# Leverage Buyout - Success or failure?

Investigating the impact of excessive leverage on operating efficiency for US. companies.

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# Abstract

This thesis investigates the relationship between excessive leverage on operating efficiency and lower debt levels. The period spans from 1990 - to 2018; however, the sample is mainly concentrated around the mid-1990s up to the financial crisis. The thesis builds on the foundation of agency theory to explain different types of behavior that make firms eventually inefficient. These firms are presumed to experience severe agency costs, and the requirement for discipline is best solved by incorporating the monitoring effect of debt. Running regressions on different operating and financial performance measures shows no evidence of relatively improved efficiency using higher debt levels.

Moreover, in analyzing differences in firm behavior, such as asset and revenue growth, there is no evidence that excessive leverage has different firm behavior than using lower debt levels. However, one compelling finding is that the firms seem to experience substantial growth in assets and revenue post-transaction, contradicting Jensen's Free cash flow hypothesis. The findings suggest that the motives for entailing leveraged buyout go beyond simply improving efficiency. The motives for LBOs, change in attitudes when incorporating excessive leverage and poor credit monitoring in bull markets, might help explain why previous research does not systematically improve operating efficiency and the history of leveraged buyouts.

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# 1 Introduction

This thesis's primary goal is to investigate leveraged buyouts' impact on operating efficiency. The extreme debt levels make this a risky transaction, and therefore, it is interesting to see whether excessive leverage outperforms lower and safer debt levels. Over seven years, we have used financial accounting data for 40 leveraged buyout US.targets and 40 buyout Us.targets, defined as the acquisition of majority interest.

In order to understand why excessive leverage could be an excellent method to improve operating efficiency, we derive why companies might become inefficient by relying on the existing agency theory. Furthermore, agency theory will also tell us about the behavior of market participants, which is essential to understand to make inferences for our results.

By combining how companies evolve and what types of financial funding sources are available over time, we can get an idea of what to expect. Finally, the different theories should help explain inefficiency in how participants behave, why LBOs should work, and if they do not, why? We will continue the literature review of the theories by previous research on leveraged buyout and, from there, create our hypotheses.

# 2 Literature Review

This chapter will review some well-known corporate finance theories that might explain why LBOs succeed and their drivers. Furthermore, we will dive into how LBOs work. Leveraged buyouts are heavily leveraged transactions, often between 50-70% debt financing (Harvard 2013, Note on LBO). The high amount of leverage used in an LBO changes the capital structure of the acquired firm significantly; thus, a deep understanding of the impact of capital structure is necessary. We begin the literature review by investigating fundamental capital structure theories.

## 2.1 Capital structure

Agency theory is a well-known phenomenon in corporate finance, where agents(corporate managers) do not always have the same incentives as the principal(shareholders). Misaligned incentives and financing choices have associated costs with the financing decision, which this section will review. This section will not derive the optimal capital structure for a given firm as it is highly industry-dependent. Instead, it will enlighten the benefits and costs of financing decisions and how it impacts an LBO. We will start by investigating agency costs of equity.

### 2.1.1 Agency costs of outside equity

In order to measure agency cost of outside equity, we compare managerial behavior when the firm is owned entirely by the manager and when he sells a fraction to outside equity investors. In order to demonstrate this, we will use the model of Jensen & Meckling. When the manager owns the firm, he will maximize his utility, consisting of firm value and non-pecuniary benefits. Non-pecuniary benefits can include office space and items, secretarial staff, private planes, personal relations, staff, etc. These benefits make the manager more comfortable; he can, i.e., hire more staff to reduce the effort he needs to put up, a comfortable office space that makes him happier. These benefits vary from manager to manager as this is personal preference, but as we shall see, the desire increases for non-pecuniary benefits when he sells a fraction to equity holders; since then, he does not bear the entire cost of these benefits.

### 2.1.2 Agency cost of outside equity model

We will only use the first model presented in the paper, which has several assumptions. The model assumes no taxes, a single owner, no complex financial claims, no monitoring, outside-equity holders have no voting rights, outside-equity holders' only benefit is cash flow from the firm, manager wage is constant, no multiperiod, firm size is fixed, no debt financing, no diversifying, for more detail look in Jensen & Meckling report. Let us look at model 1 in the paper:

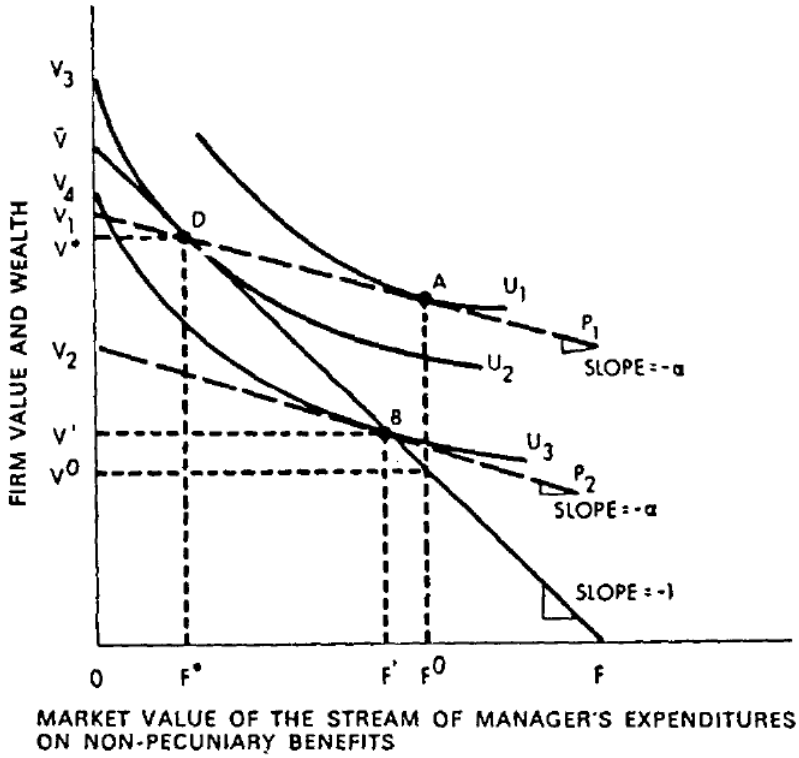


**Fig. 1. The value of the firm ($V$) and the level of non-pecuniary benefits consumed ($F$) when the fraction of outside equity is $(1-\alpha)V$, and $U_j$ $(j = 1, 2, 3)$ represents owner's indifference curves between wealth and non-pecuniary benefits.**

Figure 1: Agency cost of outside equity

Along the x-axis are the manager's expenditures on non-pecuniary benefits F, and on the y-axis is the firm value. In point D, the manager owns the firm with V* and F* non-pecuniary benefits. Please assume that the manager can sell a fraction $\alpha$ of the firm at a value V*; he will now choose F0 as this provides a higher utility. Point A is above the budget constraint, meaning the firm is no longer worth V* but rather V0; this implies that outside equity holders have bought $\alpha$ fraction of V* that is now only $\alpha$ fraction of

V0, meaning the outside equity holders have lost value. However, outside equity holders will anticipate this behavior and price the firm at V0 rather V*, occurring a value loss for the manager. Furthermore, where the lines from V0 and F0 cross the budget constraint is not optimal for the manager; he will therefore choose F' such the firm is sold at V' landing in point B, which is the optimally for the manager if and only if he chooses to sell. Comparing point B with D, the manager has reduced his utility when he sells the company to outside equity investors since he bears the entire agency costs.

Can agency costs be reduced? Yes, if the manager or outside equity holders entail monitoring such as auditing, control systems, budget constraints, and incentive compensations to align the incentives. The manager has an incentive to do so as long as the benefit outweighs the costs since it is the manager that bears all the agency costs. Despite that agency costs can be reduced, why use outside equity? Suppose the manager has positive NPV projects available and can not finance the projects himself. In that case, he will have an incentive to seek external finance as long as the project's benefits outweigh the investment cost and the increased agency cost. The separation of ownership entails agency costs, but why not use debt as finance? As we shall see, debt also entails agency costs, nevertheless unobtainable if the equity stake is too low.

### 2.1.3 Agency costs of debt

Jensen & Meckling depicted three types of costs associated with debt, The incentive effect, monitoring and bankruptcy, and reorganization costs.

### 2.1.4 The incentive effects associated with debt

Entrepreneurs and firms sometimes will be credit rationed if their equity stake is too low, even though the investment has a positive NPV. When leverage is applied, managerial incentives and behavior change, leading to potential credit rationing. A 100% equity-financed firm that takes on leverage changes the equity holder's attitude towards risk and firm value, which becomes a moral hazard problem. An equity stake in a firm with leverage is essentially a call option on the firm with a strike price equal to its debt. Fundamentally understanding the drivers of the option value, an increase in the volatility of the underlying asset increases option value and hence the equity position in a firm with leverage. The

desire for an increase in volatility of the underlying asset increases as the option becomes more out of the money(higher strike = higher debt) since it is more likely to end up in the money as volatility increases. When heavily leveraged, shareholders choose risky projects that destroy firm value for personal gain even though other value-added firm projects are available (Jensen & Meckling 1984). When the firm is 100% equity-financed, shareholders will choose the projects that maximize firm value (Jensen & Meckling 1984). This moral hazard problem leads to credit rationing if the firm does not have enough equity and the debt becomes more costly, which shareholders must bear the cost. The problem discussed above can impact LBOs by making the debt more costly and difficult to obtain.

### 2.1.5 The role of monitoring and bonding cost

Acknowledging that management does not always act appropriately, credit holders have incentives to induce restrictions on management behavior to secure their debt claims. Debt covenants will increase the probability of receiving the debt claims; however, enforcing and writing these covenants is costly and would ultimately reduce the debt's value. Furthermore, constructing covenants that eliminate the incentive effect requires exceptionally detailed contracts, and creditors need to join every investment decision, making it almost impossible to achieve as it requires creditors to take the management function (Jensen & Meckling 1984). Nevertheless, restrictions on management could prevent management from entailing good investment decisions and making the debt costly as creditors would entail the monitoring cost (writing and enforcing covenants) into the price of the debt. As long as creditors recognize the manager's incentive effect, they will incorporate this into the price setting of debt; therefore, managers would like to reduce these costs as they are the ones that end up paying for the monitoring. Managers have incentives to do the monitoring themself as they already are collecting much data for their investment decisions and so on. Therefore, acquiring a third-party auditor that creates detailed financial statements is more cost-efficient, and creditors have their desired monitoring. When a firm incorporates debts, the incentive effect will induce the desire for monitoring, which is a cost that the firm must bear (Jensen & Meckling 1984).

### 2.1.6 Bankruptcy and reorganizations cost

At first glance, the most considerable risk when doing an LBO is bankruptcy and reorganizations cost, as LBO entails extreme levels of debt, but how high are these costs? Jensen & Meckling mention in their paper the empirical studies of Warner in 1975 on the railroad industry that bankruptcy costs are almost non-existent. This study's average cost of bankruptcy was 2.5% of the firm value three years prior to bankruptcy. The bankruptcy cost had a range of 0.4-5.9%. Even though an increased level of leverage increases the bankruptcy costs, these costs are minor.

### 2.1.7 Information asymmetry

Having discussed agency costs for outside equity and debt, let us expand and look at the preferred financing choice. In the financial market, information asymmetry exists that affects the costs of the different types of financing choices. Myers & Majluf, in their paper from 1983, developed the pecking order hypothesis using game theory, which showed that the firm would first finance projects with retained earnings, debt, and at last outside equity due to mispricing. The mispricing arises from managers having private information about the project's probability of success that outside equity holders do not have. In some extreme cases of mispricing, firms will not entail positive NPV projects since the mispricing outweighs the NPV gained. To avoid mispricing firm would instead use retained earnings and only use outside equity if the NPV is large enough and retained earnings are not sufficient. Myers & Majluf also showed that debt suffers less from mispricing and is preferred over outside equity. Firms that have future positive NPV projects would like to retain earnings to avoid mispricing, which will lead to firms racking up cash. Accumulation of cash when firms have positive NPV projects is appropriate; however, as Jensen discussed, it can entail some problems.

### 2.1.8 Free cash flow hypothesis

In his paper from 1986, Jensen derived the free cash flow hypothesis that enlights some issues when firms have a high level of free cash flow. Managers of such firms are reluctant to pay out cash to shareholders as this will reduce resources under their control (Jensen 1986). Using outside financing will occur monitoring of management as discussed previously. Managers with different agendas than shareholders will not like to induce closer

monitoring. Managers have incentives to grow the firm beyond its optimal level, the so-called empire building. Expanding the firm increases the managers' power by increasing resources under their control. CEO compensation is often related to sales (Murphy & Jensen 1985), incentivizing managers to expand. When a firm has limited positive NPV projects, managers continue expanding even though it is a negative NPV project. Jensen, in his paper, enlightens that managers waste cash, and reducing the available cash will make the firm more efficient. The separation of ownership showed that managers would increase their non-pecuniary benefits when their equity stake reduces. When the firm has a significant amount of available cash, such benefits are readily available.

The essence of the free cash flow hypothesis is to reduce the available cash, i.e., paying dividends, share repurchases, and leverage. This thesis will focus on reducing free cash flow by leverage. A leveraged buyout is an excellent method of reducing the free cash flow, and it entails monitoring which will help managers make economically correct decisions. Evidence for the oil industry in the 1980s, which entailed restructuring and reducing available cash and discontinuing destructive projects, made the companies more efficient (Jensen 1986). However! The pecking order hypothesis suggests that the firm should accumulate cash, which is correct but undesired in other circumstances.

### 2.1.9 Business and industry life cycle

To better understand how the different agency costs affect a firm and the cash accumulation, we need to look into the business- and industry life cycle. The business- and industry life cycle heavily impact capital structure and, therefore, agency costs and cash accumulation. A business goes through five phases: Launch, Growth, Shake-Out, Maturity, and Decline. These phases affect cash, profit, and sales. Let us look at the graph from CFI on the business life cycle.

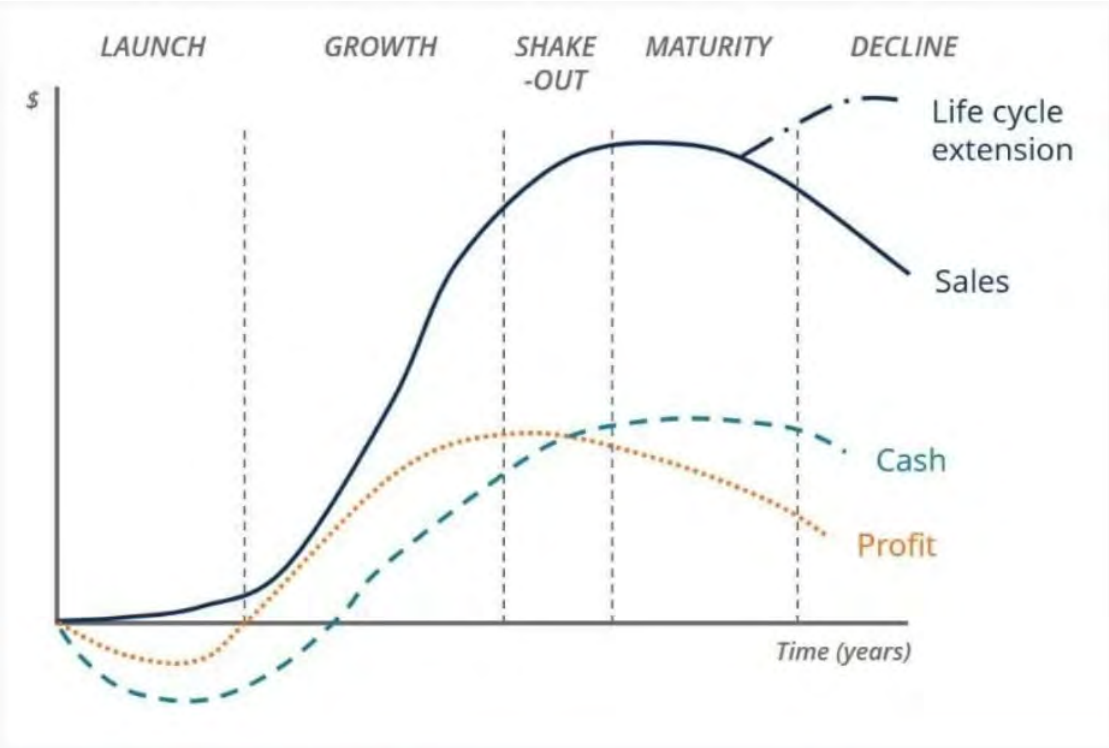


Figure 2: CFI Business life cycle

There are little or no sales, negative profits, and a lot of cash outflow due to the investment needed to start the business in the launch phase. The firm experience rapid growth in sales, profit, and cash increases, moving over to the growth phase. In the shakeout face, competitors enter due to the attractive rapid growth in sales, cash, and profit, which leads to a decline in profits, peak sales, and slowing cash growth. When the firm hits maturity, the sales and profit decrease, and cash stagger and remain stable. In the maturity face, the firm can reinvent itself and extend the life cycle; otherwise, the firm will enter the decline phase and, in the end, dissolve. The business cycle is the same as the industry cycle. The business and industry life cycle are closely related to the funding life cycle, which we will now investigate.

The funding life cycle also goes through the same 5 phases; CFI has created an excellent graph that illustrates the funding cycle.

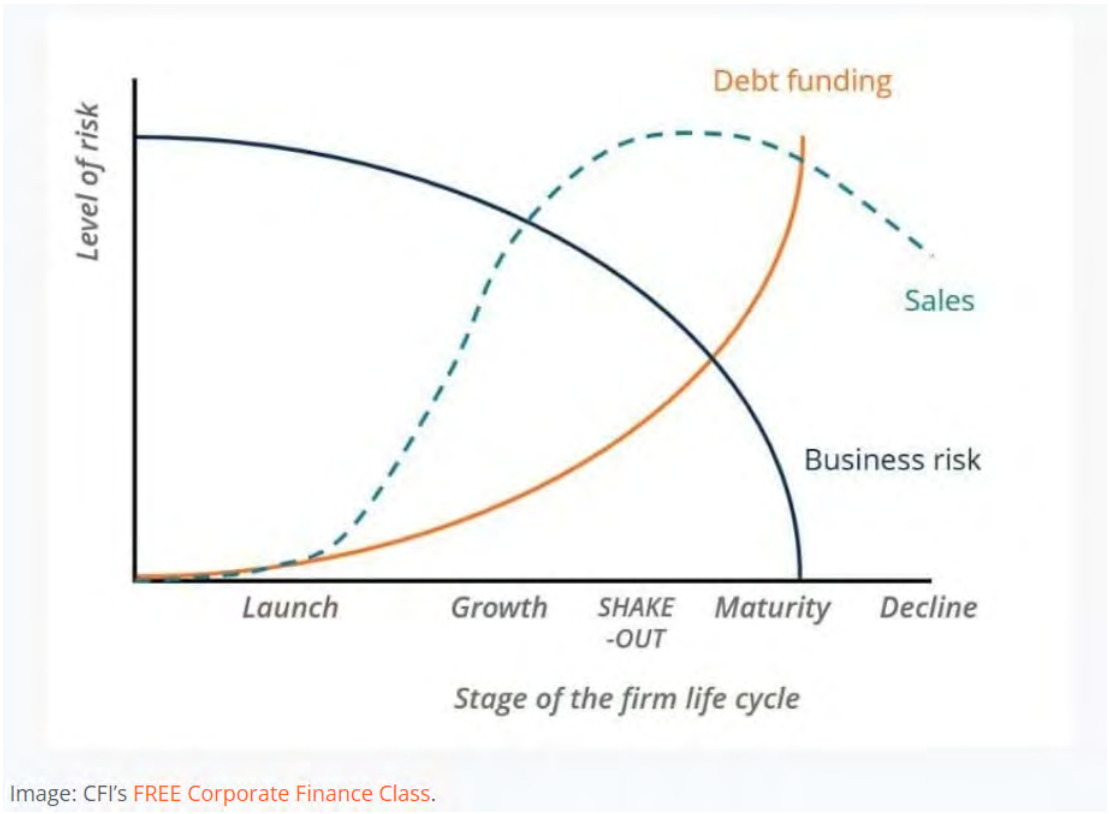


Figure 3: CFI Funding life cycle

At the launch phase, the level of risk is very high, and low sales and negative profit make debt funding nearly impossible. It is also hard to obtain outside equity at this stage due to high uncertainty, and therefore, ownership concentration is high. At the growth stage, levels of risk are also high; thus, debt financing is limited. In the growth face, profit and cash increase, making outside equity easier to obtain. The rapid growth in sales suggests that the firm has a lot of positive NPV projects. Since cash accumulation is most likely insufficient to fund all these projects, firms need to rely on outside equity; hence ownership separation increases. In the shake-out phase, sales reach a peak, and cash flow increases. A peak in sales suggests that positive NPV projects available are limited. This phase will encounter a higher debt level due to availability and less need for flexibility. When the firm is at maturity, there are no longer positive NPV projects available, and high and stable cash flows lead to even higher debt levels.

### 2.1.10 LBO targets, inefficiency, and value creation

This thesis investigates whether LBOs create value or not. However, only looking at the firm's performance due to LBO is limited research. We also need to consider whether using leverage is more effective than using less leverage. The thesis's central assumption for value creation is that bought companies are inefficient, and a restructuring of such companies will lead to value creation. Restructuring consists of restructuring operations and financial restructurings such as equity, debt, and ownership concentration.

LBO requires a lot of debt financing; this gives us information about target characteristics. The business and funding cycle illustrated how the capital structure changes and what types of financing are available. In earlier stages, the business entails higher levels of risk and negative or low fluctuating cashflows, making it hard to obtain debt financing. In these stages, the low availability of debt financing can also be explained by that firm will be credit rationed when risk is high and their equity stake is too low - Incentive effects of debt. Since LBOs take on leverage and use the target's cash flows and assets as collateral, the target needs high and stable free cash flows. If the debt was available even though the firm was in the growth phase, this is likely not desirable since the firm has many growth opportunities. Incorporating a high level of debt can lead to underinvestment as the firm might experience financial distress; nevertheless, the debt would be costly. Therefore, the targets are more mature companies. Given that the targets are mature and how the business and funding cycle works, help us explain why some mature companies are inefficient. To see this, we need to look into the evolution of companies.

At launch, there are limited financing options; at this stage, there is often a high concentration of ownership, the firm is 100% equity financed, and the manager owns a significant stake in the firm. As the firm grows, the firm seeks external equity finance to invest in profitable projects unless the owners are wealthy. The firm is not solvent at this stage; thus, the amount of debt obtainable is limited. As Jensen & Meckling pointed out, agency costs arise. The managers start to induce a higher level of non-pecuniary benefits; however, outside-equity holders and the managers have an incentive to monitor the firm, limiting waste of cash. As the firm grows and the capital needs to invest in profitable projects, they keep issuing equity. When the separation of ownership increases, shareholders' incentive to monitor decreases as the costs outweigh the benefits. As the

firm grows, retained earnings increase that finances positive projects, and the need for outside equity decreases. Debt becomes less costly and more available, and the company can issue debt to finance projects.

When companies enter a more mature state, they have accumulated much cash and have limited investment opportunities, with the possibility to finance with significant amounts of debt. This thesis suggests that increasing leverage would improve efficiency, but does this mean the firms are underleveraged? Not necessarily, and to see this, we need to dive deeper into mature companies' characteristics. Due to the birth and evolution of companies, mature companies have greater separation of ownership than less mature companies and have a significant amount of cash at hand. Combining a significant gap in ownership and a lot of cash available can create some challenges. Due to a low ownership stake, managers have incentives to induce a higher level of non-pecuniary benefits than if they had a higher stake (Jensen & Meckling 1984). The amount of cash available allows managers to do so, leading to the resistance to paying out cash to shareholders. Since shareholders hold smaller stakes in the company, the incentive to monitor the managers for the individual shareholders is less than if they would have a higher stake. Weaker monitoring by shareholders is essentially allowing managers to waste cash.

Furthermore, poorly constructed incentive contracts will make this problem worse. Jensen & Murphy showed that many managers' compensation contracts relate to sales. Since mature industries and companies have little or no positive new NPV projects, managers are incentivized to invest in destructive projects to increase sales and achieve higher compensation and market power. Moreover, managers might put less effort into creating value; since their stake is low, the effort needed to create more value is higher than the benefit of doing so. What about replacing managers? Shareholders do limited monitoring, the firm has high free cash flow, and they are solvent, implying that the risk of replacement is low since the firm is essentially doing well. Nevertheless, the firm is complex and extensive, which would require experienced managers, and the supply of managers might not be sufficient. Concentrating the ownership will incentivize shareholders to monitor and create better compensation schemes (Jensen & Mecklig 1984); therefore, a traditional buyout could solve the efficiency problem.

High free cash flow implies that the firm can incur higher debt levels if they choose to. Mature firms have a higher debt level than less mature firms and therefore have monitoring from creditors; however, since the firm is very solvent, the debt does not entail many risks. The monitoring is not very strict since the firm can easily repay the interest and down payments; the low-risk results in a lower firm's debt cost. With weak monitoring from both creditors and shareholders and a high amount of cash, how can companies become more efficient?

It is evident that a possible solution to the efficiency problem is to increase ownership stake, and therefore a regular buyout could improve efficiency. However, some of the value created in an LBO could also stem from the firm being underleveraged and, therefore, might outperform a regular buyout for similar targets. Moreover, an LBO could outperform a regular buyout just because the method is more efficient in achieving efficiency, but why? Buying a target and improving efficiency requires effort, discipline, and expertise; thus, just concentrating ownership does not fix the problem itself. The shareholders must monitor the firm closely, create a reasonable compensation scheme, and participate in decision-making. An LBO could do this more efficiently.

## 2.2 Leveraged buyouts

This section will look briefly at how an LBO works, its history of LBO, previous research, and finally, why an LBO could be an excellent method to improve inefficiencies.

### 2.2.1 LBO model

LBO debt was between 50-70% of total funding sources in the last decades (Harvard, 2013). However, an LBO uses different types of layers of debt. The debt is divided into two broad layers, senior and secured debt. While the senior debt-to EBITDA ranged from 2.4x-5.6x, the junior ranged from 0.2x-2.1x (Harvard, 2013). Examples of senior debt are Asset-backed loans and leveraged loans - larger banks and institutions often secure these types of debt.

Furthermore, junior debt includes high-yield public bonds and notes and mezzanine financing(Harvard, 2013). Knowing what funding sources are available is essential because it might tell us something when these types of financing are available. When an LBO

occurs, the firm often goes private, making financial accounting data hard to get. This thesis looks at whether an LBO increases efficiencies; however, corporate efficiency is not the only reason to encounter an LBO, which we refer to as the leveraged effect.

### 2.2.2 Leveraged effect

If the firm increases efficiency, it is apparent that the value increases; however, do shareholders always go after the firms that increase the most efficiency? In fact, no, they do not. Let us look at a simple example that illustrates this behavior. A firm is considering doing a buyout transaction and has two alternatives. They can either do a regular buyout of a firm valued at 100 that can improve efficiency such that the firm is worth 200 in 1 year and finances the transaction with 30% debt. Alternative two is to buy another firm valued at 100 and is worth 120 in year 1; however, this transaction uses a 90% debt level - now look at how these two transactions differ.

| Year | 0 | 1 |
|---|---|---|
| Alternative 1 | | |
| V | 100 | 200 |
| D | 30 | 30 |
| E | 70 | 170 |
| Return on Equity | | 143% |
| Alternative 2 | | |
| V | 100 | 120 |
| D | 90 | 90 |
| E | 10 | 30 |
| Return on Equity | | 200% |

Table 1: Leveraged effect

This example illustrates that shareholders earn a higher return on their equity investment on alternative 2 with a significantly higher debt level. Incorporating a higher debt level goes beyond increasing efficiency since investors know that leveraging their return will boost their equity return. Combining this with the asset substitution problem, shareholders also might entail in risky transactions that they benefit from at the expense of creditors and society. The leveraged effect and asset substitution problem are critical as this can prohibit efficiency improvement; otherwise would be gained when lower debt levels were incorporated. LBOs, therefore, might not be a superior method of improving efficiency.

### 2.2.3 History of Leveraged Buyouts

- The first wave of LBOs started in the early 1980s after Michael Milken invented high yield bonds. Excess speculation and poorly drafted covenants led to overpriced deals, crashing the high-yield bond market. KKR-RJR Nabisco, the largest LBO, resulted in severe losses (Himani Singh, NYU JLB). The perception of LBO was that it was a highly risky investment and decreased in popularity.

- In the 1990s, there was a revision of LBOs, and the debt levels were lower than previously(Himani Singh, NYU JLB).

- Another boom arrived in the 2000s but was short-lived due to the financial crisis in 2008(Himani Singh, NYU JLB).

- Introduction of regulations and caution regarding levered loans after the financial crisis slowed the growth in LBO. However, when regulations became clearer and large institutional investors were introduced, the LBO market recovered, similar to before the financial crisis in 2008(Himani Singh, NYU JLB).

### 2.2.4 Previous research on leveraged buyouts

Tim C. Opler, in his research on the 44 largest LBOs from 1985-1989, showed that companies entailed in a leveraged buyout improved operating margins roughly around par with other deals, an average of 11.6%. He also showed a substantial increase in cash flow resulting from the LBO - Thus significant efficiency improvements for investors.

A study of LBO deals from 1995 and 2007 constructed by Jonathan B. Cohn, Lillian F.Mills, and Erin M. Towery found little evidence of operating improvements after an LBO. They overcome the lack of financial accounting data by constructing a comprehensive dataset on corporate tax return reports. Research from Kaplan(1989a), Smith(1990), and Smart Waldfogel(1994) after the 1980s US. Management buyouts. They found out that LBOs that when private and had public statements while there were private and got public again had an improvement in operating performance. However, Guo, Hotchkiss, and Song(2011 find an 11% increase in EBITDA/Sales that did not go private, however sensitive to the measurement window. Jonathan B. Cohn, Lillian F.Mills, and Erin M. Towery point out that an explanation for this is that firms with public financial state-

ments are systematically better performers than private firms since if LBO is successful, they most likely go public afterward. They observed operating improvements with firms that had public financial statements. With a lack of operational improvements in LBO generally, it is hard to generalize the effect of LBO relying on public financial data only(Jonathan B. Cohn, Lillian F.Mills, and Erin M. Towery). Guo, Hotchkiss, and Song found that operating performance is comparable to or slightly exceeds benchmark firms. The previous research is not convincing that leveraged buyouts increase operational efficiencies.

### 2.2.5 Why should Leveraged buyouts work?

The detailed research suggests little evidence that leveraged buyouts increase operational efficiencies, which seems puzzling. The well-defined agency theory and the evolution of firms should suggest inefficiencies in the firms. Such firms that are bought up should have room for operational improvements, whether a leveraged buyout or a regular buyout. However, research suggests a slight improvement or no improvement. This thesis also believes that leverage's monitoring and discipline effect should outperform a traditional buyout, but leveraged buyouts do not even outperform similar firms that are not bought up. Nevertheless, the possibility for smaller firms to buy a larger company allows more financial players to entail efficiency improvements.

# 3 Hypothesis

### 3.0.1 Hypothesis 1

The thesis hypothesis is that a leveraged buyout should outperform a regular buyout, where a buyout is defined as acquiring a majority interest in a firm. Agency theory and evolution of firms should tell us a story that mature firms are inefficient, and a buyout of that company should improve efficiency. The believes that these targets suffer from severe agency costs, and discipline is essential to improve efficiency. The monitoring effect of debt and substantial reduction in available cash should outperform a buyout with lower debt levels.

### 3.0.2 Hypothesis 2

Secondly, we will investigate the behavior of the firms. Jensen, in his paper, discussed these firms that went through a buyout, discontinued operations, reduced wasteful cash, and became more efficient. Therefore, we would expect that firms targeted for efficiency improvements should reduce or at least not grow very much, but rather become more efficient.

The two hypotheses are related; therefore, the results need to be consistent with each other. The thesis theory is that targets are mature, and by agency theory and life-cycle, these are the ones that should have the most agency costs and efficiency improvements, and since the firms are mature, they should not grow that much. If we observe significant growth in revenue and assets, the firms should not experience significant efficiency improvements and vice versa. Thus, hypothesis 2 will help explain hypothesis 1 since we should observe a difference in behavior. Finally, if a leveraged buyout outperforms a regular buyout, we should see different behavior.

# 4 Data sample and construction

When constructing the dataset, the thesis relays on the EIKON database. The database gives an overview of 444 leveraged buyouts from 1987 to 2022. To better understand how the firm performs due to an LBO, it is necessary to have accounting data three years prior to LBO and three years after the transaction. The requirement of financial accounting data over several years limits the possible sample substantially. Nevertheless, many of these companies are private or are going private, making it even harder to obtain financial accounting data. However, Jonathan B. Cohn, Lillian F.Mills, and Erin M. Towery had a sub-sample of 71 companies that had available public financial account data, which performed operating efficiency. They used two years of account data, whereas this thesis used three years. Therefore, the sample I have is somewhat similar to the one they used since the database provides the available data. Although this thesis sample goes over several years, the sample is mostly concentrated around the same period. Since many researchers have provided research on operating efficiency and that firms that had available public information were the ones that performed the best, I wanted to compare those transactions to buyouts with lesser debt levels; nevertheless, what were the characteristics of such firms that were acquired.

## 4.1 Construction of Leveraged buyout targets

The thesis has selected 40 leveraged buyout targets from the period 1992-to 2017; however, the sample is concentrated between 1995-2007. The EIKON database put some restrictions on the financial accounting data they provided for the companies, which restricts the analysis. Although the sample size is relatively small, there are still 280 observations per financial accounting data, so some inferences should be possible. It is essential to be aware that there might be some selection bias in this sample due to the method this data is available; first of all, this sample is most likely public financial accounting data, and what Jonathan B. Cohn, Lillian F.Mills, and Erin M. Towery showed these firms had better improvement in operating efficiency than target firms. Although there are some issues regarding gathering the dataset, with critical thinking, there should be possible to get some inferences. The database provided information about the leveraged buyout transaction and financial accounting data. On these 40 companies, the thesis has manu-

ally plotted every 280 observations for the following variables: Revenue, cost of operating, SG&A, other costs of operating, EBITDA, net cash flow, Free cash flow, Total assets, Current assets, Current liabilities, Short term debt, and long term debt. Manually plotting the numbers is another factor that can affect the dataset by human error. However, the numbers should be correctly put in; we need to be aware of this.

## 4.2 Construction of buyout targets

In order to compare the acquisition method, There is gathered information on 40 different companies that went through a transaction. These deals are also buyouts(Acquisition of majority interest). For every leveraged buyout company, a similar firm that went through a buyout transaction is matched. These firms are selected within the same period the deal happened, with similar deal value, acquired interest, revenue, operating expenses, EBITDA, assets, and mid industry. For these 40 different companies, there are manually plotted 280 new observations for the different variables. The dataset now has 560 observations on different financial metrics and is ready to check whether increased leveraged outperforms a regular buyout. Due to the nature of the history of LBOs, many of these transactions happened around the crisis, such as the financial crisis and dot com bubble; therefore, the transactions might not increase performance prior to the crisis but rather outperform a similar transaction in the same crisis.

## 4.3 Creation of variables

The thesis goal is to investigate the impact on efficiency, which we divide into two parts; Operational and Financial performance. We have created variables such as revenue margin, operational margin, asset turnover(AT), current ratio(CR), and EBITDA margin to measure operational performance. The financial performance measure uses net cash flow over assets and EBITDA over assets to check the cash flow generated from the assets under management. With all these performance measures, we should be able to tell a story about the efficiency improvements in the firms. Furthermore, we have created a capital structure variable by simply taking total debt divided by total assets. Moreover, a variable completed is created, which is 1 when the transaction is final and 0 otherwise. Finally, a treatment variable is created, and one of the firms is an LBO target or 0 if it is a regular buyout target.

## 4.4 Overview of the data

Before we do any analysis, we need to understand the data we provided. We will now look into different firm characteristics, operational measures, financial measures, and how the firms look before and after the transaction.

### 4.4.1 Firm characteristics

We start by looking at firm characteristics; this table is constructed by taking the mean of every observation in a given year. Looking at the variable N, we can see that most of the observations are concentrated in the mid-1990s to the financial crisis in 2008. The treatment variable (Leveraged buyouts targets), as expected, is roughly around 50% of the data for a given year, most important around 50% where most of the observations are observed. Moving over to the variable asset, it fluctuates between 500-1000$ million from the years 1987-2005; however, in 2006 there is a big jump in assets, from then on the assets fluctuate between much higher values, this is something we need to take a closer look at. It is pretty compelling that this thesis reasoning about what companies should be bought does not represent what companies are being bought. This is understood by looking at the Free cash flow variable FCF; the mean free cash flow is negative almost every year. In his free cash flow hypothesis, Jensen suggests that firms with excessive cash are inefficient companies; nevertheless, as discussed by the industry and business life cycle, these companies with excessive cash are the mature ones; thus, these are the ones that should experience the most inefficiency. It should raise the question: Are these LBO and buyout targets inefficient or at least not so much? Finally, looking at revenue and operating expenses(OPEX), they both show similar patterns as assets. Fluctuating around 500$ million from 1987-2005 and in 2006 and further, they experience a significant jump.

Figure 4: Firm characteristics

| Year | N | Treament | Assets | D/A | CR | FCF | Revenue | OPEX |
|---|---|---|---|---|---|---|---|---|
| 1987 | 3 | 0.00 | NaN | NaN | NaN | -51.39 | 545.71 | 516.69 |
| 1988 | 4 | 0.00 | 625.40 | 0.31 | 1.72 | -38.43 | 430.34 | 409.89 |
| 1989 | 6 | 0.17 | 715.04 | 0.30 | 1.29 | -1.62 | 713.94 | 391.81 |
| 1990 | 9 | 0.22 | 892.40 | 0.41 | 1.42 | -40.95 | 468.65 | 434.67 |
| 1991 | 10 | 0.20 | 853.16 | 0.51 | 1.32 | 5.50 | 487.88 | 440.89 |
| 1992 | 11 | 0.18 | 1143.94 | 0.38 | 1.25 | -24.90 | 501.17 | 457.93 |
| 1993 | 15 | 0.33 | 1107.57 | 0.33 | 1.94 | 25.33 | 589.14 | 529.11 |
| 1994 | 19 | 0.47 | 904.34 | 0.34 | 1.80 | -19.78 | 678.01 | 651.87 |
| 1995 | 27 | 0.56 | 821.58 | 0.33 | 11.96 | 1.87 | 660.47 | 632.24 |
| 1996 | 32 | 0.62 | 622.33 | 0.27 | 2.03 | 6.44 | 606.69 | 579.07 |
| 1997 | 35 | 0.60 | 587.77 | 0.37 | 2.07 | 5.32 | 584.07 | 543.03 |
| 1998 | 39 | 0.56 | 385.50 | 0.42 | 2.77 | -14.06 | 503.11 | 485.92 |
| 1999 | 40 | 0.55 | 403.91 | 0.52 | 2.34 | -4.39 | 568.72 | 548.46 |
| 2000 | 39 | 0.51 | 440.23 | 0.55 | 2.32 | -28.78 | 527.45 | 515.02 |
| 2001 | 36 | 0.47 | 501.84 | 0.70 | 1.89 | -8.61 | 468.99 | 454.62 |
| 2002 | 29 | 0.45 | 426.20 | 0.51 | 1.76 | 9.73 | 389.14 | 368.38 |
| 2003 | 24 | 0.33 | 384.82 | 0.34 | 2.09 | -3.85 | 378.16 | 375.58 |
| 2004 | 19 | 0.37 | 412.31 | 0.32 | 2.08 | 12.77 | 343.30 | 304.83 |
| 2005 | 14 | 0.43 | 589.44 | 0.56 | 2.06 | 14.39 | 508.46 | 461.70 |
| 2006 | 15 | 0.47 | 2230.35 | 0.44 | 2.79 | -53.89 | 1512.65 | 1362.52 |
| 2007 | 15 | 0.53 | 3512.15 | 0.31 | 2.82 | -16.86 | 1414.92 | 1322.94 |
| 2008 | 12 | 0.67 | 3849.52 | 0.35 | 2.06 | -218.15 | 1495.14 | 1511.12 |
| 2009 | 14 | 0.64 | 3096.21 | 0.40 | 1.94 | -16.50 | 1048.20 | 1038.24 |
| 2010 | 12 | 0.67 | 3426.26 | 0.30 | 2.39 | -140.42 | 1135.83 | 1080.17 |
| 2011 | 13 | 0.62 | 2582.34 | 0.33 | 3.79 | 12.39 | 1012.25 | 950.19 |
| 2012 | 13 | 0.62 | 3363.76 | 0.32 | 3.05 | -225.96 | 1118.71 | 1046.09 |
| 2013 | 11 | 0.73 | 2146.04 | 0.40 | 5.45 | -333.71 | 1275.93 | 1110.52 |
| 2014 | 9 | 0.78 | 8504.47 | 0.39 | 4.66 | -214.44 | 1766.66 | 1526.55 |
| 2015 | 10 | 0.60 | 7399.58 | 0.39 | 4.63 | -2.64 | 1383.92 | 1191.36 |
| 2016 | 6 | 0.50 | 1942.20 | 0.32 | 1.71 | -152.86 | 835.12 | 792.44 |
| 2017 | 6 | 0.50 | 2602.75 | 0.27 | 1.40 | 45.40 | 1004.98 | 902.77 |
| 2018 | 4 | 0.50 | 2506.20 | 0.45 | 1.46 | -16.59 | 987.59 | 798.52 |
| 2019 | 4 | 0.50 | 2751.13 | 0.42 | 1.10 | -16.62 | 1043.08 | 881.42 |
| 2020 | 3 | 0.33 | 2288.33 | 0.48 | 1.44 | 126.65 | 1119.06 | 985.82 |
| 2021 | 2 | 0.00 | 557.80 | 0.37 | 1.17 | 75.93 | 815.99 | 699.19 |

### 4.4.2 Operational Performance

Looking at figure 5 on operational performance, we can see a pattern in Asset Turnover(AT). There seems to be a higher asset turnover before the year 2006. As we observed, the companies seemed to increase their assets substantially from the year 2006 and on, which can explain the decrease in asset turnover from 2006 and onwards. For the revenue margin, there seems not to be any particular pattern other than that it might seem that the revenue margin seems to increase from 1995 to 2006; however, it is not possible to say statistically. For the Operating income margin(OPI) and EBITDA margin, the mean seems to be negative over the whole sample. Not shocking results, given that the mean free cash flow also was negative for most of the sample. However, looking at 2012-2015, there is reason to worry. Both OPI and EBITDA margin experience a massive jump in the numbers, affecting our analysis; this needs attention.

### 4.4.3 Financial Performance

There seem to be no particular patterns for the financial performance measures in figure 6. However, like the operational measures, the performance of the companies tells us that these companies are not the best performers. Now we will move over to look at how the transaction affects the variables.

Figure 5: Operational performance

| Year | N | Treament | AT | Revenue_Margin | OPI_Margin | EBITDA_Margin |
|---|---|---|---|---|---|---|
| 1987 | 3 | 0.00 | NaN | 0.13 | 0.05 | 0.06 |
| 1988 | 4 | 0.00 | 1.41 | 0.21 | 0.03 | 0.05 |
| 1989 | 6 | 0.17 | 1.08 | 0.35 | 0.03 | 0.08 |
| 1990 | 9 | 0.22 | 0.75 | 0.40 | -1.97 | 3.42 |
| 1991 | 10 | 0.20 | 0.80 | 0.42 | -0.96 | 0.10 |
| 1992 | 11 | 0.18 | 0.90 | 0.44 | -1.35 | -1.14 |
| 1993 | 15 | 0.33 | 1.09 | 0.32 | -0.14 | -0.05 |
| 1994 | 19 | 0.47 | 1.41 | 0.34 | 0.03 | 0.10 |
| 1995 | 27 | 0.56 | 1.47 | 0.33 | -0.34 | -0.25 |
| 1996 | 32 | 0.62 | 1.37 | 0.32 | -0.46 | -0.34 |
| 1997 | 35 | 0.60 | 1.43 | 0.36 | -0.36 | -0.23 |
| 1998 | 39 | 0.56 | 1.22 | 0.27 | -0.57 | -0.26 |
| 1999 | 40 | 0.55 | 1.32 | 0.30 | -0.21 | 0.00 |
| 2000 | 39 | 0.51 | 1.44 | 0.31 | -0.16 | -0.02 |
| 2001 | 36 | 0.47 | 1.28 | 0.34 | -1.33 | -1.10 |
| 2002 | 29 | 0.45 | 1.15 | 0.37 | -0.35 | -0.24 |
| 2003 | 24 | 0.33 | 1.15 | 0.35 | -0.13 | -0.03 |
| 2004 | 19 | 0.37 | 1.01 | 0.41 | -0.12 | -0.01 |
| 2005 | 14 | 0.43 | 1.27 | 0.39 | -0.13 | 0.01 |
| 2006 | 15 | 0.47 | 1.00 | 0.45 | 0.07 | 0.12 |
| 2007 | 15 | 0.53 | 0.79 | 0.43 | -0.03 | 0.04 |
| 2008 | 12 | 0.67 | 0.93 | 0.27 | -0.32 | -0.24 |
| 2009 | 14 | 0.64 | 0.71 | 0.35 | -0.29 | -0.11 |
| 2010 | 12 | 0.67 | 0.74 | 0.41 | -0.06 | 0.03 |
| 2011 | 13 | 0.62 | 0.67 | 0.41 | -0.08 | -0.01 |
| 2012 | 13 | 0.62 | 0.60 | 0.46 | -11.82 | -11.74 |
| 2013 | 11 | 0.73 | 0.64 | 0.38 | -30.67 | -30.57 |
| 2014 | 9 | 0.78 | 0.38 | 0.42 | -28.61 | -28.45 |
| 2015 | 10 | 0.60 | 0.29 | 0.33 | -33.84 | -33.59 |
| 2016 | 6 | 0.50 | 0.51 | 0.32 | -0.30 | -0.11 |
| 2017 | 6 | 0.50 | 0.51 | 0.39 | 0.10 | 0.23 |
| 2018 | 4 | 0.50 | 0.61 | 0.42 | 0.13 | 0.28 |
| 2019 | 4 | 0.50 | 0.58 | 0.40 | 0.09 | 0.26 |
| 2020 | 3 | 0.33 | 0.63 | 0.41 | 0.02 | 0.10 |
| 2021 | 2 | 0.00 | 1.07 | 0.56 | 0.00 | 0.07 |

Figure 6: Financial performance

| Year | N | Treament | NetCF/Assets | EBITDA/Assets |
|---|---|---|---|---|
| 1987 | 3 | 0.00 | NaN | NaN |
| 1988 | 4 | 0.00 | -0.04 | 0.07 |
| 1989 | 6 | 0.17 | 0.02 | 0.06 |
| 1990 | 9 | 0.22 | 0.01 | 0.07 |
| 1991 | 10 | 0.20 | -0.01 | 0.00 |
| 1992 | 11 | 0.18 | 0.00 | 0.00 |
| 1993 | 15 | 0.33 | 0.02 | 0.08 |
| 1994 | 19 | 0.47 | -0.06 | 0.04 |
| 1995 | 27 | 0.56 | 0.04 | 0.04 |
| 1996 | 32 | 0.62 | 0.04 | 0.01 |
| 1997 | 35 | 0.60 | -0.03 | 0.06 |
| 1998 | 39 | 0.56 | 0.06 | 0.08 |
| 1999 | 40 | 0.55 | 0.02 | 0.10 |
| 2000 | 39 | 0.51 | -0.03 | -0.01 |
| 2001 | 36 | 0.47 | -0.01 | -0.04 |
| 2002 | 29 | 0.45 | -0.05 | 0.08 |
| 2003 | 24 | 0.33 | 0.02 | 0.05 |
| 2004 | 19 | 0.37 | -0.01 | 0.05 |
| 2005 | 14 | 0.43 | -0.01 | -0.19 |
| 2006 | 15 | 0.47 | 0.03 | 0.10 |
| 2007 | 15 | 0.53 | 0.02 | 0.06 |
| 2008 | 12 | 0.67 | 0.03 | -0.03 |
| 2009 | 14 | 0.64 | -0.03 | -0.05 |
| 2010 | 12 | 0.67 | 0.02 | 0.02 |
| 2011 | 13 | 0.62 | 0.04 | 0.00 |
| 2012 | 13 | 0.62 | 0.04 | -0.06 |
| 2013 | 11 | 0.73 | 0.01 | -0.10 |
| 2014 | 9 | 0.78 | 0.09 | 0.00 |
| 2015 | 10 | 0.60 | 0.03 | -0.02 |
| 2016 | 6 | 0.50 | 0.02 | 0.06 |
| 2017 | 6 | 0.50 | 0.02 | 0.09 |
| 2018 | 4 | 0.50 | 0.06 | 0.12 |
| 2019 | 4 | 0.50 | 0.02 | 0.11 |
| 2020 | 3 | 0.33 | 0.07 | 0.07 |
| 2021 | 2 | 0.00 | -0.22 | 0.12 |

### 4.4.4 Before the transaction

Table 2 depicts the mean of the different variables for both buyout targets and leveraged buyout targets before the transaction. As aspected, they appear to be similar pre-transaction, given that each LBO transaction is matched with a similar non-LBO transaction. However, some differences seem apparent, such as total assets, current ratio, free cash flow, and net cash flow.

### 4.4.5 After the transaction

Table 3 depicts some differences post-transaction. First, there seems to be a big difference in total assets between the transactions. Not surprisingly, LBOs firms have twice the leverage amount compared to regular buyouts. The current ratio now seems no different from what it did in pre-transaction. Furthermore, EBITDA seems to be relatively higher post transaction. The free cash flow is still different from what they were in pre-transaction. However, now the EBITDA margin seems to be relatively different. Lastly, there also seems to be a difference in asset turnover.

### 4.4.6 Before vs. after the transactions

Although we can not say anything statistically yet, we can tell a bit about some patterns regarding the transactions. Let us focus on how leverage buyout targets changes due to the transaction. We observe a relatively significant asset change, which doubles after the transaction. This observation is quite a contradiction to Jensen. However, this is not necessarily the truth; the LBO targets are not the targets we should expect, so this is not a contradiction.

Although we can not say anything statistically yet, we can tell a bit about some patterns regarding the transactions. Let us focus on how leverage buyout targets changes due to the transaction. We observe a relatively significant asset change, which doubles after the transaction. This observation is quite a contradiction to Jensen. However, this is not necessarily the truth; the LBO targets are not the targets we should expect, so this is not a contradiction.

Moreover, we observe that the debt levels almost double from pre-transaction. It also seems to be a significant change in EBITDA, an almost doubling of pre-transaction. Lastly, the two significant changes are in operational margin and EBITDA margin. These changes can be explained because the firms increased their assets, making it hard to maintain the same margins.

| | Buyout | LBO |
|---|---|---|
| DEAL | 604.29 | 622.29 |
| Total Assets | 770.91 | 1026.39 |
| Current Assets | 265.71 | 192.45 |
| Current Liabilities | 211.12 | 106.55 |
| STDEBT | 37.36 | 20.99 |
| LTDEBT | 175.66 | 195.14 |
| Capital_Structure | 0.35 | 0.38 |
| Current_Ratio | 4.47 | 2.50 |
| EBITDA | 65.86 | 70.24 |
| FCF | 12.29 | -57.45 |
| NetCashflow | 20.25 | 3.63 |
| Revenue_Margin | 0.40 | 0.33 |
| Operational_Margin | -0.47 | -0.44 |
| EBITDA_MARGIN | 0.13 | -0.25 |
| EBITDA_over_Assets | 0.03 | 0.01 |
| Asset_Turnover | 1.02 | 1.22 |
| NetCF_Over_Assets | 0.01 | 0.00 |

Table 2: Before Transaction

| | Buyout | LBO |
|---|---|---|
| DEAL | 604.64 | 622.29 |
| Total Assets | 1253.96 | 2124.77 |
| Current Assets | 324.81 | 253.78 |
| Current Liabilities | 233.38 | 177.95 |
| STDEBT | 22.20 | 31.31 |
| LTDEBT | 372.05 | 759.98 |
| Capital_Structure | 0.32 | 0.59 |
| Current_Ratio | 2.13 | 2.39 |
| EBITDA | 93.94 | 128.30 |
| FCF | -11.65 | -62.56 |
| NetCashflow | 4.14 | 14.27 |
| Revenue_Margin | 0.37 | 0.32 |
| Operational_Margin | -0.14 | -7.05 |
| EBITDA_MARGIN | -0.03 | -6.90 |
| EBITDA_over_Assets | 0.05 | 0.02 |
| Asset_Turnover | 0.93 | 1.25 |
| NetCF_Over_Assets | 0.00 | 0.01 |

Table 3: After Transaction

## 4.5 Control variables

We are interested in investigating whether excessive leverage outperforms another buyout that uses less leverage. Similar characteristics match the two samples of leveraged buyout and buyout targets; however, there is still possible that the firms that receive treatment(LBOs) are based on different covariates that affect our results. We divide LBOs into a treatment group and a regular buyout into a control group; our casual inference may be incorrect if we fail to randomize this. For example, firms that go through an LBO have relatively higher free cash flow than firms that do not; LBOs can experience better operating performance than others since firms with high free cash flow might have higher inefficiency than firms that do not. Looking at table 2, the means before the transaction, firms that entail a regular buyout seem to be better performers and smaller firms than leveraged buyout targets. We can see that they have relatively more minor total assets, higher current ratio, free cash flow, net cash flow, revenue margin, and EBITDA margin. This thesis theory suggests that big and profitable companies have the best possibility for operating efficiency improvements; therefore, to avoid this problem, we include two control variables: FCF and Total Assets. It is presumed that these two variables are sufficient to explain the performance and current situation of the firms that will impact our analysis.

# 5 Methodology

I have constructed a panel data set, and I will run regression on this data set. The treatment and control group division seems to be based on covariates. I have included these variables in the model to ensure an unbiased causal effect. Furthermore, I am creating four models, one pooling model, one entity fixed effect, one time fixed effect, and lastly, a model that allows for both time and entity fixed effects. The inference on the last three models is the average causal effect.

There is sound reasoning behind using fixed effects models since our dependent variables would be dependent on some unobservable firm-specific and time-specific factors, which this model solves. To ensure robustness for inferences, I have created standard errors that take autocorrelation and heteroskedasticity into account.

# 6 Results

We divide the section into two parts, efficiency improvements, and firm behavior. For each dependent variable, there are four models, (1) no fixed effects, (2) time fixed effects, (3) firm fixed effects, and (4) both time and firm fixed effects. To ensure robustness, the t values are reported using standard errors that take autocorrelation and heteroskedasticity into account.

## 6.1 Operational performance

We have five dependent variables that attempt to explain operational performance, revenue margin, EBITDA margin, operational margin, current ratio, and asset turnover.

We start by looking at the impact on revenue margin in table 4. Our variable of interest is the interaction term between a completed transaction and a leveraged buyout(Treatment). Model 1-2 provides similar non-significant results, meaning that leveraged buyout does not, on average, improve revenue margins greater than lesser debt levels. The change in the sign for models 3-4 suggests that there might be some unobserved firm characteristics and both time and firm characteristics that impact revenue margins. As discussed above, buyouts with lower debt levels seem to be better performers and smaller companies than LBO targets. However, the t-values are very small, meaning that it is very likely that there is no difference in revenue margins between the two groups.

We should be cautious making any inferences about the variable completed since the model is not created to make inferences simply about the transaction going through or not. The reason is that the transaction spans different periods, especially around bear and bull markets; nevertheless, different industries might experience different changes. Without controlling for this, our causal inference will be incorrect. However, it is noteworthy that revenue margins seem to go down post-transaction, although this could be explained by the natural growth in booms and downs and firm and industry characteristics.

Table 4: Effect on Revenue Margin

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | Revenue_Margin | | | |
| | (1) | (2) | (3) | (4) |
| Completed | −0.015 | −0.036 | −0.025 | −0.017 |
| | t = −0.545 | t = −1.208 | t = −1.084 | t = −0.630 |
| Treatment | −0.039 | −0.035 | | |
| | t = −0.655 | t = −0.629 | | |
| FCF | 0.00001 | 0.00002 | 0.00004 | 0.0001 |
| | t = 0.196 | t = 0.362 | t = 0.799 | t = 1.488 |
| Total_Assets | 0.00001* | 0.00001 | −0.00001*** | −0.00001*** |
| | t = 1.802 | t = 1.318 | t = −6.302 | t = −6.088 |
| Completed:Treatment | −0.025 | −0.022 | 0.023 | 0.014 |
| | t = −0.571 | t = −0.486 | t = 0.628 | t = 0.383 |
| Constant | 0.374*** | | | |
| | t = 9.686 | | | |
| Observations | 490 | 490 | 490 | 490 |
| $R^2$ | 0.027 | 0.024 | 0.056 | 0.045 |
| Adjusted $R^2$ | 0.016 | −0.058 | −0.134 | −0.248 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |

In the investigation of EBITDA margins, the results seem more consistent. Although not statistically significant, our interaction term remained mainly stable across all models (1)-(4). It could seem that EBITDA margins were a bit worse for leveraged buyouts; however, the considerable negative impact suggests some firms had huge negative EBITDA margins, which can impact the analysis; these observations are something we will remove in our subsample. As mentioned before, inference about the variable completed requires caution. Here what is noteworthy is that there seem to be some unobserved firm-specific factors that impact the transaction. Observing change in the sign in model 2 suggests the possibility of omitted firm-specific factors; combining this with the large values in the interaction term, some leveraged buyouts might have unusually large negative EBITDA margins, impacting our analysis.

Table 5: Effect on EBITDA Margin

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | EBITDA_MARGIN | | | |
| | (1) | (2) | (3) | (4) |
| Completed | −0.339 | 0.184 | −0.225 | −0.245 |
| | t = −0.670 | t = 0.180 | t = −0.480 | t = −0.179 |
| Treatment | −0.577 | 0.776 | | |
| | t = −0.933 | t = 0.436 | | |
| FCF | 0.0002 | −0.002 | 0.0004 | −0.001 |
| | t = 0.188 | t = −0.416 | t = 0.366 | t = −0.444 |
| Total_Assets | 0.0003 | 0.001 | 0.0001 | 0.001 |
| | t = 1.026 | t = 1.169 | t = 0.714 | t = 1.145 |
| Completed:Treatment | −6.860 | −6.724 | −7.965 | −7.292 |
| | t = −0.930 | t = −1.032 | t = −0.947 | t = −1.055 |
| Constant | −0.100 | | | |
| | t = −0.189 | | | |
| Observations | 490 | 490 | 490 | 490 |
| $R^2$ | 0.021 | 0.035 | 0.027 | 0.038 |
| Adjusted $R^2$ | 0.011 | −0.046 | −0.169 | −0.258 |
| *Note:* | | | | $^{*}$p<0.1; $^{**}$p<0.05; $^{***}$p<0.01 |

The results seem to tell the same story as EBITDA margins, moving over to operational margins. The interaction term remains relatively negatively stable across all models, although not statistically significant. Combining the large values in the interaction term and relative change in model 2 suggests some firm-specific observation impacts the results that need attention. The operational margins seem to improve after the transaction and worse improvements for leveraged buyout targets. Nevertheless, as mentioned earlier, these inferences are extraordinarily vague and should be taken cautiously.

Table 6: Effect on operating income margin

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | Operational_Margin | | | |
| | (1) | (2) | (3) | (4) |
| Completed | 0.219 | 0.688 | 0.300 | 0.480 |
| | t = 0.731 | t = 0.757 | t = 1.011 | t = 0.381 |
| Treatment | −0.125 | 0.965 | | |
| | t = −0.237 | t = 0.538 | | |
| FCF | 0.0003 | −0.002 | 0.001 | −0.001 |
| | t = 0.333 | t = −0.397 | t = 0.706 | t = −0.367 |
| Total_Assets | 0.0003 | 0.001 | 0.0002 | 0.001 |
| | t = 1.043 | t = 1.175 | t = 0.914 | t = 1.202 |
| Completed:Treatment | −7.326 | −7.107 | −8.469 | −7.575 |
| | t = −0.994 | t = −1.092 | t = −1.008 | t = −1.096 |
| Constant | −0.781** | | | |
| | t = −2.049 | | | |
| Observations | 490 | 490 | 490 | 490 |
| $R^2$ | 0.021 | 0.035 | 0.027 | 0.040 |
| Adjusted $R^2$ | 0.010 | −0.046 | −0.169 | −0.255 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |

Now let us look at the liquidity control for the firms. The current ratio tells us how well the firm can meet its current liabilities by its current assets. Looking at the interaction term, we see two big jumps in models 2 and 4. Suggesting there might be some firm-specific factors and both firm and time factors that impact the change in liquidity control that are not included in the model. However, we see no statistically significant differences, but the liquidity control seems to improve for leveraged buyouts. There seems to be worse liquidity control for regular buyouts looking at the completed variable. However not statistically significant, and the need for caution for omitted variables; this is not a clear pattern. Also, we see that some firm and time unobserved variables impact the result by looking at the sudden increase in value in model 4.

Table 7: Effect on current ratio

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | Current_Ratio | | | |
| | (1) | (2) | (3) | (4) |
| Completed | −2.295 | −2.346 | −2.131 | −0.539 |
| | t = −0.988 | t = −1.023 | t = −1.059 | t = −0.509 |
| Treatment | −1.883 | −3.310 | | |
| | t = −0.797 | t = −0.945 | | |
| FCF | 0.001** | 0.002 | −0.0004 | 0.002 |
| | t = 2.132 | t = 1.557 | t = −0.919 | t = 1.309 |
| Total_Assets | −0.0001 | −0.0001 | 0.00000 | −0.0001* |
| | t = −1.418 | t = −1.438 | t = 0.134 | t = −1.749 |
| Completed:Treatment | 2.307 | 3.563 | 2.159 | 3.827 |
| | t = 0.964 | t = 0.965 | t = 1.052 | t = 1.011 |
| Constant | 4.525* | | | |
| | t = 1.932 | | | |
| Observations | 474 | 474 | 474 | 474 |
| $R^2$ | 0.008 | 0.013 | 0.006 | 0.009 |
| Adjusted $R^2$ | −0.003 | −0.073 | −0.196 | −0.301 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |

We observe no statistical significance in the interaction term at the asset turnover. Although it seems to be a positive pattern, it is tough to say. Here again, we observe changes in the magnitude of the variable across the models suggesting some unobserved factors related to time and firm that impact the results. The model (4) shows a negative, statistically significantly completed variable, suggesting the transaction causes worse asset turnover. Here again, we need to be cautious due to unobserved variables. The sudden change in significance and magnitude suggests the model lacks unobserved variables related to time and firm characteristics.

Table 8: Effect on asset turnover

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | Asset_Turnover | | | |
| | (1) | (2) | (3) | (4) |
| Completed | −0.061 | −0.027 | −0.071 | −0.443** |
| | t = −0.586 | t = −0.218 | t = −0.672 | t = −2.475 |
| Treatment | 0.214 | 0.205 | | |
| | t = 0.882 | t = 0.878 | | |
| FCF | 0.0002* | 0.0002* | 0.00004 | −0.00004 |
| | t = 1.854 | t = 1.794 | t = 1.468 | t = −0.610 |
| Total_Assets | −0.00005** | −0.00003* | −0.00001 | −0.00001 |
| | t = −2.299 | t = −1.716 | t = −1.336 | t = −1.182 |
| Completed:Treatment | 0.126 | 0.165 | 0.090 | 0.067 |
| | t = 0.773 | t = 1.011 | t = 0.580 | t = 0.430 |
| Constant | 1.055*** | | | |
| | t = 8.417 | | | |
| Observations | 492 | 492 | 492 | 492 |
| $R^2$ | 0.059 | 0.038 | 0.006 | 0.042 |
| Adjusted $R^2$ | 0.049 | −0.043 | −0.196 | −0.255 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |

## 6.2 Financial performance

Vi starts by investigating the effect on net cash flow over assets, which is essentially how much cash there is after operating, investing, and financing cash flows, divided by total assets. As we observe in the interaction term no significant improvement; however, there seems to be a pattern that leveraged buyouts have higher net cash flow over assets. Looking at the completed variable, a sudden increase and almost significant variable in model 4 might suggest some unobserved firm and time-specific factors affect the results.

Table 9: Effect on netcashflow/assets

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | NetCF_Over_Assets | | | |
| | (1) | (2) | (3) | (4) |
| Completed | −0.009 | −0.006 | −0.010 | 0.047 |
| | t = −0.742 | t = −0.473 | t = −0.840 | t = 1.560 |
| Treatment | −0.010 | −0.020 | | |
| | t = −0.710 | t = −1.367 | | |
| FCF | 0.00001* | 0.00002* | 0.00001 | 0.00003 |
| | t = 1.830 | t = 1.836 | t = 1.486 | t = 1.490 |
| Total_Assets | 0.00000 | −0.00000 | −0.00000 | −0.00000 |
| | t = 0.483 | t = −1.217 | t = −0.746 | t = −1.205 |
| Completed:Treatment | 0.018 | 0.020 | 0.022 | 0.027 |
| | t = 0.856 | t = 1.051 | t = 1.032 | t = 1.237 |
| Constant | 0.013 | | | |
| | t = 1.388 | | | |
| Observations | 493 | 493 | 493 | 493 |
| $R^2$ | 0.002 | 0.005 | 0.002 | 0.016 |
| Adjusted $R^2$ | −0.009 | −0.078 | −0.201 | −0.287 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |

There is little inference to EBITDA over total assets like the other metrics. In the interaction term, we see no significant impact; although the pattern seems negative, it is hard to say. We observe a change in the model (3) compared to the other models for both completed and the interaction term; this change happens when we include firm-specific characteristics. Having observed no difference in operational performance and financial performance between leveraged buyouts and buyouts with lower debt levels, how did they behave?

Table 10: Effect on EBITDA/Total assets

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | EBITDA_over_Assets | | | |
| | (1) | (2) | (3) | (4) |
| Completed | 0.018 | 0.028 | 0.005 | 0.022 |
| | t = 0.478 | t = 0.623 | t = 0.130 | t = 0.302 |
| Treatment | −0.022 | −0.010 | | |
| | t = −0.258 | t = −0.125 | | |
| FCF | 0.0001* | 0.00005 | 0.00005*** | 0.00005** |
| | t = 1.651 | t = 1.077 | t = 2.708 | t = 2.178 |
| Total_Assets | 0.00001 | 0.00001* | −0.00000* | −0.00000 |
| | t = 1.486 | t = 1.672 | t = −1.861 | t = −1.006 |
| Completed:Treatment | −0.013 | −0.019 | −0.034 | −0.017 |
| | t = −0.197 | t = −0.262 | t = −0.454 | t = −0.221 |
| Constant | 0.024 | | | |
| | t = 0.486 | | | |
| Observations | 493 | 493 | 493 | 493 |
| $R^2$ | 0.006 | 0.007 | 0.005 | 0.002 |
| Adjusted $R^2$ | −0.004 | −0.076 | −0.197 | −0.306 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |

## 6.3 Firm behavior

We saw no difference in efficiency improvements, and therefore by hypothesis 2, we should also not see any difference in the behavior. There was also little evidence for efficiency improvements; this inference needs to be very cautious due to insufficient control variables and unobserved variables affecting the results. We will now turn to how the behavior changes post transaction and if there is any difference.

We will look into three factors that might explain the change in behavior post-transaction. First, efficiency improvements should be accompanied by little or no growth in revenue and assets. A severe growth in revenue and assets might explain either that the firm grows beyond the optimal level or that it is not a mature company. Thus the motivation for growth is driven by the nature of the life cycle or empire building. Nevertheless, a firm in earlier stages by the agency theory discussed in the thesis suggests there is less room for efficiency improvements since these companies' agency costs are not as severe. We run regressions on three different dependent variables, the logarithm of revenue and assets. We use logarithms since the companies are different; therefore, revenues and assets are quite different; we can observe these growths by taking the logarithm. Lastly, we will investigate the change in the capital structure.

We move over to the regression on log revenue. We observe no significant difference in the revenue increase when looking at the interaction term. In models (3) - (4), we observe a sudden drop in the interaction term. Suggesting account for firm, both time and firm characteristics impact the revenue growth, which is purely logical, given that revenue growth is highly dependent on time, industry, and firm size. However, there seems to be a pattern that the revenue increases with significant values at the 1% level in models (1) - (3). We still need to be cautious about making inferences due to omitted variables, but there seems to be a pattern.

Table 11: Effect on log revenue

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | log_revenue | | | |
| | (1) | (2) | (3) | (4) |
| Completed | 0.568*** | 0.692*** | 0.457*** | 0.007 |
| | t = 3.701 | t = 3.752 | t = 3.192 | t = 0.043 |
| Treatment | 0.477 | 0.589 | | |
| | t = 0.985 | t = 1.185 | | |
| FCF | 0.001* | 0.001** | 0.0001 | 0.00002 |
| | t = 1.844 | t = 2.035 | t = 0.401 | t = 0.092 |
| Total_Assets | 0.0002** | 0.0002*** | 0.0001*** | 0.0001*** |
| | t = 2.502 | t = 2.637 | t = 3.319 | t = 3.086 |
| Completed:Treatment | −0.137 | −0.288 | −0.018 | −0.089 |
| | t = −0.545 | t = −0.958 | t = −0.077 | t = −0.378 |
| Constant | 4.411*** | | | |
| | t = 13.389 | | | |
| Observations | 490 | 490 | 490 | 490 |
| $R^2$ | 0.156 | 0.148 | 0.158 | 0.043 |
| Adjusted $R^2$ | 0.147 | 0.076 | −0.011 | −0.251 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |

When regressing on log assets, we remove the control variable assets. Here we observed no statistical difference in the interaction term. It is hard to say if there is any pattern that leveraged buyouts experience lower growth in assets. We observe a change in the interaction term model 3, suggesting firm specifics impact the growth, and there is a difference in firm specifics in the sample. As discussed earlier, buyout targets seemed to be smaller and better performer companies, which will impact how the firm grows. Account for different unobserved factors; we cannot find any statistical difference. However, the completed variable is not perfect for inference due to a lack of controls and unobserved variables. There still seems to be a pattern that the acquirers try to grow the companies post-transaction, and quite substantially—an average increase between 36.6% and 69.1% is a lot. However, these numbers cannot be taken for granted; looking at the data and regression on log revenue; there seems to be a motivation to increase the revenue and assets; nevertheless no sign of different behavior due to leverage. We should therefore not expect any difference in operating efficiency.

Table 12: Effect on log assets

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | log_assets | | | |
| | (1) | (2) | (3) | (4) |
| Completed | 0.611*** | 0.691*** | 0.493*** | 0.366** |
| | t = 3.509 | t = 2.712 | t = 3.111 | t = 2.201 |
| Treatment | 0.311 | 0.304 | | |
| | t = 0.670 | t = 0.667 | | |
| FCF | −0.001** | −0.001 | −0.0003 | −0.0003 |
| | t = −1.970 | t = −1.476 | t = −1.453 | t = −1.464 |
| Completed:Treatment | −0.030 | −0.188 | 0.087 | −0.040 |
| | t = −0.126 | t = −0.652 | t = 0.404 | t = −0.212 |
| Constant | 5.050*** | | | |
| | t = 14.964 | | | |
| Observations | 493 | 493 | 493 | 493 |
| $R^2$ | 0.057 | 0.040 | 0.190 | 0.042 |
| Adjusted $R^2$ | 0.049 | −0.038 | 0.027 | −0.250 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |

We, of course, when regressing on the capital structure, observe a difference in the interaction term. We observe a higher level in the capital structure ranging from 18.7%-26.8%. From models (1) - (3), the interaction term is significant at the 1% level; however only significant at 5% in the model (4). The fluctuations in the numbers due to firm, time, and time and firm variables are expected. How big the companies are, the industry, and the time; explain why the capital structure changes over time and across firms. Most importantly, we observe that these leveraged buyouts use significantly higher leverage. Before we conclude the result, I would like to perform the same analysis by removing the outliers that seemed to affect our analysis discussed earlier.

Table 13: Effect on capital structure

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | Capital_Structure | | | |
| | (1) | (2) | (3) | (4) |
| Completed | −0.023 | −0.033 | −0.053 | −0.122* |
| | t = −0.445 | t = −0.643 | t = −1.072 | t = −1.929 |
| Treatment | 0.028 | 0.092 | | |
| | t = 0.399 | t = 1.234 | | |
| FCF | −0.00004 | −0.0001 | 0.00001 | −0.00004 |
| | t = −0.412 | t = −0.683 | t = 0.143 | t = −0.775 |
| Total_Assets | −0.00001** | −0.00000 | −0.00000 | 0.00000 |
| | t = −2.013 | t = −1.092 | t = −0.614 | t = 0.110 |
| Completed:Treatment | 0.260*** | 0.192** | 0.268*** | 0.187** |
| | t = 2.704 | t = 2.117 | t = 2.751 | t = 2.188 |
| Constant | 0.353*** | | | |
| | t = 7.827 | | | |
| Observations | 482 | 482 | 482 | 482 |
| $R^2$ | 0.088 | 0.080 | 0.070 | 0.027 |
| Adjusted $R^2$ | 0.079 | 0.001 | −0.118 | −0.275 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |

## 6.4 Summary

After removing a few companies that had severe outliers and winsorizing the data, the conclusion of the results remains similar to the one we have discussed. The results of the sub-sample can be found in the appendix. So what did the results tell us? Well, we could not find any evidence that excessive leverage improves operating efficiency relative to using less leverage, which is consistent with the research of Tim C. Opler. Although our results may suggest no improvement in operating efficiency overall, this is not possible without comparing with similar target firms that did not go through a transaction since the sample goes over bear and bull markets affecting the results.

Furthermore, there was no evidence that the behavior of the firms was different when exessive leverage was implemented; quite logically, since the change in efficiency was not any different, they should behave similarly. Finally, the sample and regression results on firm behavior suggest quite a contradiction to Jensen. The firms seemed to grow and were not necessarily huge companies with much cash. We did not see any pattern of discontinuing operations and the reduction of wasteful spending. Jonathan B. Cohn, Lillian F.Mills, and Erin M. Towery also told a story where they did not find any systematically operating improvement caused by a leveraged buyout. Does this raise the question was Jensen wrong? and why does not leveraged buyout provide systematically operational performance?

# 7 Discussion

We divide this section into two parts leverage as a monitor and motivation. Jensen, Jensen, and Meckling provide a fundamental understanding of the agency theory and managerial behavior to help us understand the situation. Furthermore, we will also try to enlighten the evolution of leveraged buyouts, why they did fall, and why they are becoming popular again. Our results will also help us understand the situation.

## 7.1 Leverage as monitoring

In his paper about the free cash flow hypothesis, Jensen suggested that the monitoring effect of debt could contribute to operating efficiency.

As a result, firms with excessive leverage that should have stricter monitoring did not outperform the ones with slacker monitoring. Their behavior on firm assets and revenue was not any different from firms with lower debt levels. Furthermore, relying on the evolution of firms and financing of firms depicted by CFI and combining the theory from Jensen and Meckling about the theory of the firm, an increase in monitoring for the firms should help improve efficiency. Our sample suggests that the firms expected to have the most inefficiency are not necessarily the firms being bought.

Furthermore, an increase in ownership would improve the incentive for monitoring for shareholders. This can help explain why the exessive leverage does not improve efficiency relative to lesser debt levels; The firms are not inefficient, and the increased concentration in ownership is sufficient to provide enough monitoring for the firm. Another explanation is that creditors' monitoring is not necessarily always that good. We will investigate the matter.

To understand why creditors' monitoring might not always be that good, we need to dive into the evolution of LBOs. The first wave started in the 1980s due to the invention of the high yield bond market(Himani Singh, NYU JLB). The crash of this market suggests the capital sat loose for investors that wanted in on the action. This period experienced highly levered deals; however, the willingness to lend decreased after the crash. However, in the early 2000s, up to the financial crisis, the LBO market recovered, and so did the increased leverage. After the crash, willingness to lend decreased, and the LBO market just recently recovered to the same levels as before the financial crisis(Himani Singh, NYU JLB). This history might depict some typical behavior among creditors; in good times, getting finance is no problem, but the willingness to lend decreases when the downfall occurs. Poorly structured covenants in the 1980s and the lending market in the financial crisis are some evidence that the lending market was not quite disciplined.

Given that most of the deals were around the boom from the 2000s up to the financial crisis, it is possible that the monitoring effect would be weaker than in downfalls periods. Since most highly levered deals occur in good times, the monitoring effect might not be as good as expected. So what about the motivation for leveraged buyouts?

## 7.2 Motivation

The motivation for excessive leverage could be summarized by one word: Money. From our sample, there seems to be that acquirers do not necessarily buy firms to mainly improve operating efficiency, which can explain why there is a contradiction to Jensen. The targets were not systematically big and mature companies with high free cash flow; why? Acquirers care about one thing and one thing only, making money. They tried to acquire firms, increase their valuation, and sell them off. Increasing value is not only achieved by increasing leverage. So why leverage? First of all, acquirers cannot finance the investment solely by equity. Second, Myers and Majluf discussed that outside equity suffers from more significant mispricing due to information asymmetry than debt, and hence debt is better financing. Although these are possible explanations, I do not think these are the main reason.

### 7.2.1 Let us make some f... money

Although leveraged buyouts are perceived as very risky transactions, if I were the investors, I would do a leveraged buyout, even though lesser debt levels would provide the same efficiency improvements and change in firm behavior. As an investor, I care only about making money. Jensen and Meckling discussed the incentive problem when incorporating debt and how the behavior changes. The appetite for risk increases as the debt level rises since the investor has less to lose as the debt increases and more to gain if there is a substantial change in asset value; investors would therefore entail riskier projects. Nevertheless, the gearing effect of leverage on the equity return allows us to earn much money for small changes in firm value. In good times when the capital sits lose for creditors, investors exploit this and incorporate higher debt levels. This kind of behavior could explain the rise and fall of the leveraged buyout market. So was Jensen wrong? No, not necessarily; however, the incentive to increase debt levels is more related to gearing the return rather than as a superior method of improving efficiency. Finally, the targets that should be inefficient are not necessarily the ones being bought. Hence this also might explain why there is no systematic improvement in efficiency.

# 8 Limitations of Research

Every research has to some extent, some limitations regarding it. This thesis's most significant limitation is the availability of data. Since the buyouts often go private afterward, obtaining financial accounting data is challenging. The EIKON database provides only a fraction of information regarding the LBOs hence our inferences might be incorrect if we had the whole dataset.

To get a better grasp of the firm's behavior and inefficiencies, the analysis should include more detailed information about the behavior of the firms. Did the manager get fired after the transaction, how did the manager's compensation change, and what was the difference in ownership concentration? What about capital expenditures? Furthermore, a comparison of firms that did not go through the transactions. Moreover, what were the financial costs? It would also be interesting to investigate whether the firm got sold in the future and how much money it made. Also, looking at bankruptcy costs and bankruptcy rate is important.

Finally, the story of the rising, fall, and rise of leveraged buyouts have some issues. Leveraged buyouts have not necessarily been a success throughout history. Therefore, it would be interesting to investigate how are they working today and are they better than previously? Finally, the impact of regulations on leveraged buyouts.

# 9 Conclusion

The thesis builds on the foundation that mature firms become inefficient over time and that buyouts of these firms should lead to operating efficiency. The severe agency costs in these firms require much discipline to improve operating efficiency. Using excessive leverage to improve discipline in inefficient companies was perceived to be an excellent method. The operating efficiency was perceived to be closely related to the change in firm behavior. It was expected that the firm would discontinue operations and reduce wasteful spending since the inefficient companies grew beyond the optimal level.

However, the findings in this thesis suggest that excessive leverage does not outperform buyouts using less leverage. Explanations for these findings are that the companies being bought are not the ones one would expect that suffer from inefficiencies, and the required discipline to tackle these agency costs is potentially sufficient enough with a concentration of ownership; the firm was not inefficient, poor monitoring from creditors in bull markets, and that the motive of acquiring these companies was driven by gearing the return.

The second hypothesis is that difference in behavior should explain the potential difference in operating efficiency. Findings suggest similar behavior when excessive is implemented compared to lesser debt levels. The findings also showed that the companies experience substantial growth, which contradicts what one would expect when improving efficiency. The incentive effect of debt help explains why investors not only care about operating efficiency, they care about making money. Gearing the return and increasing value is a good enough reason to entail these transactions. I argue that Jensen is correct about the inefficiency; however, the market participants allow investors to take on excessive leverage leading to an incentive problem. To conclude, some of these reasons might explain why there is hard to prove that LBOs generate systematically operating efficiency and the history of leveraged buyouts.

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# 11 Appendix

Table 14: Effect on revenue margin - subsample

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | Revenue_Margin | | | |
| | (1) | (2) | (3) | (4) |
| Completed | 0.008 | −0.012 | −0.004 | 0.008 |
| | t = 0.343 | t = −0.410 | t = −0.229 | t = 0.327 |
| Treatment | −0.015 | −0.015 | | |
| | t = −0.288 | t = −0.285 | | |
| FCF | 0.00002 | 0.00002 | 0.0001 | 0.0001*** |
| | t = 0.243 | t = 0.339 | t = 1.432 | t = 2.634 |
| Total_Assets | 0.00001* | 0.00001** | −0.00001*** | −0.00001*** |
| | t = 1.913 | t = 2.269 | t = −5.596 | t = −4.966 |
| Completed:Treatment | −0.061 | −0.062 | −0.010 | −0.009 |
| | t = −1.484 | t = −1.354 | t = −0.311 | t = −0.244 |
| Constant | 0.340*** | | | |
| | t = 10.058 | | | |
| Observations | 450 | 450 | 450 | 450 |
| $R^2$ | 0.039 | 0.049 | 0.057 | 0.051 |
| Adjusted $R^2$ | 0.029 | −0.039 | −0.135 | −0.253 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |

Table 15: Effect on EBITDA margin - subsample

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | EBITDA_MARGIN | | | |
| | (1) | (2) | (3) | (4) |
| Completed | 0.019 | 0.021 | −0.001 | −0.168 |
| | t = 0.237 | t = 0.256 | t = −0.007 | t = −1.032 |
| Treatment | 0.094 | 0.067 | | |
| | t = 0.748 | t = 0.543 | | |
| FCF | 0.0002 | 0.0001 | 0.0003*** | 0.0003*** |
| | t = 1.119 | t = 1.062 | t = 2.718 | t = 3.025 |
| Total_Assets | 0.00002** | 0.00002* | −0.00001** | −0.00001*** |
| | t = 2.449 | t = 1.772 | t = −2.414 | t = −3.071 |
| Completed:Treatment | −0.042 | −0.004 | −0.006 | 0.041 |
| | t = −0.423 | t = −0.032 | t = −0.052 | t = 0.371 |
| Constant | −0.043 | | | |
| | t = −0.486 | | | |
| Observations | 450 | 450 | 450 | 450 |
| $R^2$ | 0.021 | 0.016 | 0.024 | 0.033 |
| Adjusted $R^2$ | 0.010 | −0.075 | −0.175 | −0.277 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |

Table 16: Effect on operating income margin - subsample

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | Operational_Margin | | | |
| | (1) | (2) | (3) | (4) |
| Completed | −0.017 | −0.012 | −0.055 | −0.276 |
| | t = −0.196 | t = −0.133 | t = −0.542 | t = −1.427 |
| Treatment | −0.055 | −0.092 | | |
| | t = −0.283 | t = −0.419 | | |
| FCF | 0.0003** | 0.0002** | 0.0002** | 0.0002** |
| | t = 1.971 | t = 1.996 | t = 2.158 | t = 2.357 |
| Total_Assets | 0.00002** | 0.00002* | −0.00001** | −0.00001** |
| | t = 2.199 | t = 1.870 | t = −2.000 | t = −2.554 |
| Completed:Treatment | 0.133 | 0.190 | 0.191 | 0.263 |
| | t = 0.759 | t = 0.862 | t = 1.032 | t = 1.169 |
| Constant | −0.115 | | | |
| | t = −1.262 | | | |
| Observations | 450 | 450 | 450 | 450 |
| $R^2$ | 0.017 | 0.018 | 0.015 | 0.023 |
| Adjusted $R^2$ | 0.006 | −0.072 | −0.186 | −0.290 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |

Table 17: Effect on current ratio - subsample

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | Current_Ratio | | | |
| | (1) | (2) | (3) | (4) |
| Completed | −0.263 | −0.270 | −0.420 | 0.237 |
| | t = −0.683 | t = −0.715 | t = −1.162 | t = 0.739 |
| Treatment | −0.050 | −0.123 | | |
| | t = −0.102 | t = −0.219 | | |
| FCF | 0.001*** | 0.001*** | −0.0002 | 0.0005* |
| | t = 2.749 | t = 2.700 | t = −0.915 | t = 1.843 |
| Total_Assets | −0.00002 | −0.00002 | 0.00000 | −0.00002** |
| | t = −1.058 | t = −0.821 | t = 0.324 | t = −1.992 |
| Completed:Treatment | −0.097 | −0.090 | 0.025 | 0.126 |
| | t = −0.191 | t = −0.153 | t = 0.051 | t = 0.220 |
| Constant | 2.294*** | | | |
| | t = 6.039 | | | |
| Observations | 440 | 440 | 440 | 440 |
| $R^2$ | 0.020 | 0.020 | 0.015 | 0.005 |
| Adjusted $R^2$ | 0.008 | −0.073 | −0.184 | −0.316 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |

Table 18: Effect on asset turnover - subsample

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | Asset_Turnover | | | |
| | (1) | (2) | (3) | (4) |
| Completed | −0.094 | −0.023 | −0.099 | −0.410** |
| | t = −0.820 | t = −0.170 | t = −0.849 | t = −2.415 |
| Treatment | 0.190 | 0.189 | | |
| | t = 0.775 | t = 0.814 | | |
| FCF | 0.0002** | 0.0002** | 0.0001* | −0.00001 |
| | t = 1.993 | t = 2.431 | t = 1.790 | t = −0.243 |
| Total_Assets | −0.0001** | −0.00003* | −0.00001 | −0.00001 |
| | t = −2.281 | t = −1.789 | t = −1.349 | t = −1.173 |
| Completed:Treatment | 0.132 | 0.157 | 0.085 | 0.072 |
| | t = 0.759 | t = 0.894 | t = 0.526 | t = 0.429 |
| Constant | 1.144*** | | | |
| | t = 8.613 | | | |
| Observations | 451 | 451 | 451 | 451 |
| $R^2$ | 0.080 | 0.049 | 0.011 | 0.047 |
| Adjusted $R^2$ | 0.070 | −0.039 | −0.191 | −0.258 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |

Table 19: Effect on netcashflow/assets - subsample

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | NetCF_Over_Assets | | | |
| | (1) | (2) | (3) | (4) |
| Completed | −0.006 | −0.003 | −0.007 | 0.043 |
| | t = −0.485 | t = −0.230 | t = −0.599 | t = 1.498 |
| Treatment | −0.012 | −0.017 | | |
| | t = −0.867 | t = −1.212 | | |
| FCF | 0.00001* | 0.00002** | 0.00001 | 0.00003 |
| | t = 1.769 | t = 2.082 | t = 1.568 | t = 1.410 |
| Total_Assets | 0.00000 | −0.00000 | −0.00000 | −0.00000 |
| | t = 0.922 | t = −0.700 | t = −0.635 | t = −0.408 |
| Completed:Treatment | 0.012 | 0.011 | 0.016 | 0.016 |
| | t = 0.629 | t = 0.612 | t = 0.813 | t = 0.779 |
| Constant | 0.012 | | | |
| | t = 1.202 | | | |
| Observations | 452 | 452 | 452 | 452 |
| $R^2$ | 0.003 | 0.006 | 0.002 | 0.017 |
| Adjusted $R^2$ | −0.009 | −0.086 | −0.200 | −0.296 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |

Table 20: Effect on EBITDA/Total assets - subsample

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | EBITDA_over_Assets | | | |
| | (1) | (2) | (3) | (4) |
| Completed | 0.020 | 0.028 | 0.008 | 0.026 |
| | t = 0.653 | t = 0.727 | t = 0.300 | t = 0.483 |
| Treatment | 0.020 | 0.024 | | |
| | t = 0.294 | t = 0.381 | | |
| FCF | 0.0001* | 0.00004 | 0.0001*** | 0.0001*** |
| | t = 1.849 | t = 1.077 | t = 2.976 | t = 2.675 |
| Total_Assets | 0.00000 | 0.00001 | −0.00000* | −0.00000 |
| | t = 1.235 | t = 1.213 | t = −1.898 | t = −1.532 |
| Completed:Treatment | −0.052 | −0.050 | −0.069 | −0.062 |
| | t = −1.128 | t = −0.929 | t = −1.330 | t = −1.140 |
| Constant | 0.035 | | | |
| | t = 0.848 | | | |
| Observations | 452 | 452 | 452 | 452 |
| $R^2$ | 0.006 | 0.006 | 0.017 | 0.009 |
| Adjusted $R^2$ | −0.005 | −0.086 | −0.183 | −0.306 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |

Table 21: Effect on log revenue - subsample

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | log_revenue | | | |
| | (1) | (2) | (3) | (4) |
| Completed | 0.454*** | 0.527*** | 0.296** | −0.105 |
| | t = 3.275 | t = 3.226 | t = 2.493 | t = −0.858 |
| Treatment | 0.479 | 0.533 | | |
| | t = 1.138 | t = 1.184 | | |
| FCF | 0.001** | 0.001*** | −0.00004 | −0.00003 |
| | t = 2.012 | t = 2.646 | t = −0.260 | t = −0.193 |
| Total_Assets | 0.0002** | 0.0002** | 0.0001*** | 0.00004*** |
| | t = 2.511 | t = 2.540 | t = 4.788 | t = 3.656 |
| Completed:Treatment | −0.027 | −0.125 | 0.213 | 0.119 |
| | t = −0.133 | t = −0.475 | t = 1.183 | t = 0.589 |
| Constant | 4.779*** | | | |
| | t = 15.153 | | | |
| Observations | 450 | 450 | 450 | 450 |
| $R^2$ | 0.191 | 0.149 | 0.221 | 0.040 |
| Adjusted $R^2$ | 0.182 | 0.071 | 0.062 | −0.267 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |

Table 22: Effect on capital structure - subsample

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | Capital_Structure | | | |
| | (1) | (2) | (3) | (4) |
| Completed | −0.004 | −0.013 | −0.033 | −0.106 |
| | t = −0.077 | t = −0.243 | t = −0.608 | t = −1.633 |
| Treatment | 0.043 | 0.108 | | |
| | t = 0.590 | t = 1.384 | | |
| FCF | −0.00003 | −0.0001 | 0.00002 | −0.0001 |
| | t = −0.263 | t = −0.501 | t = 0.329 | t = −0.934 |
| Total_Assets | −0.00001** | −0.00001* | −0.00000 | −0.00000 |
| | t = −2.084 | t = −1.811 | t = −0.679 | t = −0.530 |
| Completed:Treatment | 0.252** | 0.178* | 0.262*** | 0.179** |
| | t = 2.527 | t = 1.919 | t = 2.593 | t = 1.998 |
| Constant | 0.357*** | | | |
| | t = 7.491 | | | |
| Observations | 441 | 441 | 441 | 441 |
| $R^2$ | 0.102 | 0.091 | 0.080 | 0.026 |
| Adjusted $R^2$ | 0.092 | 0.005 | −0.106 | −0.287 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |

Table 23: Effect on log assets - subsample

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | log_assets | | | |
| | (1) | (2) | (3) | (4) |
| Completed | 0.533*** | 0.485** | 0.398*** | 0.297* |
| | t = 3.067 | t = 1.976 | t = 2.630 | t = 1.741 |
| Treatment | 0.376 | 0.288 | | |
| | t = 0.814 | t = 0.657 | | |
| FCF | −0.001** | −0.001 | −0.0004 | −0.0003 |
| | t = −2.139 | t = −1.629 | t = −1.606 | t = −1.616 |
| Completed:Treatment | −0.058 | −0.164 | 0.084 | −0.044 |
| | t = −0.263 | t = −0.588 | t = 0.411 | t = −0.234 |
| Constant | 5.224*** | | | |
| | t = 14.603 | | | |
| Observations | 452 | 452 | 452 | 452 |
| $R^2$ | 0.060 | 0.033 | 0.161 | 0.042 |
| Adjusted $R^2$ | 0.052 | −0.053 | −0.006 | −0.259 |
| *Note:* | | | | *p<0.1; **p<0.05; ***p<0.01 |