients.

The first regression produces an R^2 value of .21 and a F statistic of 3.80 which indicates the data explains 21% of the model. The only statistically significant variable

that the model produces is the -6.29 coefficient of fixed assets to total assets, or CVA. This would imply that a 1unit increase in the collateral value of assets of a firm results in a 6.29 unit decrease in leverage levels. This finding is related to Grossman and Harts (1980) findings that collateral and debt financing are negatively related. When the collateral value of a firms assets is high, the advantage of debt financing disappears. Debt financing disappears because debt providers, investment banks, use collateral to exercise their power, meaning they will put up their as many of their assets as they can as collateral against the debt the company takes out.

Firm size is the second most significant variable in regards to the amount of leverage a firm takes on. With a p-value of 0.063, or 93.7% confidence, the increase in leverage based off of the size of a firm is an extremely small positive relation with a coefficient of .00012. Although it is somewhat significant, the value is not significant enough to come to a conclusive answer to reject the null hypothesis. The coefficient implies that the larger the size of the target company, the higher the leverage multiple is by a very small margin. The rest of the variables in the model are not significant according to their t-statistics and p-values, but the signs of the coefficients are interesting to point out.

The growth potential of a firm, or price-to-book ratio, has a negative coefficient in relation to leverage of an LBO. This is because firms that undergo an LBO may have financing restrictions if they take on debt that may limit the growth opportunities they have (Myers, 1977). The sign of the coefficient is similar to previous research, but we cannot come any closer to rejecting or accepting the null hypothesis based off of the statistically insignificant variable (Brinkhuis and Maesenerie, 2007).

The higher the amount of free cash flow a LBO company has, should result in a higher leverage multiple. The regression results do not support this reasoning because the negative statistically insignificant coefficient contradicts previous empirical work (Brinkhuis and Maesenerie, 2007). The coefficient of -3.288 is not significant with a t statistic of -0.32. It is likely that there are enough data points to accurately predict this variable as a driver of leverage in LBO's.

Return on assets, used to measure the profitability of a firm, is also not significant. I believe that the data causes issues for this variable because ROA should have a negative relation to leverage, not a positive one which the regression in table 3 indicates.

Consistent with previous findings, the coefficient for the high yield spread is negative, although it is statistically insignificant. Since it is insignificant it is once again not a conclusive variable, but the sign of the coefficient relates to the idea that when debt is cheaper, the amount of debt issued is higher than when debt is more expensive.

With the data provided in this paper, leverage in LBOs cannot be explained by classical capital structure theory and debt market liquidity. Too many external factors contribute to leverage multiples, which could be an explanation for the regression results in table 3.

Table 3.
Regression Results for Classic Capital Structure Theory and Debt Market Liquidity

		R^2 Value:	0.2162
		F Statistic:	3.8

Variable	*β*	*SE*	*t*
Sales	0.0001299	0.0000677	1.92
PTBratio	-0.00423327	0.00696	-0.61
Fixed Assets/Total Assets	-6.290166*	2.543826	-2.47
FCF/Total Capital	-3.288369	10.25878	-0.32
ROA	2.158824	12.57506	0.17
Hyspread	-2.489987	2.432948	-1.02

Note. Significance *p < .05. **p < .01. ***p < .001

Notes: Above is the linear regression results of the classical capital structure determinates and debt market liquidity with respect to a firms leverage. Debtebitda is the leverage multiple and represents the leverage multiple of a firm after an LBO. Sales are recorded as revenue and represents the size of the firm. Ptbratio is the price-to-book ratio and represents the growth potential of a firm. Fixedassets is the ratio of fixed assets to total assets and represents the collateral value of a firm's assets. Returnonassets is the ROA of a firm and represents the profitability of a firm. Hyspread is the spread on high yield bonds in the debt market and represents debt market liquidity. Fcftotalassets is the ratio of free cash flow to total capital and represents the amount of free cash flow that a firm has. *B represents the coefficient of the variable. SE represents the standard error of the coefficient. T represents the t statistic of the coefficient measuring its significance.*

Recession Years and the Relationship to LBO Leverage.

Leverage levels during the recession and leading up to it, will have higher leverage levels than post recession years. This is due to the fact that large amounts of debt were issued to companies who were unable to pay it back with high interest rates. Using the dummy variable yeardummy1, the regression results in table 4 demonstrate the effect of companies who completed an LBO during the recession with leverage multiples. The results indicate that leverage levels are .756 units higher when a company completed an LBO during the recession, as opposed to companies who completed one post recession. This relationship is recorded even though it is not statistically significant with a t-statistic of 1.23. Since it is insignificant, the data fails to reject the null hypothesis even though the sign of the coefficient of the variable relates to previous research. A reason for leverage multiples being higher during recession years is that banks and

sponsors were giving companies too high of leverage multiples during their evaluations. Post recession leverage multiples were more conservatively evaluated due to the fear that companies may not be able to pay back the debt that they issued. The average LBO leverage multiple for the 20 observations for years during the recession is 6.73 times debt to EBTIDA. The average LBO leverage multiple for the 25 post recession year observations is 6.04 times debt to EBITDA.

Table 4.
Regression Results for Leverage During Recession and Post Recession Years

R^2 Value:	0.23
F Statistic:	3.41

Variable	*β*	*SE*	*t*
Sales	0.0001311	0.0000666	1.97
PTBratio	-0.0033432	0.0072259	-0.46
Fixed Assets/Total Assets	-6.521162*	2.538659	-2.57
FCF/Total Capital	-1.785852	10.34398	-0.17
ROA	0.9474674	12.40898	0.08
Hyspread	0.7561256	2.425261	-0.91
YearDummy1	0.7561256	0.6159327	1.23

Note. Significance *p < .05. **p < .01. ***p < .001

Notes: Above is the linear regression results of classic capital structure determinates and debt market liquidity with respect to leverage controlling for the year the LBO was completed. Debtebitda is the leverage multiple and represents the leverage multiple of a firm after an LBO. Sales are recorded as revenue and represents the size of the firm. Ptbratio is the price-to-book ratio and represents the growth potential of a firm. Fixedassets is the ratio of fixed assets to total assets and represents the collateral value of a firm's assets. Returnonassets is the ROA of a firm and represents the profitability of a firm. Hyspread is the spread on high yield bonds in the debt market and represents debt market liquidity. Fcftotalassets is the ratio of free cash flow to total captial and represents the amount of free cash flow that a firm has. Yeardummy1 represents companies that completed an LBO before and during the years of 2006-2009. *B represents the coefficient of the variable. SE represents the standard error of the coefficient. T represents the t statistic of the coefficient measuring its significance.*

Primary vs. Secondary Deals and the Relationship to LBO Leverage.

A dummy variable represents the deal type of the LBO, where the variable Lbodummy1 indicates a primary LBO. Brinkhuis and Maesenerie (2007) find that leverage levels are higher for secondary deals, which is consistent with the regression results in table 5. Primary deals have .92 lower units of leverage multiple than secondary

deals, indicating that the leverage multiple will be lower in primary deals. This is not statistically significant in the regression because the coefficients do not produce high p-values and t-statistics. The model presents two significant variables, sales and fixed assets to total assets. Since the variable for deal type is not significant, I fail to reject the null hypothesis, even though the coefficient is consistent with previous empirical evidence (Brinkhuis and Maesenerie, 2007). The p-value for the LBO dummy is .374, which is not statistically significant. The model produces a higher R^2 value of .23, than the first regression in table 3, and produces a better f-statistic of 3.51 as well.

Table 5.
Regression Results for Leverage Levels in Primary vs. Secondary Deals

		R^2 Value:	0.23
		F Statistic:	3.51
Variable	*β*	*SE*	*t*
Sales	0.0001435*	0.0000666	2.16
PTBratio	-0.0031406	0.0072715	-0.43
Fixed Assets/Total Assets	-6.465539*	2.646516	-2.44
FCF/Total Capital	-2.090035	10.065	-0.21
ROA	2.172279	12.86236	0.17
Hyspread	-1.827607	2.620738	-0.70
lbodummy1	-0.9225825	1.025412	-0.90

Note. Significance *p < .05. **p < .01. ***p < .001

Notes: Above is the linear regression results of classic capital structure determinates and debt market liquidity with respect to leverage controlling for the type of deal the LBO was. Debtebitda is the leverage multiple and represents the leverage multiple of a firm after an LBO. Sales are recorded as revenue and represents the size of the firm. Ptbratio is the price-to-book ratio and represents the growth potential of a firm. Fixedassets is the ratio of fixed assets to total assets and represents the collateral value of a firm's assets. Returnonassets is the ROA of a firm and represents the profitability of a firm. Hyspread is the spread on high yield bonds in the debt market and represents debt market liquidity. Fcftotalassets is the ratio of free cash flow to total capital and represents the amount of free cash flow that a firm has. Lbodumy1 represents a company who completed a Primary LBO. *B represents the coefficient of the variable. SE represents the standard error of the coefficient. T represents the t statistic of the coefficient measuring its significance.*

Private Equity Party Reputation and the Relationship to LBO Leverage.

The data set was divided into two groups that were based on the amount of capital a PE firm raised, where the top 50 firms in the world were given a dummy variable of 1.

The regression results in table 6 indicate that LBO leverage is higher in deals not sponsored by one of the top 50 private equity firms. I once again fail to reject the null hypothesis because the data proves to be statistically insignificant. Even though the data is statistically insignificant, I can loosely conclude that the leverage multiple is 1.17 units higher for less reputable firms. This does not relate to Brinkhuis and Maesenerie's (2007) findings that more reputable firms offer higher leverage. One conclusion that I can make is that the data does not actively represent the market because one would intuitively think that more reputable firms would attract higher leverage levels. This also goes against previous empirical work that finds a relationship between more reputable firms and higher leverage levels (Kaplan and Stromberg, 2009).

Table 6.
Regression Results for Private Equity Party Reputation and Leverage Levels

		R^2 Value:	0.25
		F Statistic:	6.17
Variable	*β*	*SE*	*t*
Sales	0.0001163	0.0000629	1.85
PTBratio	-0.0056795	0.007163	-0.79
Fixed Assets/Total Assets	-6.776941	2.600533	-2.61
FCF/Total Capital	-2.187945	10.37584	-0.21
ROA	4.733324	11.50549	0.41
Hyspread	-1.412244	2.5367	-0.56
Pedummy1	1.167675	0.8567847	1.36

Note. Significance *p < .05. **p < .01. ***p < .001

Notes: Above is the linear regression results of classic capital structure determinates and debt market liquidity with respect to leverage controlling for the private equity party reputation. Debtebitda is the leverage multiple and represents the leverage multiple of a firm after an LBO. Sales are recorded as revenue and represents the size of the firm. Ptbratio is the price-to-book ratio and represents the growth potential of a firm. Fixedassets is the ratio of fixed assets to total assets and represents the collateral value of a firm's assets. Returnonassets is the ROA of a firm and represents the profitability of a firm. Hyspread is the spread on high yield bonds in the debt market and represents debt market liquidity. Fcftotalassets is the ratio of free cash flow to total assets and represents the amount of free cash flow that a firm has. Pedummy1 represents LBO deals where the private equity firm involved is not in the top 50 PE firms in the world. *B represents the coefficient of the variable. SE represents the standard error of the coefficient. T represents the t statistic of the coefficient measuring its significance.*

Different Industries and the Relationship to LBO Leverage.

I fail to reject the null hypothesis that leverage multiples differ across industries. Leverage multiples differ across industries, which is consistent with previous findings as well. However in this regression, I run into the same issue with all the other regressions, which is that the model is not statistically significant. Again, the two significant variables that are drivers of leverage are sales and the ratio of fixed assets to total assets. The regression does provide us with loose conclusions as the coefficients indicate leverage levels are different in the four industries. Dummy variables were assigned to the four industries: 1 represents healthcare, 2 represents industrials, 3 represents materials and 4 represents consumer staples. The regression in table 7 presents industries 2-4 along with the basic model of determining leverage multiples in LBO's. The regression in table 7 produces the largest R^2 value out of any of the regression at a value of 0.26, or 26%. The information is not statistically significant according to the results, but the coefficients differ which indicates that there could be a difference in leverage multiples among different industries. It seems that multiples in the healthcare industry have the largest relationship with leverage multiples of LBO companies because the other three dummy variables that represent the other industries, are negatively related to healthcare. Consumer staples have the second highest leverage multiples, followed by industrials and finally materials, which have the lowest leverage multiples. The data seems to be an issue in this regression as well because as a model it is not significant with a low f-statistic.

Table 7.
Regression results for leverage levels with respect to industry.

R^2 Value:	0.26
F Statistic:	2.34

Variable	*β*	*SE*	*t*
Sales	0.0001482*	0.0000706	2.10
PTBratio	-0.003092	0.0061792	-0.50
Fixed Assets/Total Assets	-6.287812*	2.453044	-2.56
FCF/Total Capital	-6.304018	10.40637	-0.61
ROA	3.243186	12.64177	0.26
Hyspread	-2.613837	2.434639	-1.07
Industrydummy2	-1.080861	0.8839742	-1.22
Industrydummy3	-1.698429	1.142873	-1.49
Industrydummy4	-0.7570691	0.8285326	-0.91

Note. Significance *p < .05. **p < .01. ***p < .001

Notes: Above is the linear regression results of classic capital structure determinates and debt market liquidity with respect to leverage controlling for industry. Debtebitda is the leverage multiple and represents the leverage multiple of a firm after an LBO. Sales are recorded as revenue and represents the size of the firm. Ptbratio is the price-to-book ratio and represents the growth potential of a firm. Fixedassets is the ratio of fixed assets to total assets and represents the collateral value of a firm's assets. Returnonassets is the ROA of a firm and represents the profitability of a firm. Hyspread is the spread on high yield bonds in the debt market and represents debt market liquidity. Fcftotalassets is the ratio of free cash flow to total assets and represents the amount of free cash flow that a firm has. Industrydummy1 represents healthcare. Industrydummy2 represents industrials. Industrydummy3 represents materials.

CONCLUSION

This thesis looks at the potential drivers of leverage in U.S. private equity sponsored buyouts. The regression analysis will examine the classical capital structure theory and debt market liquidity as potential drivers of leverage. The unique hand crafted data set for this thesis provided no real statistically significant results. When running a regression with the classical capital structure drivers of leverage and debt market liquidity against leverage multiples, only one variable was statistically significant. The ratio of fixed assets to total assets was negatively statistically significant when related to leverage, which contradicts previous findings. One can say that the ratio, which is one of the classical determinants of LBO leverage, has a statistically significant effect on leverage and can somewhat accept the null hypothesis. Instead the model fails to reject the null hypothesis that leverage multiples are the same across industries because the rest of the variables were statistically insignificant. Brinkhuis and Maesenerie (2007) find similar results, that the classical determinants of capital structure and the high yield bond spread do not accurately predict the drivers of LBO leverage. I believe that the statistically significant ratio is skewed due to the size of the data. The 45 observations in the data set proved to be too small which is why the regressions did not provide any conclusive results. When running the rest of the regressions, the only variables that are significant in the results is the size of the firm and the ratio of fixed assets to total assets, which is again believed to be skewed.

From a statistically significant point of view, each regression presented in this thesis fails to reject the null hypotheses. However, the signs of coefficients indicate that the regressions relate to previous empirical findings. I find that leverage multiples are

higher for secondary LBO's rather than primary ones. I find that leverage levels are higher for deals where the lead sponsor group is in the top 50 private equity groups in the world based on the amount of capital raised by the firm. I also find that leverage multiples for the years during the recession of 2007 are in fact higher than deals completed after the recession. In regards to leverage levels across different industries, I find that leverage levels in healthcare, industrials, materials and consumer staples differ from each other and that healthcare can attract the highest leverage levels.

From the results gathered in this paper, some conclusions can be drawn. One conclusion being that there are too many external factors that drive the leverage in leveraged buyouts and the variables that were chosen in the model do not accurately predict leverage multiples. This is why banks do not have a specific recipe for success, and why some companies who enter a LBO file for bankruptcy. The risk of filing for bankruptcy is a reason why the proper amount of leverage is so crucial when financing a leveraged buyout. There is no such thing as the perfect drivers of leverage; it all depends on the specific deal and the companies involved. Too many factors that are unique to each company make it hard to find the drivers of leverage. Each bank and private equity firm has their own recipe for success, which demonstrates that there is no specific driver of LBO leverage. Another conclusion can be that the proxy's used to represent growth potential, profitability and collateral value of assets are not the best indicators of those predictors. There are other ratios and formulas that represent the same variables that may have proved more effective than the ones chosen for this paper.

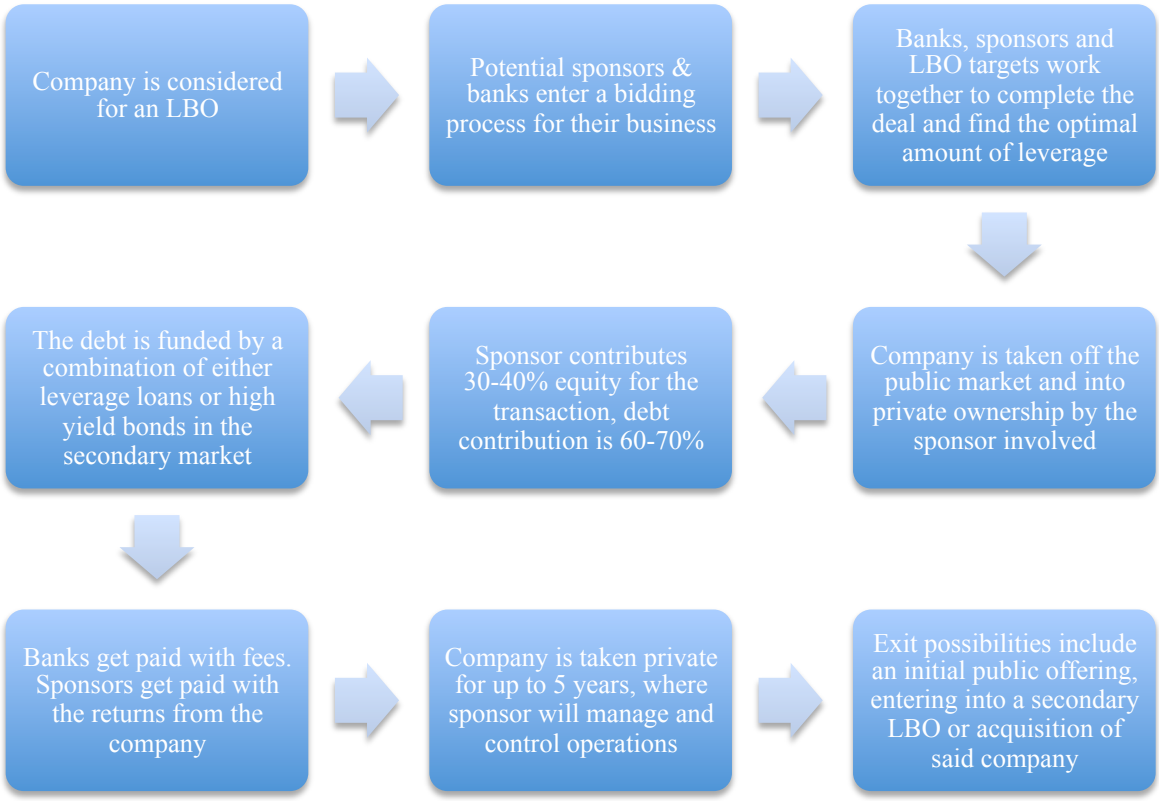
Limitations and Further Research

The biggest limitation to this paper is the sample size of the data. With only 45 companies, it was hard to come to any conclusive results when rejecting the null hypotheses. Since the website CapitalIQ.com was the only database available to me to gather the financial information I needed, I could not expand my data set. If I was allotted more time, I would have maybe been able to come up with more observations that could have led to more statistically significant results. I also would have collected data on the leverage loan spread in the debt markets, to more accurately represent debt market activity.

The small data set limited the amount of results that I previously had anticipated on recording. When looking at leverage multiples, the industry is extremely important when comparing them to other multiples. Bradley et al., (1984) Brinkhuis and Maesenerie, (2007) and Harris and Raviv (1991) all stress that leverage multiples tend to be similar in the same industry. Each industry is very different from one another and the classical capital structure theories may not apply to all the leverage multiples as a whole, but may apply to specific industries. If this study were to be completed again, I would run all of the regressions again while controlling for industry. If I were able to collect more data points for the different industries, I would see if the classical capital structure determinants and debt market liquidity have different effects on leverage multiples of LBO's. This method would be a more accurate representation of the leverage buyout market, as financials and multiples are different across different industries.

Appendix A

A.1
Road Map of a Typical Leveraged Finance Deal



A.2
List of Key Words and Definitions

Leveraged Buyout (LBO)	The acquisition of another company using a significant amount of borrowed money (debt) to meet the cost of the acquisition
Sponsor	The private equity firm that is involved in the deal
Primary Leveraged Buyout Deal	The first time a company is taken private through an LBO
Secondary Leveraged Buyout	A type of leveraged buyout in which a financial sponsor or private equity firm sells it's investment in a company to

	another financial sponsor or private equity firm
Leverage Multiple	The ratio of debt to EBITDA. This is an industry standard when used by banks and sponsors to assess how much debt a company can take on through an LBO
Classic Capital Structure Theory	Put forth relation between the proportion of debt in financing of a company's assets, the weighted average cost of capital and the market value of a company
Reputable Private Equity Firms	Private equity firms who are in the top 50 in the world in regards to how much capital they have raised for their investing funds
Bank	The investment bank involved in the LBO transaction

Note: Definitions taken from the website Investopedia.com.

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