

## Buyout or Sit Out?

- A Study on LBO Motives and Firm Characteristics of  
Buyout Targets in a Boom Period and in a Financial Crisis

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The subject of leveraged buyout (LBO) motives and value creation following LBO transactions has been a frequent topic in the corporate finance literature ever since the LBO phenomenon gained foothold in the society during the 1980s. The distinguishing factors between firms that go private through an LBO and comparable companies that stay in public ownership have been investigated. However, the results have rarely been compared across time periods and between industries. In this thesis, we seek to fill that gap in the existing literature by not only investigating the distinguishing factors between LBO firms and public firms, but also by separating and comparing the results of two distinct time periods in terms of LBO activity; the boom period of 2006 to 2007 and the financial crisis of 2008 to 2010, and of two industries; the manufacturing and the service industry. Using a sample of 145 LBO transactions in the US between 2006 and 2010, we compare the pre-LBO characteristics of firms that went private through an LBO with those of comparable firms that remained public. We find that there are distinguishing characteristics between LBO firms and public firms, most notably in that LBO firms have lower growth prospects and higher potential tax benefits. However, the characteristics of LBO firms, and hence the LBO motives, are sensitive both to time period and to industry. The results indicate that LBO motives cannot properly be generalized, which arguably explains the lack of consistent results in earlier research. We believe that future research could benefit from taking into account the sensitivity of LBO motives with regards to the macroeconomic environment and to industries.

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# 1 Introduction

## 1.1 Background

In October 2007, the energy company TXU was bought out from the New York Stock Exchange for a total transaction value of close to 45 billion dollars, still representing the largest leveraged buyout (LBO) to date. The transaction marked the end of what has been described as a golden era for LBOs. During the boom period in 2006 and 2007, a record amount of capital, both in nominal terms and in relation to the market, was invested in private equity. However, in 2008, the LBO industry was hit hard by the financial crisis. As financial institutions became unwilling to issue and extend debt, financing became more costly and difficult to obtain. As a result, the LBO activity fell drastically in 2008 and the LBO market subsequently collapsed in 2009. How did this rapid change in activity and market conditions affect the motives for LBO transactions between the boom period and the financial crisis? In this thesis we seek to add to the research topic of LBO motives by studying the characteristics of firms that went private through an LBO in the US. We seek to identify both differences between LBO firms and firms staying public as well as characteristical differences between LBO firms during the boom period and the financial crisis. Furthermore, we extend the analysis of LBO motives by separately studying LBO firms within the manufacturing and the service industry.

In a going private LBO, a company is typically bought out from the stock market by a private equity company financed with a substantial amount of debt. An LBO could also be an acquisition of a privately held company. However, for the purpose of this thesis, we focus on going private LBOs. Some studies furthermore differentiate between insider driven management buyouts (MBOs), outsider driven management buy-ins (MBIs) and exclusively private equity sponsored institutional buyouts (IBOs). We will use the term LBO to refer to LBOs made by private equity firms, similar to how it is used by, for instance, Kaplan and Strömberg (2008) and Officer, Ozbas and Sensoy (2010). Furthermore we will refer to a company acquired by a private equity firm in an LBO as an LBO firm or an LBO target.

A private equity firm raises closed-end funds, in which the investors provide the majority of the capital while the private equity firm actively manages the fund. The investors are commonly institutional, such as banks, insurance companies and pension funds, as well as wealthy individuals. The fund typically has a fixed lifetime of ten years where the first five years are intended for investing the committed capital in new companies and the subsequent five years are meant to return the capital to investors. Investments are generally held for between five and seven years, after which they are either sold to strategic buyers or to other private equity firms, or listed on a stock exchange through an initial public offering (Kaplan and Strömberg, 2008).

In contrast to strategic buyers, a private equity company does commonly not consider strategic fit or possible synergies when investing in companies. Instead, private equity firms seek to increase the value of their holdings using other sources of value creation. Significant research has been conducted in the area of how value is created in an LBO and if the value created could be linked to pre-LBO firm specific characteristics of the targets. If certain firm specific characteristics facilitate value creation in an LBO, the firms carrying those characteristics are arguably more attractive to private equity investors, and therefore have a higher probability of getting bought out from the stock market. As the existing shareholders in an LBO typically receive a premium over the current stock price, identifying the firm specific characteristics distinguishing LBO firms should be of special interest for investors in the capital markets.

## **1.2 Purpose and Research Questions**

Several studies have focused on identifying firm characteristics of LBO targets. However, none has isolated and compared a period of favorable macroeconomic conditions with a period of economic slowdown. Neither has any study differentiated between industries. As will be further elaborated on in Section 2.1, the LBO activity has since its appearance been cyclical and evolved over time. We therefore believe that it might be problematic to generalize characteristics of LBO firms through the economic cycles, and find it motivated to take the macroeconomic environment into consideration when studying this topic. Hence, we seek to fill a gap in the existing literature by answering the following research questions:

- 1) Do firms acquired in an LBO carry firm specific characteristics that distinguish them from firms remaining public?
- 2) Are the firm specific characteristics that distinguish LBO firms from firms remaining public different in a boom period compared to a financial crisis?
- 3) Are the results in questions 1) and 2) different when applied on the service and the manufacturing industry separately?

Using US data, we aim to answer the research questions by comparing firms that went through an LBO with firms that remained public during both the boom period in 2006 to 2007 and the financial crisis in 2008 to 2010. In short, our hypotheses are that LBO firms compared to public firms have higher free cash flows, have lower growth prospects, are more undervalued, have higher potential to benefit from tax savings, are less financially distressed, have lower cost of financial distress and are less cyclical. By testing the hypotheses on several samples we are able to compare which hypotheses act as LBO motives in the boom period compared to the financial crisis, as well as for buyouts within the service industry compared to buyouts within the manufacturing industry.

### **1.3 Main Findings**

Our main findings indicate that there are differences between firms that undergo an LBO and firms that stay in public ownership, most notably in terms of the lack of growth prospects and higher potential tax benefits among LBO firms. Furthermore, the results indicate that there are differences in the firm characteristics between LBO firms of the two time periods. First, the value creation from potential tax benefits is more important during a financial crisis. In addition, private equity companies tend to a larger extent to target distressed or near distress firms during a financial crisis, as well as less cyclical firms. Moreover, the motives for acquiring manufacturing and service companies differ, indicating that the characteristics of LBO firms are sensitive to industry. Interestingly, neither the lack of growth prospects nor the value creation from possible tax benefits are important in the decision to buy out manufacturing firms during the boom period, whereas both were found to be important for the LBOs of service firms irrespective of time period.

The paper proceeds as follows; previous literature and hypotheses will be presented in Section 2. In Section 3 we will describe our method and the variables selected. Empirical results will be presented and discussed in Section 4 followed by a conclusion in Section 5.

## **2 Previous Literature and Hypotheses**

In the previous literature, hypotheses regarding what firm specific characteristics motivate LBOs and therefore increase a firm's likelihood of becoming an LBO target have been developed and tested. In this section we will firstly present an overview of the development of the LBO industry. Subsequently, we will present and explain the hypotheses studied in this thesis and the rationale behind them. Under each hypothesis, results from earlier studies in regards to the hypothesis will also be outlined.

### **2.1 The Evolution of LBOs**

Even though debt financed acquisitions had occurred historically, it took until the late 1970s for the practice to receive attention. The private equity and LBO pioneer Kohlberg, Kravis and Roberts (KKR) was founded in 1976, and in 1979 the company acquired the Houdaille Corporation, a Fortune 500 conglomerate with 7,700 employees. As KKR financed a large part of the acquisition with debt, it required very little initial investment. However, it yielded spectacular returns to the shareholders and served as the beginning of what is commonly referred to as the first LBO wave (Appelbaum and Batt, 2012). During the 1980s, the number of LBOs grew dramatically in the US and subsequently in the UK (Renneboog and Simons, 2005), and private equity firms such as Bain Capital, Blackstone Group, Carlyle and ABRY

Partners were all founded during the decade. A study by Mitchell and Mulherin (1996) suggests that 57 percent of the public firms in the US were takeover targets or went through a major restructuring during 1982 to 1987. The US going private market concurrently increased from less than 1 billion dollars in 1979 to 60 billion dollars in 1988 (Renneboog, Simons and Wright, 2007). The transactions during the second half of the 1980s were characterized by being large in size and by being financed with an overwhelming portion of debt, often amounting to at least 90 percent of the deal value (Kaplan and Stein, 1993). Furthermore, corporate raiders and hostile takeovers were prominent during the 1980s, often followed by asset stripping (i.e. selling off a company's assets separately), corporate restructuring and the divestiture of businesses (Holmstrom and Kaplan, 2001).

By the end of the first LBO wave, the till then widespread belief of the public corporations always being beneficial compared to its private counterpart was no longer given. In 1989, Jensen, in his frequently cited article "Eclipse of the Public Corporation", even predicted a disappearance of the public corporation;

*"The publicly held corporation, the main engine of economic progress in the United States for a century, has outlived its usefulness in many sectors of the economy and is being eclipsed"*

However, after the boom during the 1980s, the junk bond market crashed and a large amount of LBOs defaulted (Kaplan and Strömberg, 2008). For instance, Kaplan and Stein (1993) found that 27 percent of their sample of 83 LBOs between 1985 and 1989 had defaulted by August 1991. The successful deals in the early 1980s attracted a large inflow of new money into the LBO market and the demand for good deals exceeded the supply, which resulted in an overheated market. Deals became overpriced and irresponsibly structured, leading to bankruptcies that in turn stemmed public and political resistance to LBO activity (Kaplan and Stein, 1993). New anti-takeover legislation and the US Tax Reform Act were introduced, and as the credit market dried up, the LBO activity abruptly slowed down to less than 4 billion dollars in 1990 (Renneboog et al., 2007).

During the first half of the 1990s, the practice of taking firms private through LBOs was virtually non-existent, as buyouts of privately held firms accounted for a majority of the private equity activity. However, after 1997, the public-to-private LBOs reappeared and the number of transactions once again increased. Private equity firms were again able to raise large amounts of debt and equity capital, which resulted in a second wave of LBOs. By this time, LBOs were motivated by the declining stock market, which made public funding costly, while low interest rates made lending cheap. The LBO activity experienced a short dip in 2000-2001, on the back

of the poor market conditions following the dot-com bubble. However, the implementation of the Sarbanes-Oxley Act in the US in 2002 increased the costs of listings substantially (Renneboog et al., 2007). The LBO market was once again growing, and reached record levels in the mid-2000s (Kaplan and Strömberg, 2008). During the years 2006 and 2007, notable transactions such as the buyouts of TXU, Equity Office Properties, HCA, and First Data closed, and new records regarding the largest LBO were set on several occasions. However, in the fall of 2007 the trend was interrupted. The collapse of the subprime mortgage market disrupted the economy and caused the credit markets to freeze. As financial institutions became unwilling to issue and extend debt, financing became both more expensive and difficult to obtain (Davidoff, 2008). The total value of LBO transactions fell drastically from 2007 to 2008 and even further in 2009, when the leveraged buyout market collapsed and deal activity was below the level of 2003 (Appelbaum and Batt, 2012).

Some differences between the first and second waves are evident. The first wave, during the 1980s, was characterized by large transactions, mainly in mature industries such as manufacturing and retail (Strömberg, 2008). The transactions during this wave were highly levered and not seldom of hostile nature. The second wave, running from the late 1990s to 2007 (with the exception of the dip in 2000-2001), however, was arguably affected by new legislation and changed corporate governance, resulting in lower leverage and less hostile takeover attempts. Concurrently, so called club deals, where multiple private equity firms jointly conduct an LBO, became a prominent acquisition strategy (Officer et al., 2010). Evidently, the LBO industry has, during its relatively short life, been subject to constant change, both with regards to deal structure, target companies and takeover strategy.

## **2.2 Hypotheses**

This thesis revolves around six hypotheses developed in the previous literature. In this section, we will present each hypothesis, both in terms of underlying rationales and in terms of results from earlier studies.

### **2.2.1 Free Cash Flow Hypothesis**

In a public firm, the agent-principal relationship between managers and shareholders might lead to conflicts and inefficiencies. Jensen (1986) argued that the problem is particularly severe in companies with substantial free cash flow, which he defined as “*cash flow in excess of that required to fund all projects that have positive net present values (NPV) when discounted at the relevant cost of capital*”. As the growth of a firm increases managers’ power and is typically correlated with their compensation, managers are incentivized to retain, rather than to distribute, free cash flow and invest it in projects below its cost of capital or waste it on

inefficiencies. Thereby, they are growing the firm beyond its optimal size. Shareholders, on the other hand, benefit more if the firm distributes the excess cash to the owners in dividends or repurchasing schemes since they then have the option to invest them elsewhere and possibly receive a higher return (Jensen, 1986).

Jensen (1986) strongly advocated LBOs, arguing that the debt raised in LBOs acts as a major control function and prevents managers from retaining the free cash flow and spend it unwisely. Debt could therefore act as a substitute for dividends because by issuing debt the company is promising to pay out excess cash in the form of interest and repayments. Interest has to be paid while dividends could be promised but never actually paid out. Hence, a firm generating high cash flows will be managed more efficiently if it has high debt and is forced to use the cash for interest payment. Jensen (1986) therefore argued that companies with high free cash flow should benefit more from removing the conflict of interest over the free cash flow and thereby be more likely to become an LBO target. The free cash flow hypothesis states the following:

- ❖ *A firm's level of free cash flow is positively correlated with the likelihood of becoming an LBO target*

Jensen's (1986) free cash flow hypothesis has generated tremendous interest in the finance literature and studies have both verified and rejected the hypothesis. Lehn and Poulsen (1989) have frequently been cited for providing support for the free cash flow hypothesis. They studied the sources of stockholder gains in going private transaction using a sample of 263 transactions in the US between 1980 and 1987, and their results suggest that the likelihood of going private is directly related to the ratio of undistributed cash flow to equity. However, when Kieschnick (1998) interpreted the data used by Lehn and Poulsen (1989) by conducting a new test taking into account particular attributes of the data and the sampling method, he arrived at a result rejecting the free cash flow hypothesis. Also rejecting the hypothesis were Halpern, Kieschnick and Rotenberg (1999). Using a sample of 126 US LBOs during 1981 to 1985, they found no evidence supporting that the average LBO firm had significantly higher levels of free cash flow than firms either acquired by another operating company or corporations remaining public. However, when Bharath and Dittmar (2006), by studying a sample of 1,060 going-private transactions between 1980 and 2004 in the US, attempted to find the source of stockholder gains in LBOs, they found strong support for the free cash flow hypothesis, but only during the 1980s.

In a European study, Betzer (2006) investigated the free cash flow hypothesis by examining buyouts led by private equity investors between 1996 and 2002. He found no support for that free cash flow after distribution is a factor influencing European companies to go private.

However, he concluded that LBO firms tend to have higher free cash flow before distribution. Yet, he did not find that to be evidence supporting the free cash flow hypothesis. Rather, he suggested that private equity firms, to be able to cover high interest payments following the LBO, pursue companies with high free cash flow before distribution. Another European study made by Nadant and Perdreau (2006) on 175 French LBOs between 1996 and 2006 also rejected the free cash flow hypothesis. The sample did, however, consist of mainly privately held and fairly small companies, which could be a reason as to why the agency conflict over free cash flows was not found to be an issue.

### **2.2.2 Growth Prospects Hypothesis**

As a part of the free cash flow hypothesis, Jensen (1986) further argued that desirable LBO candidates do not only have a substantial free cash flows, but are also often mature firms with low growth prospects. A low growth firm has few investment opportunities with positive NPV and the management is therefore more likely to spend cash on low-benefit or even value destroying investments to increase the size of the firm. Hence, firms with low growth prospects, especially in combination with high free cash flows, are more likely to become LBO targets, leading up to the following hypotheses:

- ❖ *A firm's growth prospects are negatively correlated with the likelihood of becoming an LBO target*
- ❖ *Low growth prospects in combination with a high level of free cash flow are positively correlated with the likelihood of becoming an LBO target*

Similar to their results with regards to free cash flow hypothesis, Lehn and Poulsen (1989) found support for the low growth prospect hypothesis, but Kieschnick (1998) rejected it after recreating their test. However, Denis (1992) investigated investment decisions of going private candidates during the five-year period preceding each going private proposal using the same sample as Lehn and Poulsen (1989). The results provide evidence that going private firms invested in projects that were viewed by the market as negative NPV opportunities, since the majority of the firms were met with a negative stock reaction upon investment announcement. Denis (1992) therefore concluded that one motivation of going private is the correction of poor investment strategies undertaken by the going private firms. However, nearly half of the sample firms had no reported announcements, which makes the conclusion questionable. Servaes (1994) also examined investments, by investigating whether capital expenditures of a sample of going private firms before the transaction was larger than the industry average. If a firm invests more than its industry peers it would indicate overinvestment, which would, according to Servaes' (1994) theory, act as an opportunity for private equity firms to take the company

private and reduce the inefficient investments. However, Servaes (1994) found no support for his overinvestment theory. Halpern et al. (1999) also studied investment expenditures on plant and equipment and arrived at the same result as Servaes (1994) in that no support was found for LBO firms investing more than firms remaining public. However, as emphasized by Servaes (1994), those results are not necessarily inconsistent with the growth prospects hypothesis since the study only investigated internally generated investments and not acquisitions. Furthermore, Ng (2014) actually claimed that low capital expenditures indicates low growth opportunities, and found evidence supporting his hypothesis.

With regards to the combination of low growth prospects and high free cash flows, Opler and Titman (1993) found support for the hypothesis in their study of 180 LBOs in the US during the period 1980 to 1990. However, stand-alone neither characteristic was significant.

### **2.2.3 Undervaluation Hypothesis**

In a public firm there may be asymmetric information between management and outsiders about the maximum value that can be realized with the firm's existing assets. With its superior private information, the management might find the share price undervalued and not corresponding to the true value of the firm (Renneboog et al., 2007). This potentially limits the management to use the benefits that come along with being a public corporation. For instance, it becomes more expensive for an undervalued firm to raise additional capital for new investments (Fidrmuc, Palandri, Roosenboom and van Dijk, 2012). The problem may be particularly severe for listed smaller firms having issues attracting interest from analysts, media, institutional shareholders and fund managers. The lack of public interest results in thin trading and illiquidity, implying that the share price will remain low and act as a motive for firms to leave the stock exchange (Renneboog et al., 2007). Furthermore, in the eyes of private equity investors, undervalued companies are thought to be preferred. Hence, the following hypothesis can be stated:

- ❖ *A firm's undervaluation is positively correlated with the likelihood of becoming an LBO target*

On a sample of 75 LBOs in the UK, Fidrmuc et al. (2012) found support for the undervaluation hypothesis in the sense that the sample was significantly more undervalued prior to the takeover than a control group of firms remaining public. Weir, Laing and Wright (2005b) studied a sample of 84 buyouts in the UK between 1998 and 2000 and differentiated between perceived undervaluation by management and objective undervaluation. In their study, the perceived undervaluation was defined as the deterioration of the firm's share price relative to firms remaining public, which sought to capture the management's ability to use the expected benefits of being listed. The objective undervaluation was measured as the change in enterprise value

since it provides a broader measurement of the company value. The results of Weir et al. (2005b) support that LBO firms suffer from perceived undervaluation. Their results also showed evidence of lower objective valuation, however, it does not hold if a longer period is used for comparison.

#### **2.2.4 Tax Benefit Hypothesis**

Under the tax benefit hypothesis, a firm with the potential to benefit from tax reductions would be more likely to become an LBO target. In earlier research, different sources of potential tax benefits of LBOs have been studied. Maupin (1987) found evidence for that firms going private in an MBO benefit from significant tax savings generated from increased depreciation deductions. She found that when firms go private, the book value of assets typically increases to reflect the purchase price and therefore the depreciation increases, which in turn reduces the taxes. However, the most frequently cited benefit of LBOs, according to Kosedag and Lane (2002), is reductions in tax payments stemming from the tax shield on the interest payments of the raised debt. Kaplan (1989) estimated the median tax benefit for buyout companies during the period of 1980 to 1986 to be in the range of 21 to 143 percent of the premium paid to pre-buyout shareholders. Frankfurter and Gunay (1993) concluded that large premiums paid in MBOs are mostly driven by tax subsidies of the debt and not the other way around. Hence, MBO firms did not raise debt in order to cover for the premium but to obtain the tax subsidy. However, Opler and Titman (1993) found it unlikely that LBO firms raised as much debt as they did only for the tax benefits, since LBO firms took on more debt than necessary to offset taxable profit. The tax benefit hypothesis states the following:

- ❖ *A firm's potential of benefiting from tax savings is positively correlated to the likelihood of becoming an LBO target*

Lehn and Poulsen (1989) concluded that firms going private have larger undistributed cash flows, which could enable them to take on more debt and therefore benefit from tax savings. Hence, they argued that the results could be interpreted as showing support for the tax benefit hypothesis. With this reasoning, one can assume support for the tax benefit hypothesis when the free cash flow hypothesis is supported. However, Lehn and Poulsen (1989) found no support for the hypothesis that going private firms pay more tax before the transaction than firms remaining public, and therefore benefit more from the tax shield. Conversely, using US data from 1981 to 1986, Halpern et al. (1999) found that LBO firms paid more tax before the transaction than firms remaining public.

Kaplan and Strömberg (2008) concluded that the interest tax deductions on the debt raised in an LBO create value and therefore act as incentives for an LBO. However, they argued that it

is difficult to accurately value the interest tax deductions of the additional debt raised. Furthermore, both the tax rate and the level of debt used in LBOs have declined since the 1980s and the benefit would therefore be lower for LBOs in the 1990s and the 2000s. Furthermore, the tax system has evolved since the 1980s. For example, the Tax Reform Act of 1986, in which the US Congress, among other things, lowered the top marginal corporate tax rate from 46 percent to 34 percent, created a major change in the leveraged buyout tax structure in the US (Newbould, Chatfield and Anderson, 1992).

Because several factors have changed since Kaplan's (1989) frequently cited study on tax benefit for buyout companies, Jenkinson and Stucke (2011) performed a similar analysis on more recent data. They estimated the size of the additional tax benefit available for the private equity purchasers of the 100 largest private-to-public LBOs in the US during 2003 to 2008. The results indicate strong cross-sectional relationship between tax savings and the size of the premium. Hence, previous shareholders benefit from the tax savings and it is therefore unlikely that tax savings is an important source of returns for private equity firms. On the other hand, when bidding against potential strategic acquirers, private equity firms have an advantage because they are able to pay a higher price than the strategic acquirer thanks to the future tax benefit. However, similar to Kaplan and Strömberg (2008), Jenkinson and Stucke (2011) argued that the measuring of the tax benefit is not straightforward and it has become increasingly complex as estimations have to build on a larger set of assumptions.

### **2.2.5 Financial Distress Hypothesis**

Financial distress costs cause a major concern in LBOs. Because of the high leverage, many LBO firms are threatened with financial difficulty from their inception (Opler, 1993). As discussed in the Section 2.1, problems related to financial distress were prominent during the first LBO wave. In addition to the study by Kaplan and Stein (1993), in which the authors found that 27 percent of their examined LBOs between 1985 and 1989 had defaulted by August 1991, Andrade and Kaplan (1998) found that 23 percent of the larger MBOs defaulted in the 1980s. Furthermore, for the entire sample of 124 MBOs, they estimated a financial distress cost of 10 to 20 percent of firm value.

According to Titman (1984), a firm's customers, workers and suppliers suffer in the case of bankruptcy and are therefore unwilling to do business with a firm that is in or near financial distress, which would make the firm undesirable as an acquisition target. This was confirmed in a study of European buyouts between 2000 and 2008 by Tykvová and Borell (2012), whose results suggest that private equity investors pursue companies that are less financially distressed than comparable non-buyout companies. Furthermore, in a study of 180 LBOs in the US during the 1980s, Opler and Titman (1993) found that firms with high expected financial distress costs

are less likely to go through an LBO. Hence, the two hypotheses regarding financial distress are stated as follows:

- ❖ *A firm's risk of financial distress is negatively correlated to the likelihood of becoming an LBO target*
- ❖ *A firm's expected cost of financial distress is negatively correlated to the likelihood of becoming an LBO target*

In their study from 2012, Tykvová and Borell found that the risk of financial distress increased after the buyout. Despite increased distress risk, however, the private equity backed companies had lower bankruptcy rates than the public counterparts, indicating that private equity firms could better manage distress risk (Tykvová and Borell, 2012). Opler (1993) found similar results, which he explains by the private equity firms' use of innovative financing methods. An explanation as to why private equity firms' involvement reduces bankruptcy rates after the buyout is that these firms have incentives to act in the interest of both the equity holders and the debt holders. The creditors negotiate the debt terms with private equity firms before the transactions, and since private equity firms repeatedly raise debt, it is essential for them to have a good reputation among and a good relationship with creditors (DeAngelo and DeAngelo, 1987). Hence, it is in the private equity firm's interest to maximize the value of the firm while pleasing all stakeholders (Opler, 1993). Axelson, Jenkinson, Strömberg and Weisbach (2007) further argued that the private equity firm's relationship with the lenders facilitates for renegotiation of debt contracts and that the private equity firms can inject additional equity into a portfolio company if it becomes necessary. This is also supported by Hotchkiss, Smith and Strömberg (2014), who found that private equity firms experience a more efficient resolution of financial distress. Despite some earlier research indicating that private equity firms better resolve financial distress, we expect private equity companies to prefer firms with low risk of and low expected cost of financial distress.

### **2.2.6 Cyclical Hypothesis**

According to Maupin (1987), the most significant risk in a buyout is that the company will not generate the cash flow necessary to service the large debt. Johnson (1997) argued that firms with more volatile earnings may experience problems related to covering the interest payments. Nadant and Perdreau (2006) therefore reasoned that LBO firms invest in firms with lower business risk and avoid investing in highly cyclical businesses since stable earnings and cash flows are crucial factors for a successful deal. Hence, the more cyclical the firm is, the more undesirable it is as an LBO target, since cyclical earnings limit the ability to raise debt in the transaction. The cyclical hypothesis therefore states the following:

- ❖ *A firm's cyclicality is negatively correlated with the likelihood of becoming an LBO target*

Even though Nadant and Perdreau (2006) reasoned that low business risk attracts private equity firms, their results indicated an unexpected risky profile of LBO firms. However, they used the coefficients of variation of turnover growth, return on invested capital and free cash flow in relation to turnover as proxies for business risk, which could indicate that the sample instead experienced a steady and high growth rate.

Roden and Wilbur (1995) also argued that high variability in the target firm's earnings will decrease the private equity firms' willingness to use high leverage. They therefore suggest that the greater the variability in earnings of an LBO firm, the greater portion of the deal will be financed with equity. Using a sample of 107 LBOs in the US, they found significant support for their theory.

### **3 Method**

In this section we will present the process of data collection and sampling, followed by an introduction to the testing methods and the variables used to test the hypotheses.

#### **3.1 Data and Sample Construction**

As this thesis seeks to assess the changing LBO motives over time, it is necessary to define time periods from which to construct samples. The boom period is henceforth defined as the years 2006 and 2007, where the US LBO market reached high levels both in terms of number of transactions and total deal value. The financial crisis is concurrently defined as the years 2008, 2009 and 2010, where the credit markets dried up and the LBO activity decreased substantially. Two samples will be constructed for each of the two time periods; one sample of LBO firms and, in order to form control groups (CG), one sample of companies that stayed public.

As a first step, LBO transactions between 2006-01-01 and 2010-12-31 in the US were identified. This information was collected through S&P Capital IQ according to the following criteria: announcement date of transaction between 2006-01-01 and 2010-12-31, the target company is headquartered in the US, the buyer is either a private equity company or a venture capital company, and the transaction type is going private and an LBO. This sample of LBOs was subsequently cross-checked with a corresponding sample of LBO transactions gathered via Mergermarket, with the criteria of the announcement date ranging from 2006-01-01 to 2010-12-31, the target and seller being located in the US, the bidder being either a private equity or

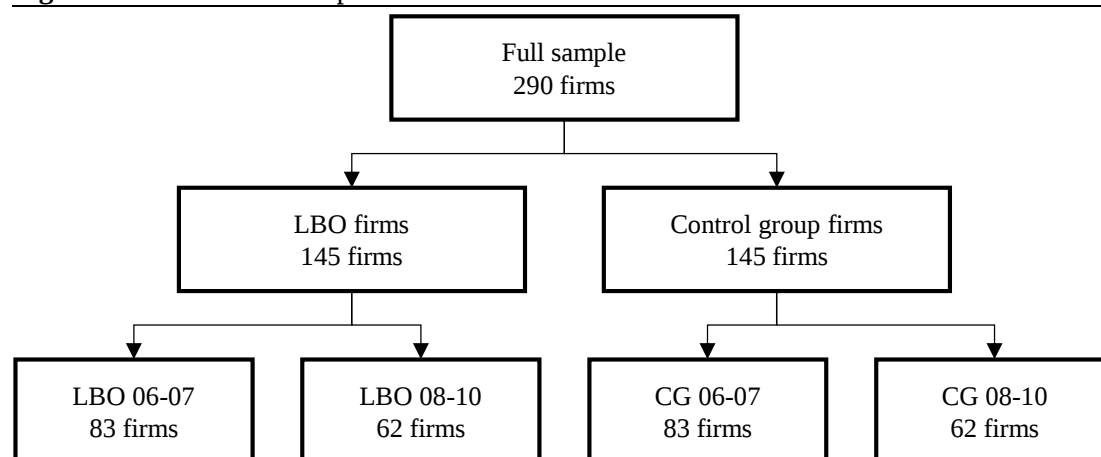
a venture capital firm, the deal arena being public and the deal type take private. In order to reach our final sample, we made a number of adjustments. First, we excluded cancelled transactions. We also excluded financial firms (with SIC codes between 6000 and 6999) because of two reasons. First, the nature of these firms' business makes balance sheet items less straightforward to interpret, which might distort financial ratios. Secondly, these firms are subject to scrutiny from financial regulatory authorities. Furthermore, we also excluded utility firms with SIC codes between 4900 and 4999 due to the risk of distorted ratios following the unique regulatory environment surrounding these firms. The resulting transactions were then reviewed on a firm-to-firm basis, and excluded if the buyer acquired a minority stake or a division, or if the target's shares traded at over-the-counter markets such as Non-NASDAQ OTC and OTC Bulletin Board. Companies with over-the-counter traded stocks often differ compared to companies listed on formal exchanges in that they do not fulfil the listing requirements of a formal exchange, and therefore face less regulation in terms of, for instance, corporate governance. Moreover, over-the-counter stocks are generally illiquid and often referred to as penny stocks on the back of their low market capitalization. Excluding these companies from the sample is thought to increase the relevance of the analysis. After adjusting the original transaction sample with the aforementioned exclusions, the total number of LBO firms amounted to 145; 83 that was bought out during the boom period, and 62 that was bought out during the financial crisis.

In order to compare the characteristics of the LBO firms with those of public firms, we constructed control group samples containing companies that were publicly owned at the time of the transaction, and that were still in public ownership on November 1, 2014. We acknowledge that there is a slight survivorship bias in our control group samples since possible control group firms were disregarded if they happened to go bankrupt (and subsequently were delisted) in between the assessed time periods and November 1, 2014. However, to avoid the risk of including firms in our control group that were bought out at a later stage, we opted to consider only the firms that were still publicly owned on November 1, 2014.

In the previous literature, control groups have predominantly been constructed using either random sampling or matched sampling. In random sampling, a sample is randomly drawn from a population, whereas matched sampling is the process of choosing a control group that is similar to the sample subject to analysis with regards to a number of pre-determined variables (Rosenbaum and Rubin, 1985). In accordance with, among others, Lehn and Poulsen (1989), Weir et al. (2005b), Betzer (2006) and Nadant and Perdreau (2006), we constructed matched samples on a 1-to-1 basis, meaning that each LBO firm was matched with one public counterpart. As Manski and McFadden (1981) show, the benefits in terms of information

content with this sampling method is evident when the likelihood of one outcome is very small compared to the other outcome in a population (in our case LBO firms versus public firms). Figure 1 illustrates the sample build-up and distribution between LBO firms, control group firms and time periods.

**Figure 1:** Overview of sample



**Notes:** CG = control group sample, LBO = LBO firm sample.

The control group samples were matched on the basis of industry and size, as represented by the four-digit SIC code and revenue measured at the fiscal year-end prior to the takeover announcement, respectively. The LBO firm was matched with a control group firm primarily based on the four-digit SIC code, and thereafter based on size. In the cases where the LBO firm had no public counterpart with the identical four-digit SIC code, the industry matching was based on the three-digit SIC code. Matching based on size increases the comparability between the LBO firm and its control group company, and by controlling for industry we ensure that the results will not be biased in a sense that one industry is over-represented in either the LBO sample or the control group sample.

As evident by Table 1, presenting an overview of the industry distribution across the full sample, the matching based on industry was successful. The most prominent industries targeted for LBOs during the assessed time period were business services, health, education, and social services as well as retail trade. The industry distribution between the two time periods is remarkably similar, indicating that the LBOs were largely focused around the same industries during both the boom period and the financial crisis. Overall, however, a wide range of industries was subject to LBOs during the examined time periods.

**Table 1:** Industry distribution of the full sample

| Industry                           | LBO 06-07<br>(# firms) | CG 06-07<br>(# firms) | LBO 08-10<br>(# firms) | CG 08-10<br>(# firms) |
|------------------------------------|------------------------|-----------------------|------------------------|-----------------------|
| Apparel, furniture, fixtures       | 3                      | 3                     | 0                      | 0                     |
| Business services                  | 18                     | 18                    | 19                     | 19                    |
| Chemicals                          | 2                      | 2                     | 4                      | 4                     |
| Construction                       | 0                      | 0                     | 1                      | 1                     |
| Consulting services                | 2                      | 2                     | 3                      | 3                     |
| Electronic equipment               | 2                      | 2                     | 4                      | 4                     |
| Health, education, social services | 12                     | 12                    | 7                      | 7                     |
| Hotels, motels                     | 3                      | 3                     | 1                      | 1                     |
| Machinery                          | 3                      | 3                     | 2                      | 2                     |
| Measuring instruments              | 5                      | 5                     | 1                      | 1                     |
| Metal                              | 3                      | 3                     | 1                      | 1                     |
| Mining                             | 0                      | 0                     | 2                      | 2                     |
| Other manufacturing                | 1                      | 1                     | 0                      | 0                     |
| Personal services                  | 1                      | 1                     | 1                      | 1                     |
| Printing, publishing               | 2                      | 2                     | 0                      | 0                     |
| Retail trade                       | 14                     | 14                    | 8                      | 8                     |
| Rubber, leather                    | 2                      | 2                     | 1                      | 1                     |
| Transportation equipment           | 2                      | 2                     | 1                      | 1                     |
| Transportation, communications     | 6                      | 6                     | 5                      | 5                     |
| Wholesale trade                    | 2                      | 2                     | 1                      | 1                     |
| Total                              | 83                     | 83                    | 62                     | 62                    |

**Notes:** Industrial classification is based on SIC codes.

In order to examine the manufacturing and service industries individually, and thereby shed light on research question number three, we used the initial LBO and CG samples and extracted firms based on SIC codes. First, we extracted the manufacturing firms, with SIC codes between 2000 and 4000, and then the service firms, defined as the firms with SIC codes between 7000 and 9999. These industry specific samples of LBO firms are outlined in Table 2 below. As our matching with regards to industry was perfect, the control group samples corresponding to the industry specific LBO samples have the same size and sub-industry distribution.

**Table 2:** Distribution of manufacturing and service LBO samples

| Manufacturing industry       |       |       | Service industry             |       |       |
|------------------------------|-------|-------|------------------------------|-------|-------|
| Industry                     | 06-07 | 08-10 | Industry                     | 06-07 | 08-10 |
| Apparel, furniture, fixtures | 3     | 0     | Business services            | 18    | 19    |
| Chemicals                    | 2     | 4     | Consulting services          | 2     | 3     |
| Electronic equipment         | 2     | 4     | Health, educ., soc. services | 12    | 7     |
| Machinery                    | 3     | 2     | Hotels, motels               | 3     | 1     |
| Measuring instruments        | 5     | 1     | Personal services            | 1     | 1     |
| Metal                        | 3     | 1     |                              |       |       |
| Other manufacturing          | 1     | 0     |                              |       |       |
| Printing, publishing         | 2     | 0     |                              |       |       |
| Rubber, leather              | 2     | 1     |                              |       |       |
| Transportation equipment     | 2     | 1     |                              |       |       |
| Total                        | 25    | 14    | Total                        | 36    | 31    |

**Notes:** This table outlines LBO firms pertaining to manufacturing industry and the service industry, respectively, for each time period. Note that the control group samples corresponding to the LBO samples outlined in this table have the same size and distribution among sub-industries as do the LBO samples. Industrial classification is based on SIC codes. Health, educ., soc. services refers to the category health, educational, social services.

The manufacturing industry is seemingly heterogeneous, with companies from ten sub-industries represented in the samples. The manufacturing LBO sample for the financial crisis contains 14 observations, which may be considered small for testing purposes. However, as sample size determination with regards to the test model in question, the logistic regression model (see Section 3.2.2), lacks consensus in the previous literature, we opted to perform the test and acknowledge that the specific results may be less robust. In the service industry samples, companies within the sub-industries business services and health, educational and social services represent a vast majority of the total sample.

Financial and company data, including the SIC codes used in the sampling process, were obtained from Datastream. For the LBO firms, data from the fiscal year-end prior to the transaction announcement date were used. The corresponding fiscal year-ends were used when retrieving data for the control groups. After retrieved, the data were subsequently manually canvassed, and if necessary complemented with data from the companies' 10-K filings. Earnings measures (i.e. EBITDA and revenue) were adjusted by adding back goodwill and other asset impairments, as it was thought to increase comparability. Before performing the tests, the data were also Winsorized at the 1 and 99 percent levels to limit outliers.

## 3.2 Test Method

The samples were tested in two steps; first in the form of univariate tests, and then in the form of multivariate tests. In the univariate tests, we tested each variable on a stand-alone basis by comparing sample means and medians through Student's t-test and Wilcoxon rank-sum test. The multivariate tests were done by estimating logistic regression models. The focus of our analysis is on the more comprehensive multivariate testing, whereas the purpose of the univariate tests is rather of descriptive nature. Further details, explanations and testing rationale are outlined below.

### 3.2.1 Univariate Testing

Univariate testing allows us to draw initial conclusions about the characteristics of the samples. In the testing we included all variables selected to proxy for the hypotheses, which will be presented and explained in Subsection 3.3. We also included the variable *revenue* in the univariate test in order to test if the sampling process was successful in terms of matching LBO firms with public firms of similar size. The testing was done both on the basis of sample means and sample medians. With Student's t-test, we tested the null hypothesis that two sample means are equal, whereas Wilcoxon rank-sum tests the null hypothesis that two independent samples are drawn from populations with an equal distribution (Wilcoxon, 1945). Student's t-test is a parametric test, assuming that the data are normally distributed, whereas the Wilcoxon rank-sum test (also known as the Mann-Whitney U test) is a non-parametric test based on ranks, therefore not assuming any particular data set distribution (McElduff, Cortina-Borja, Chan and Wade, 2010). Hence, the Wilcoxon rank-sum test is generally more applicable when the population distribution is unknown or thought to be non-normal. Parametric tests are, however, thought to have better information content as they, unlike non-parametric tests, provide estimates and confidence intervals. In similar studies, both methods have frequently been used for the purpose of univariate analysis, explaining our decision to perform both tests.

### 3.2.2 Multivariate Testing

As previously discussed, the univariate testing allows us to draw initial conclusions about the samples. However, the univariate analysis does not determine what variables actually affect the probability of going through an LBO, and hence has little predictive power. In order to assess the variables' effect on the likelihood of a firm going through an LBO, we therefore turned to the logistic regression model. The logistic regression model allows us to explore the relationship between a number of explanatory variables and a binary dependent variable, usually in the form of two contrasting outcomes (e.g. the outcome LBO or the outcome staying public) coded as 0 or 1. The probit regression model would also allow us to explore this relationship. However, arguably due to its less straightforward interpretation, the probit

regression model is rare in the previous literature, both in the LBO firm characteristics literature and the takeover prediction literature.

The logistic regression model and its coefficients are interpreted in terms of probability, i.e. what effect the explanatory variables have on the probability of the binary outcome 1. The coefficients show the change in the log of the odds ratio resulting from a one unit change in the variable. A coefficient of 0 indicates an odds ratio of 1:1 (or a probability of 50 percent), meaning that a one unit change in the variable will have no effect on the binary outcome. A negative coefficient concurrently indicates an odds ratio of less than 1:1 (or a probability of less than 50 percent), which in turn means that a one unit increase in the variable has a negative effect on the probability of the binary outcome 1. A positive coefficient has, with the same logic, a positive effect on the probability of the binary outcome 1. Hence, by examining the signs of the coefficients, we are able to identify whether the variables have negative, neutral, or positive relationships with the dependent binary variable.

In the first step of our multivariate analysis, we let the binary dependent variable take the value 1 if the firm went through a buyout (an LBO firm) and 0 if it stayed public (a control group firm). This will essentially let us estimate a model in which the relationship between the explanatory variables and the probability of belonging to the LBO firm sample becomes evident. This was done for the boom period sample and for the financial crisis sample individually. The initial models, including all the assessed variables, were then reduced to only include the variables significant at the 20 percent level. The reduction was made through backward selection, meaning that the initial model was reduced stepwise, by repeatedly excluding the least significant variable until the model only included variables significant at the set significance level (Sutter and Kalivas, 1993).

As a second step, we set the binary dependent variable equal to 1 if the firm belongs to the financial crisis sample, and 0 if it belongs to the boom period sample. We subsequently estimated two regression models: one for the LBO firms and one for the control group firms. These two models allow us to draw conclusions about what variables were significant in distinguishing the boom period LBO firms from the financial crisis LBO firms and the boom period CG firms from the financial crisis CG firms, respectively. Similar to step one, we reduced the initial models, through backward selection, to only include variables significant at the 20 percent level.

By analyzing the models estimated in these two steps we will be able to identify 1) how LBO firms differed compared to control group firms with regards to our assessed variables during the two time periods, and 2) what variables were significant in distinguishing firms from the

boom period with firms from the financial crisis. In a third step, we isolated the manufacturing companies and the service companies and performed step one and step two based on these two groups. This will enable us to assess whether the results differ between industries, and in that case how.

As a measure of goodness-to-fit, we will present the models' corresponding pseudo R-squared. However, we do acknowledge the limitations with regards to the R-squared in logistic regression models, and will therefore complement this information by presenting classification tables in which we seek to illustrate how well the models are able to classify the firms based on the true sample observations. The classification table shows the models' classification of the observations into either the outcome 0 or 1. The actual observations were inserted into our estimated model, which resulted in a predicted value of the observation of between 0 and 1. The predicted value was subsequently classified as either 0 or 1. Due to the similar number of observations in each sample, we used the cut-off point 0.5, meaning that a predicted value of at least 0.5 was classified as the outcome 1, and a predicted value of less than 0.5 was classified as a 0. This predicted value was then compared to the observations' actual outcome. Hence, the classification table enables us to compare the observed values of the dependent variable (referred to as "True" in the classification tables) with the predicted values of the dependent variable (referred to as "Classified as"). In a perfect model, 100 percent of the observations would be predicted correctly. In such a case, all observations with the observed, or true, value of 1 would be predicted as 1 according to the model. Likewise, all observations with the observed value of 0 would be predicted accordingly.

### **3.3 Variable Selection**

In order to test the hypotheses outlined in Section 2.2, it is necessary to develop testable proxy variables. The development of proxy variables is not straightforward, as made evident by the wide variety of proxy variables used in the previous literature. All the variables in our models are based on previous literature and in order not to exclude variables that may have explanatory power over the likelihood of going through an LBO, we chose to include more than one variable proxying for some of the hypotheses. We mainly included more than one variable when significantly different proxies have been used for the same hypothesis in the previous literature, and there is no consensus with regards to which variable is the most appropriate. However, we consider a hypothesis supported if at least one of the proxying variables are significant. Hence, a hypothesis is not deemed to be supported only if all of its proxying variables are supported.

A summary of the hypotheses, their corresponding proxy variables, the definitions and the expected coefficient signs (i.e. the variables' relationship with the binary dependent variable)

are outlined in Table 3. In the remaining part of this section we provide a more thorough discussion regarding the different variables used in the previous literature as well as the rationale behind them.

**Table 3:** Overview of hypotheses and variables

| Hypothesis                    | Variable        | Definition                                                                                              | Expected sign |
|-------------------------------|-----------------|---------------------------------------------------------------------------------------------------------|---------------|
| Free cash flow hypothesis     | <i>fcf</i>      | Free cash flow <sup>1</sup> /revenue                                                                    | +             |
| Growth prospects hypothesis   | <i>growth</i>   | Compound annual growth rate of revenue between t-1 and t-3                                              | –             |
| Growth prospects hypothesis   | <i>mtb</i>      | Market to book ratio <sup>2</sup>                                                                       | –             |
| Growth prospects hypothesis   | <i>capex</i>    | Capital expenditures/revenue                                                                            | +             |
| Growth prospects hypothesis   | <i>grdummy</i>  | Dummy, taking the value 1 if variable <i>fcf</i> is over median and variable <i>mtb</i> is below median | +             |
| Undervaluation hypothesis     | <i>return</i>   | Stock market return <sup>3</sup>                                                                        | –             |
| Undervaluation hypothesis     | <i>evebitda</i> | Enterprise value/EBITDA <sup>4</sup>                                                                    | –             |
| Tax benefit hypothesis        | <i>tax</i>      | Income taxes/revenue                                                                                    | +             |
| Tax benefit hypothesis        | <i>lev</i>      | Total debt/total equity                                                                                 | –             |
| Financial distress hypothesis | <i>intang</i>   | Intangible assets/total assets                                                                          | –             |
| Financial distress hypothesis | <i>altdummy</i> | Dummy, taking the value 1 if high probability of failure <sup>5</sup>                                   | –             |
| Cyclical hypothesis           | <i>stdmarg</i>  | Standard deviation of EBITDA margin between t-1 and t-4                                                 | –             |

**Notes:** All data from the fiscal year-end prior to announcement date (denoted as t-1), unless otherwise stated. 1) Free cash flow calculated as EBITDA less income taxes, interest expense and dividends. 2) Market to book is calculated as the market capitalization plus total liabilities relative to total assets. 3) Stock market return is calculated as Datastream's return index ("RI") for the share according to:  $RI(t-1)/RI(t-3) - 1$ . 4) EBITDA is short for Earnings Before Interest, Taxes, Depreciation and Amortization. 5) The probability of failure is calculated according to Altman's bankruptcy prediction models, and deemed as high if the Z-score is in Altman's "distress" zone. See further explanation in Appendix A.

### **3.3.1 Free Cash Flow**

Measuring free cash flow in accordance with Jensen's (1986) definition is problematic since such a measure requires information about the firm's set of positive net present value projects before the LBO (Halpern et al., 1999). Therefore, several, although similar, measures have been used in previous research to proxy for Jensen's (1986) definition. Lehn and Poulsen (1989) used post-tax cash flow that was not distributed to security holders as either interest or dividend payments in relation to equity as their free cash flow variable. Opler and Titman (1993) used operating income divided by assets as a proxy. However, Kieschnick (1998) questioned this selection of variable as it does not take into account dividends. Kieschnick's critique is based on evidence from a study made by Maupin, Bidwell and Ortegren (1984), in which the authors found that their sample of going-private firms was characterized by having both higher prior undistributed cash flows and higher cash dividends. Hence, since Opler and Titman (1993) did not account for cash dividends, their proxy does not reflect how much cash is retained in the firm and the actual agency costs of the free cash flow.

Betzer (2006) measured both cash flow before and after distribution to debt holders, equity holders and the government. The cash flow before distribution was a proxy for the agency problem. However, since private equity firms presumably target companies with high and stable distributed cash flows in order to cover high interest payments after the LBO, the undistributed cash flow was included in the model. As the previous variables used are very similar, we decided to include only one variable proxying for the free cash flow hypothesis. In line with Betzer (2006), Lehn and Poulsen (1989) and Nadant and Perdreau (2006), we included EBITDA less tax, interest expenses and dividends deflated by sales as a proxy for the free cash flow. We find this to be an appropriate proxy since the numerator acts as a proxy for free cash flow after distribution (and hence exclude cash paid out to equity and credit holders as well as the government), which is desirable as we want to account for the cash retained in the firm. Furthermore, we find sales to be an appropriate denominator as it gives an indication of the company's ability to convert sales to cash. As LBO targets are expected to have higher free cash flows than firms remaining public, we expect the coefficient of the variable to be positive.

### **3.3.2 Growth Prospects**

To proxy for the growth prospect hypothesis, we included a set of variables as distinctly different measures have been used in the previous literature. We included growth in sales as one proxy as it has been used in earlier studies (see Lehn and Poulsen, 1989; Nadant and Perdreau, 2006; Weir, Laing and Wright, 2005a). We expect the coefficient of the variable to be negative as LBO targets are expected to have lower growth opportunities. A disadvantage with this proxy though, as emphasized by Lehn and Poulsen (1989), is that it might measure

non-productive use of free cash flow. Furthermore, growth in sales demonstrates historical growth rather than reflects future growth. Historical growth can act as an indicator to future growth, however, this correlation is not always evident.

Another commonly used proxy for growth prospects is Tobin's  $q$ , or market to book value (see Opler and Titman, 1993; Ng, 2014; Lehn, Netter and Poulsen, 1990; Betzer, 2006). Tobin's  $q$  is the market value of a firm's assets divided by its replacement cost or reproduction cost (Tobin, 1969). According to Tobin (1969), firms with a  $q$  value less than 1 have no incentives to invest because their capital equipment is worth less than the costs of replacing. Hence, the  $q$  value captures a firm's prospects for profitable reinvestment. However, as replacement cost or reproduction cost is difficult to obtain we, similar to several earlier studies, included the market to book ratio as a proxy for Tobin's  $q$ . Research shows that the market to book ratio provides a reasonable proxy for Tobin's  $q$ , and for example Amit, Livnat, and Zarowin (1989) found that the market to book ratio and Tobin's  $q$  are highly correlated. A drawback of the market to book ratio is, however, that it could be a proxy for other hypotheses. For example, Fidrmuc et al. (2012) used the market to book value as a proxy for undervaluation. Since we expect growth prospects to have a negative relationship with the probability of going through an LBO, we expect the coefficient of the market to book variable to be negative.

As a last proxy for growth opportunities we included the capital expenditures to sales ratio. This variable is a proxy for overinvestment, in accordance with earlier studies (see Betzer, 2006; Halpern et al., 1999). As high capital expenditures indicates overinvestments and few profitable growth opportunities, we expect the coefficient of the variable to be positive.

To proxy for the combination of high free cash flows and low growth prospects we introduced a dummy variable. The dummy variable takes the value 1 if the free cash flow variable is above the sample median and if the market to book is below the sample median. If these requirements are not met the dummy variable takes the value 0. We expect the coefficient of the dummy variable to be positive.

### **3.3.3 Undervaluation**

According to Weir et al. (2005b), undervaluation may be defined in terms of the deterioration of the company's share price relative to other public firms. If the share price decreases relative to other companies' share prices, it could indicate that the company cannot make use of the benefits of being a public company, and that the market does not value the firm correctly. We therefore included the total return to shareholders, measured from the fiscal year-end three years prior to the announcement date up until the fiscal year-end prior to the announcement date, as a proxy for undervaluation, and expect the coefficient of the variable to be negative.

Furthermore, to not only focus on the equity value, but also on the value of the whole firm, we included the enterprise value (EV) in relation to the earnings before interest, taxes, depreciation and amortization (EBITDA) as a proxy for undervaluation. Some earlier studies have used the price-to-earnings ratio as a measure of undervaluation (e.g. Loh, 1992; Betzer, 2006). However, since we want to capture the value of the entire firm, not only the equity, and the actual cash flow generated by the firm we included the EV to EBITDA ratio, and expect the coefficient of the variable to be negative. Furthermore, this measure is also suitable because it is a common multiple used by private equity firms (Gompers and Lerner, 2000).

### **3.3.4 Tax Benefit**

To proxy for the potential tax benefit, previous studies have used the firm's tax level (e.g. Nadant and Perdreau, 2006; Lehn and Poulsen, 1989; Weir et al., 2005b; Renneboog et al., 2007). We included the tax level, defined as the tax expense divided by revenue, as a proxy and expect it to be positively correlated with the likelihood of becoming an LBO target, since a company that pays higher taxes would be more incentivized to decrease its tax payments. Several studies (e.g. Weir et al., 2005b; Renneboog et al., 2007) have, in addition, used the leverage ratio as a proxy because it indicates how much additional debt a firm can raise. With this reasoning, a firm with a low leverage ratio is more attractive since it has the ability to generate higher tax shields from the incremental debt raised. Therefore we included the leverage ratio, as we define as the ratio of financial debt to total equity. The proxy is expected to be negative as a firm with larger capacity to take on more debt would be a more attractive buyout target.

### **3.3.5 Financial Distress**

To proxy for the expected cost of financial distress, we included intangible assets in relation to total assets. According to John (1993), the most important cost of liquidation is the destruction of going-concern value that occurs when assets are sold to pay down debt. The cost of financial distress will be higher for firms whose assets are more intangible since the value of intangible assets depends on the firm's assets base being kept together. When selling the assets separately, intangible assets generate the largest value loss. This is further argued for by Axelson, Jenkinson, Strömberg and Weisbach (2013), who suggested that costs of financial distress are likely to be higher for firms with more intangible assets. As we expect private equity investors to prefer targets with low financial distress costs, we expect the coefficient of the intangible assets to total assets ratio to be negative.

Tykvová and Borell (2012) measured the risk of financial distress with three different models; the Zmijewski-score (Zmijewski, 1984), the O-score (Griffin and Lemmon, 2002; Ohlson, 1980) and Altman's Z-score (Altman, 1968). All the three measures indicated that private

equity firms pursued companies with lower financial distress risk. Gleason, Payne and Wiggernhorn (2007) as well as Halpern, Kieschnick and Rotenberg (2009) also included Altman's Z-score as a measure of financial risk. In line with this research, we used Altman's Z-score as a proxy for financial distress risk. We used Altman's original bankruptcy prediction model for manufacturing companies and the extended non-manufacturing bankruptcy prediction model for non-manufacturers (Altman, 1968; Altman, 2000). We included a dummy variable taking the value 1 if the firm according to Altman's Z-score lies in the "distress" zone, which for manufacturing firms is defined as a Z-score below 1.8 and for non-manufacturers below 1.1 (Altman, 1968; Altman, 2000). We expect the coefficient of the dummy variable to be negative.

### **3.3.6 Cyclicalities**

As a proxy for cyclicalities, we included the standard deviation of operating margins, defined as EBITDA divided by revenue, from the four fiscal year-ends leading up to the transaction announcement. Since the standard deviation of operating margins captures volatility in operating performance, which is more often high for cyclical companies, we consider it an appropriate indicator of a firm's cyclicalities. Kaplan and Stein (1993) used a similar proxy, defined as the standard deviation of the growth rate of operating margins, as a measure of total risk. However, one difficulty with the both our cyclicalities measure and the total risk measure in Kaplan and Stein (1993) is that a firm with sequential margin improvements is interpreted as being risky, which is not necessarily true. As we expect private equity firms to prefer less cyclical companies, we expect the coefficient of the variable to be negative.

## **4 Empirical Results and Analysis**

In this section we will present our results and analyze them according to the hypotheses outlined in Section 2.2. First, we present our findings related to the full sample, and then we extend our analysis by examining the service and manufacturing industries.

### **4.1 Full Sample**

For the full sample, including all firms irrespective of industry, the results are first presented in the form of a univariate analysis in 4.1.1. This is followed by logistic regressions models to further assess the differences between the LBO companies and the control group firms. Furthermore, in Section 4.1.3 we present results related to differences between the time periods, where we identify differences between the LBO firms acquired during the boom period and those acquired during the financial crisis. The section is concluded with an analysis.

#### **4.1.1 Univariate Analysis**

Table 4 presents the results from the univariate analysis. As described in Section 3.2.1, the basis for the univariate analysis is Student's t-test that lets us test the null hypothesis of no difference between our samples' means. The Wilcoxon rank-sum test complements the analysis by testing the null hypothesis that the samples are drawn from populations with an equal distribution. As described in Section 3.2.1, we included all our variables in the univariate testing as well as the variable *revenue*, in order to test whether the matching process was successful in terms of matching companies with similar size.

##### **4.1.1.1 Boom Period**

The univariate results indicate that there is no statistically significant difference in terms of revenue between the boom period LBO firms and the boom period control group, which is interpreted as our matching process having been successful with regards to size. There is a statistically significant difference between the market to book ratios of the LBO firms and the control group during this time period. This preliminary supports the growth prospects hypothesis, stating that LBO firms have lower growth prospects compared to the public firms. Furthermore, the variable *return* shows that the shares of the LBO firms underperformed those of the control group firms, which is in accordance with the undervaluation hypothesis. This hypothesis is further supported by the economically significant difference in EV to EBITDA between the samples. The control group companies were on average valued at 11.5 times EBITDA, whereas the corresponding number for the LBO firms amounted to 9.5 times EBITDA.

##### **4.1.1.2 Financial Crisis**

The difference in size between LBO firms and control group firms during the financial crisis is not statistically significant, which shows that the matching based on size was successful for the financial crisis samples as well. In general, the univariate results indicate similar characteristic differences between the two financial crisis samples as between the boom period samples. Market to book is on average significantly lower for the bought out firms than for the control group firms. Both the differences in EV to EBITDA and in stock market returns are economically significant, though not statistically significant. Since both variables are lower for LBO firms than for firms remaining public, this could indicate that the LBO firms, in accordance with the undervaluation hypothesis, during the financial crisis were undervalued relative to their public counterparts. The results further indicate that the LBO firms unexpectedly had higher intangible assets relative to total assets, which is directly contradicting the financial distress hypothesis stating that higher expected cost of financial distress is negatively correlated with a firm's probability of going through an LBO. Though not

statistically significant, there is a noticeable difference between both the tax level and the leverage of LBO firms compared to the firms remaining public. On average, LBO firms had a tax level of 2.70 percent of revenues the fiscal year prior to the buyout, compared to the control group firms' corresponding number of 1.95 percent. The average leverage of the LBO firms amounted to 53 percent during the period, which was cogently lower than the leverage of 69 percent for the control group firms. These results could indicate support for the tax benefit hypothesis.

#### **4.1.1.3 Difference between the Time Periods**

This subsection is concluded with the between-period results, as presented in the “06-07 vs 08-10” column in Table 4. The momentarily contrasting LBO market environment between the two time periods is made evident by the size of the acquired firms. The average revenue of the firms bought out during the financial crisis amounted to 619 million dollars, which is a substantial drop from the average revenue size of 1,888 million dollars during the boom period. Furthermore, the market to book ratios of LBO firms from the financial crisis were significantly lower than those of the firms that were acquired during the boom period. As a result of the suffering financial markets during the financial crisis, both the valuation in terms of EV to EBITDA and the stock market performance were expectedly lower during this time period. The probability of bankruptcy, as captured by the dummy variable *altdummy*, and the cyclicity, measured by the variable *stdmarg*, were on the other hand significantly higher for LBO firms during the financial crisis.

**Table 4:** Results from the univariate testing

|                             | 06-07 |        |        |       |        |                | 08-10 |        |        |       |        |                | 06-07 vs. 08-10 |                |
|-----------------------------|-------|--------|--------|-------|--------|----------------|-------|--------|--------|-------|--------|----------------|-----------------|----------------|
|                             | LBO   |        |        | CG    |        |                | LBO   |        |        | CG    |        |                | T-test (mean)   |                |
|                             | Mean  |        | Median | Mean  |        | Median         | Mean  |        | Median | Mean  |        | Median         | LBO             | CG             |
|                             | Mean  | Median |        | Mean  | Median |                | Mean  | Median |        | Mean  | Median |                |                 |                |
| <i>revenue</i> <sup>1</sup> | 1,888 | 601    |        | 1,589 | 575    | 298            | 619   | 292    |        | 707   | 372    | -88            | <b>1,269***</b> | <b>882***</b>  |
| <i>fcf</i>                  | 0.07  | 0.08   |        | 0.08  | 0.09   | -0.01          | 0.03  | 0.08   |        | 0.05  | 0.07   | -0.03          | 0.04            | 0.03           |
| <i>growth</i>               | 0.12  | 0.09   |        | 0.13  | 0.10   | 0.00           | 0.10  | 0.07   |        | 0.10  | 0.06   | 0.00           | 0.02            | 0.03           |
| <i>mtb</i>                  | 1.77  | 1.61   |        | 2.15  | 1.86   | <b>-0.38**</b> | 1.53  | 1.30   |        | 2.00  | 1.50   | <b>-0.47**</b> | <b>0.24*</b>    | 0.15           |
| <i>capex</i>                | 0.06  | 0.03   |        | 0.06  | 0.04   | 0.00           | 0.05  | 0.03   |        | 0.07  | 0.03   | -0.02          | 0.01            | -0.01          |
| <i>grdummy</i>              | 0.22  | 0.00   |        | 0.14  | 0.00   | 0.07           | 0.18  | 0.00   |        | 0.13  | 0.00   | 0.05           | 0.04            | 0.02           |
| <i>return</i>               | 0.25  | 0.06   |        | 0.44  | 0.24   | <b>-0.19*</b>  | -0.25 | -0.33  |        | -0.07 | -0.26  | -0.18          | <b>0.49***</b>  | <b>0.51***</b> |
| <i>evebitda</i>             | 9.51  | 8.92   |        | 11.50 | 9.10   | -1.99          | 7.06  | 6.54   |        | 9.39  | 6.81   | -2.33          | <b>2.45**</b>   | 2.12           |
| <i>tax</i>                  | 0.03  | 0.03   |        | 0.03  | 0.02   | 0.00           | 0.03  | 0.02   |        | 0.02  | 0.01   | 0.01           | 0.00            | 0.01           |
| <i>lev</i>                  | 0.88  | 0.28   |        | 0.93  | 0.33   | -0.05          | 0.53  | 0.13   |        | 0.69  | 0.17   | -0.16          | 0.36            | 0.24           |
| <i>intang</i>               | 0.25  | 0.20   |        | 0.21  | 0.13   | 0.05           | 0.27  | 0.27   |        | 0.20  | 0.11   | <b>0.07*</b>   | -0.02           | 0.01           |
| <i>altdummy</i>             | 0.11  | 0.00   |        | 0.16  | 0.00   | -0.05          | 0.34  | 0.00   |        | 0.24  | 0.00   | 0.10           | <b>-0.23***</b> | -0.09          |
| <i>stdmarg</i>              | 0.04  | 0.02   |        | 0.05  | 0.02   | -0.01          | 0.07  | 0.03   |        | 0.09  | 0.04   | -0.03          | <b>-0.03*</b>   | <b>-0.05**</b> |

**Notes:** 1) *revenue* is not a variable used for testing, but is included in the above table for sample description purposes. *revenue* is expressed in million USD; *tax*, *lev*, *fcf*, *capex*, *growth*, *return*, *intang* and *stdmarg* are expressed as percent in decimal form; *mtb* and *evebitda* are expressed as multiples; *grdummy* and *altdummy* are dummy variables. An overview of the variables and their definitions is found in Section 3.3 and Appendix A. The T-test tests the null hypotheses that the means are equal between the LBO group and the control group. The Wilcoxon test tests the null hypothesis that the samples are drawn from populations with an equal distribution. The T-test and Wilcoxon columns present the differences between the means and medians, respectively. The column "06-07 vs. 08-10" tests the null hypotheses that the means for the LBO groups and the control groups, respectively, are the same between the time periods. \* indicates significance at the 10% level; \*\* indicates significance at the 5% level; \*\*\* indicates significance at the 1% level.

#### 4.1.2 Logistic Regressions

In order to capture the relationship between explanatory variables we estimated logistic regression models. As explained in Section 3.2.2, the multivariate testing serves as the basis for our analysis. We estimate two initial logistic regression models; Model I 2006-2007 based on the transactions during the boom period and Model I 2008-2010 based on the transactions during the financial crisis. The logistic regression models have a binary dependent variable, which in the case of Model I equals 1 if the firm was bought out and 0 if it stayed in public ownership. The coefficients reveal the change in the log of the odds ratio of a one unit increase of the variable. Hence, the coefficients show the effect in terms of the probability of the dependent variable taking the value 1, meaning that a positive sign indicates a positive correlation between the explanatory variable and the probability of the outcome 1. To exclude the variables insignificantly affecting the probability of the outcome, a final logistic regression model is estimated for both time periods. In these models, denoted Model II 2006-2007 and Model II 2008-2010, the initial models are reduced to only include variables significant at the 20 percent level. The estimated coefficients and their statistical significance, along with the expected sign according to Section 3.3, of the models are outlined in Table 5 below.

**Table 5:** Logistic regression models for the full sample

| Variables       | Expected Sign | Model I<br>2006-2007 | Model II<br>2006-2007 | Model I<br>2008-2010 | Model II<br>2008-2010 |
|-----------------|---------------|----------------------|-----------------------|----------------------|-----------------------|
| <i>Constant</i> |               | <b>1.142**</b>       | <b>0.956**</b>        | 0.477                | 0.446                 |
| <i>fcf</i>      | +             | -1.591               |                       | -1.302               | -1.302                |
| <i>growth</i>   | -             | 0.146                |                       | 0.413                |                       |
| <i>mtb</i>      | -             | <b>-0.639**</b>      | <b>-0.617***</b>      | -0.441               | <b>-0.543**</b>       |
| <i>capex</i>    | +             | 1.337                |                       | -1.115               |                       |
| <i>grdummy</i>  | +             | <b>-0.194*</b>       |                       | 0.064                |                       |
| <i>return</i>   | -             | -0.366               | -0.375                | -0.345               |                       |
| <i>evebitda</i> | -             | -0.016               |                       | -0.022               |                       |
| <i>tax</i>      | +             | <b>13.909*</b>       | <b>13.039**</b>       | <b>12.926**</b>      | <b>12.619**</b>       |
| <i>lev</i>      | -             | 0.051                |                       | 0.013                |                       |
| <i>intang</i>   | -             | 0.857                |                       | 1.091                | 1.204                 |
| <i>altdummy</i> | -             | -0.504               |                       | 0.774                | <b>0.947*</b>         |
| <i>stdmarg</i>  | -             | -3.166               |                       | -4.269               | <b>-4.094*</b>        |
| Number of obs.  |               | 166                  | 166                   | 124                  | 124                   |
| Pseudo $R^2$    |               | 0.078                | 0.059                 | 0.118                | 0.104                 |

**Notes:** The table shows logistic regression models comparing the LBO firms with the control groups during the two time periods. Model I 2006-2007 and Model I 2008-2010 are the initial models including all examined variables. Model II 2006-2007 and Model II 2008-2010 are reduced to only include the variables significant at the 20% level. Estimated coefficients are shown under each model. \* indicates significance at the 10% level; \*\* indicates significance at the 5% level; \*\*\* indicates significance at the 1% level. The variables included in Model II 2006-2007 and Model II 2008-2010 but not bold are significant at the 20% level.

#### **4.1.2.1 Boom Period**

The tax level is, as made evident by Model II 2006-2007, one of the variables most prominently affecting the probability of going private during the boom period. This finding provides support for the tax benefit hypothesis. Furthermore, the market to book ratio affects the probability of going through an LBO during the boom period. Here, the results indicate that firms with a lower market to book ratio are more likely to be acquired, which is in accordance with the growth prospects hypothesis. The stock market return is furthermore included in the Model II 2006-2007, supporting the undervaluation hypothesis.

#### **4.1.2.2 Financial Crisis**

Similar to during the boom period, relatively high levels of income taxes and a low market to book ratio increase the probability of getting bought out, which is expected according to the tax benefit hypothesis and the growth prospects hypothesis. Lower cyclicity, as proxied by the variable *stdmarg* measuring the standard deviation of operating margins, also increases this probability, as expected by the cyclicity hypothesis. The free cash flow coefficient, the coefficient of the variable intangible assets over total assets and the financial distress dummy coefficient all surprisingly have signs opposite of the expected. Hence, the free cash flow hypothesis is contradicted, as firms with lower free cash flows were more likely to get bought out during the financial crisis. Furthermore, a company with high expected financial distress costs and a relatively high probability of actually going bankrupt was more likely to be acquired during the financial crisis, both contradicting the financial distress hypothesis.

#### **4.1.2.3 Goodness-of-fit and Classification Accuracy**

The models' goodness-of-fit measure pseudo R-squared ranges, as presented in Table 5, from 5.9 and 11.8 percent, which is broadly in line with previous research, where the R-squared has typically ranged from between 5 and 20 percent (see e.g. Nadant and Perdreau, 2006; Opler and Titman, 1993). Naturally, the R-squared measures for Model II 2006-2007 and Model II 2008-2010 are lower as an effect of dropping variables from the initial models. Table 6 complements the R-squared by illustrating how the four models classified the companies based on the observations, the data, and the coefficients used in the logistic regression models.

**Table 6:** Classification tables

| Model I<br>2006-2007 |       |          |          | Model II<br>2006-2007 |          |       |          |          |          |
|----------------------|-------|----------|----------|-----------------------|----------|-------|----------|----------|----------|
| Classified as        | True  |          |          | Classified as         | True     |       |          |          |          |
|                      | LBO   | CG       | Total    |                       | LBO      | CG    | Total    |          |          |
|                      | LBO   | 59 (71%) | 39 (47%) |                       | 98       | LBO   | 55 (66%) | 40 (48%) | 95       |
|                      | CG    | 24 (29%) | 44 (53%) |                       | 68       | CG    | 28 (34%) | 43 (52%) | 71       |
|                      | Total | 83       | 83       |                       | 166 (=n) | Total | 83       | 83       | 166 (=n) |

| Model I<br>2008-2010 |       |          |          | Model II<br>2008-2010 |          |       |          |          |          |
|----------------------|-------|----------|----------|-----------------------|----------|-------|----------|----------|----------|
| Classified as        | True  |          |          | Classified as         | True     |       |          |          |          |
|                      | LBO   | CG       | Total    |                       | LBO      | CG    | Total    |          |          |
|                      | LBO   | 41 (66%) | 30 (48%) |                       | 71       | LBO   | 39 (63%) | 27 (44%) | 66       |
|                      | CG    | 21 (34%) | 32 (52%) |                       | 53       | CG    | 23 (37%) | 35 (56%) | 58       |
|                      | Total | 62       | 62       |                       | 124 (=n) | Total | 62       | 62       | 124 (=n) |

**Notes:** The table shows the classification tables for Model I 2006-2007, Model II 2006-2007, Model I 2008-2010 and Model II 2008-2010. The denotation “True” refers to the observed values of the dependent variable. “Classified as” refers to the predicted values of the dependent variables. The number in each cell is expressed in terms of number of companies, and the percentages are calculated as the number of classified companies divided by the true total sample. The bold cells highlight the correctly classified number of companies and corresponding percentages of the total true sample.

Notably, all four models managed to classify the LBO companies with a significantly better accuracy than the control group companies. Model II 2006-2007 classified 66 percent of the true LBO sample as LBO companies, and the corresponding number for Model II 2008-2010 amounted to 63 percent. At the same time, only around half of the control group companies were classified accordingly. Furthermore, in both time periods, Model I managed to correctly classify the LBO firms slightly better compared to Model II, which is arguably due to the model containing a larger set of variables.

#### 4.1.3 Differences between the Time Periods

We extend our analysis by comparing the samples over the two time periods, to see whether, and possibly how, the firm characteristics differ between the boom period and the financial crisis. Table 7 shows four logistic regression models; two initial models (Model III LBO and Model III CG) and two final models (Model IV LBO and Model IV CG). Model III LBO and

Model III CG are based on the sample of LBO firms and control group firms, respectively, and have the time period as the dependent variable. These models are subsequently reduced with the variables non-significant at the 20 percent level to yield the final models. A dependent variable value of 1 indicates that the sample firm was either, in Model III LBO and Model IV LBO, acquired during the financial crisis or, in Model III CG and Model IV CG, belongs to the control group for that time period. Hence, a positive coefficient is in Model III LBO and Model IV LBO interpreted as the variable having an increasing effect on the probability of a firm being acquired during the financial crisis as opposed to during the boom period. Likewise, in Model III CG and Model IV CG, a positive coefficient indicates a positive correlation to the probability of a firm originating from the financial crisis control group.

**Table 7:** Logistic regression models for LBO firms between time periods

| Variables             | Model III<br>LBO | Model IV<br>LBO  | Model III<br>CG  | Model IV<br>CG   |
|-----------------------|------------------|------------------|------------------|------------------|
| <i>Constant</i>       | 0.073            | −0.358           | −0.143           | <b>−0.575**</b>  |
| <i>fcf</i>            | 0.246            |                  | 1.844            | 1.353            |
| <i>growth</i>         | −1.092           |                  | −0.048           |                  |
| <i>mtb</i>            | −0.371           |                  | −0.127           |                  |
| <i>capex</i>          | −4.490           | <b>−6.480**</b>  | −2.193           |                  |
| <i>grdummy</i>        | <b>−1.002*</b>   | −0.725           | −0.049           |                  |
| <i>return</i>         | <b>−2.639***</b> | <b>−2.624***</b> | <b>−1.082***</b> | <b>−1.079***</b> |
| <i>evebitda</i>       | −0.039           | −0.045           | −0.001           |                  |
| <i>tax</i>            | <b>17.418*</b>   | 11.459           | −1.517           |                  |
| <i>lev</i>            | −0.019           |                  | −0.018           |                  |
| <i>intang</i>         | 0.148            |                  | −0.245           |                  |
| <i>altdummy</i>       | <b>1.148*</b>    | <b>1.119*</b>    | −0.223           |                  |
| <i>stdmarg</i>        | 5.629            | 5.833            | <b>7.021**</b>   | <b>5.325**</b>   |
| Number of obs.        | 145              | 145              | 145              | 145              |
| Pseudo R <sup>2</sup> | 0.263            | 0.251            | 0.125            | 0.115            |

**Notes:** The table shows two logistic regression models comparing the LBO firms during the boom period with the LBO firms during the financial crisis (Model III LBO and Model IV LBO) and two models comparing the control group firms during the boom period with the control group firms during the financial crisis (Model III CG and Model IV CG). Model III LBO and Model III CG include all variables, whereas Model IV LBO and Model IV CG only include the variables significant at the 20% level. Estimated coefficients are shown under each model. \* indicates significance at the 10% level; \*\* indicates significance at the 5% level; \*\*\* indicates significance at the 1% level. The variables included in Model IV LBO and Model IV CG but not bold are significant at the 20% level.

#### 4.1.3.1 LBO Firms

Model IV LBO reveals several differences between LBO firms that were acquired during the boom period and those that were acquired during the financial crisis. First, LBO firms during the financial crisis faced higher taxes and showed higher standard deviations of operating margins than the LBO firms did during the boom period. Moreover, the financial distress

dummy indicates that a financially distressed firm was more likely to have been acquired during the financial crisis, which is reasonable considering the poor performance of companies during this time period. On the other hand, financial crisis LBO firms' capital expenditures levels were lower, and both the valuation in terms of EV to EBITDA and the stock return suffered expectedly compared to the LBO firms from the preceding time period. The model also shows that a high growth dummy value, i.e. a combination of high free cash flows and a low market to book ratio, to a larger extent is connected to the boom period.

#### **4.1.3.2 Control Group Firms**

The above paragraph explains that the LBO firms from the two time periods differ with regards to several variables. However, there is a possibility that these differences are general and not the result of changed buyout strategies and LBO motives during the financial crisis as opposed to during the boom period. If this were the case, the same differences as outlined above should be significant in Model IV CG comparing the control groups between the two time periods. As outlined in Table 7, however, there are only three variables that significantly differ control group firms between the time periods. The stock market return and the standard deviation of operating margins are significant, both of which were significant when comparing LBO firms between the time periods as well. Furthermore, Model IV CG contains the free cash flow variable that was found to be insignificant in explaining any differences in Model IV LBO. However, the levels of capital expenditures, the growth dummy variable, the valuation in terms of EV to EBITDA, the tax levels and the financial distress dummy, that were all significant in explaining differences between the LBO firm samples in Model IV LBO, were not found significant in Model IV CG.

#### **4.1.3.3 Goodness-of-fit and Classification Accuracy**

All four models for comparing differences between time periods show relatively high goodness-of-fit and strong prediction power. Table 8 shows that the classification accuracy with regards to the boom period is superior to that of the financial crisis. All of the four models were able to accurately predict at least 80 percent of the boom period samples. The superior classification accuracy with regards to the boom period samples is partly an effect of the boom period samples being larger than the financial crisis samples, meaning that the used cut-off point of 0.5 is slightly distorting.

**Table 8:** Classification tables for differences between time periods

| Model III<br>LBO |       |                 |                 | Model IV<br>LBO |          |       |                 |                 |          |
|------------------|-------|-----------------|-----------------|-----------------|----------|-------|-----------------|-----------------|----------|
| Classified as    | True  |                 |                 | Classified as   | True     |       |                 |                 |          |
|                  | 08-10 | 06-07           | Total           |                 | 08-10    | 06-07 | Total           |                 |          |
|                  | 08-10 | <b>41 (66%)</b> | 12 (14%)        |                 | 53       | 08-10 | <b>41 (66%)</b> | 14 (17%)        | 55       |
|                  | 06-07 | 21 (34%)        | <b>71 (86%)</b> |                 | 92       | 06-07 | 21 (34%)        | <b>69 (83%)</b> | 90       |
|                  | Total | 62              | 83              |                 | 145 (=n) | Total | 62              | 83              | 145 (=n) |

| Model III<br>CG |       |                 |                 | Model IV<br>CG |          |       |                 |                 |          |
|-----------------|-------|-----------------|-----------------|----------------|----------|-------|-----------------|-----------------|----------|
| Classified as   | True  |                 |                 | Classified as  | True     |       |                 |                 |          |
|                 | 08-10 | 06-07           | Total           |                | 08-10    | 06-07 | Total           |                 |          |
|                 | 08-10 | <b>37 (60%)</b> | 15 (18%)        |                | 52       | 08-10 | <b>34 (55%)</b> | 17 (20%)        | 51       |
|                 | 06-07 | 25 (40%)        | <b>68 (82%)</b> |                | 93       | 06-07 | 28 (45%)        | <b>66 (80%)</b> | 94       |
|                 | Total | 62              | 83              |                | 145 (=n) | Total | 62              | 83              | 145 (=n) |

**Notes:** The table shows the classification tables for Model III LBO, Model IV LBO, Model III CG and Model IV CG. The denotation “True” refers to the observed values of the dependent variable. “Classified as” refers to the predicted values of the dependent variables. The number in each cell is expressed in terms of number of companies, and the percentages are calculated as the number of classified companies divided by the true total sample. The bold cells highlight the correctly classified number of companies and corresponding percentages of the total true sample.

#### 4.1.4 Analysis

The logistic regression models reveal interesting findings in terms of classification and goodness-of-fit, as seen in Table 6, in that the prediction accuracy is significantly better for the LBO firms. This essentially means that the estimated models are better at classifying LBO sample firms as LBO firms than classifying control group firms as non-LBO firms. Hence, there seem to be some homogeneity among the LBO firms, but not as strong of a homogeneity among the control sample firms; around half of the control sample firms actually have the characteristics of LBO firms.

Overall, the full sample models indicate that there are differences between the samples based on several aspects. First, a number of factors significant in determining the differences between LBO firms and the control group firms were different during the financial crisis compared to during the boom period. This is further supported by the finding that the characteristics of the

firms that went through a buyout differed between the two time periods. These findings are analyzed more in detail in terms of the previously discussed hypotheses below.

#### **4.1.4.1 Free Cash Flow Hypothesis**

The free cash flow hypothesis is not supported in either of the time periods. This is consistent with earlier studies by Kieschnick (1998), Halpern et al. (1999), Betzer (2006) and Nadant and Perdreau (2006). Interestingly, the free cash flow variable in Model II 2008-2010 indicates a negative relationship between the probability of getting bought out and the levels of free cash flow, which is directly contradicting the free cash flow hypothesis. As discussed in Section 2.2.1, the free cash flow hypothesis is based on the agent-principal relationship and managers' tendency to suboptimally make use of the free cash flow generated by the firm. However, this problem fades during a financial crisis since there is a focus shift towards handling surfaced problems such as staggering performance, illiquidity, and dried up credit markets. Campello, Graham and Campbell (2010) conducted a survey with 1,050 CFOs during the financial crisis of 2007-2008 to assess the real effects on company actions following a financial crisis. The authors found that, among other things, the financial crisis forced firms to alter their investment plans, which included cuts in spending and capital expenditures, as well as the bypassing of investment opportunities. Such company behavior suggests that the lowered relevance of the free cash flow hypothesis during the financial crisis is justified; managers are often forced to shift focus away from suboptimal investment activities.

Furthermore, the corporate governance in the US has evolved substantially since the 1980s when Jensen (1986) developed the hypothesis. From a public market with leveraged hostile takeovers and buyouts during the 1980s, the corporate governance mechanisms have shifted the focus to more incentive-based compensation, more active board of directors and increased shareholder activism (Holmstrom and Kaplan, 2001), which conceivably have reduced the inefficiencies and therefore the agency costs. Hence, the free cash flow hypothesis was arguably more relevant in the prevailing business climate by the time the hypothesis was formed, and may have lost some of its importance following the changed corporate governance and incentives systems. This provides another possible explanation for the lack of significance with regards to the free cash flow hypothesis.

Finally, as discussed in Subsection 3.3.1, the free cash flow variable is, as it does not take into account the NPV of the firms' projects, not entirely consistent with Jensen's definition of free cash flow. Hence, the lack of results with regards to the free cash flow hypothesis may also be explained by the difficulties in developing a proper proxy variable.

#### **4.1.4.2 Growth Prospect Hypothesis**

The results suggest that low growth prospects, as proxied by the market to book ratio, is one of the motives for private equity firms in their pursuit of LBO targets in both a boom period and a financial crisis. The coefficient of the market to book variable is significant and, as expected, negative in both time periods, indicating that LBO firms have poorer prospects for profitable reinvestments. The results are consistent with Bharath and Dittmar (2006) and Fidrmuc et al. (2012). However, as discussed in Section 3.3.2, Fidrmuc et al. (2012) used the market to book ratio to measure undervaluation, which suggests that the significant market to book coefficient may not only indicate support for the growth prospects hypothesis, but also for the undervaluation hypothesis.

The capital expenditures are not significantly different between LBO firms and firms remaining public during either of the periods, indicating that there is no support for private equity firms acquiring overinvesting LBO firms. This is consistent with the results of Servaes (1994) and Halpern et al. (1999). However, as emphasized by Servaes (1994), the lack of significance with regards to the capital expenditures variable does not necessarily reject the low growth prospect hypothesis, as the capital expenditures measure only captures internal investments and not external investments such as acquisitions. The results further show that the capital expenditures were lower for LBO firms during the financial crisis as opposed to during the boom period. However, as no support was found for the capital expenditures variable affecting the probability of going through an LBO in either of the time periods, this difference is not analyzed in greater detail.

The theory that LBO firms should experience higher growth in sales is not supported in any of the periods either. This finding is consistent with the results of Kieschnick (1998), Nadant and Perdreau (2006) and Fidrmuc et al. (2012). Likewise, the dummy variable combining high free cash flow and low growth prospects and consequently the hypothesis stating that this combination has a positive correlation with the probability of becoming an LBO target, is not supported in either of the time periods.

#### **4.1.4.3 Undervaluation Hypothesis**

The undervaluation hypothesis proved to be one of the motives for LBOs during the boom period, but not during the financial crisis. A higher stock market return lowered the probability of going private during the boom period, indicating that LBO firms underperformed their public counterparts prior to the transaction. However, this theory was not supported during the financial crisis, which may be the effect of stock markets acting irrationally, aggravating the deducing of clear patterns. Further supporting the undervaluation hypothesis is the significant effect of the market to book ratio, that as explained in Section 4.1.4.2 have been used not only

as a proxy for growth prospects but also for undervaluation (see e.g. Fidrmuc et al., 2012). On the other hand, no support was found for the valuation in terms of EV to EBITDA affecting the probability of getting bought out, even though there existed significant differences in the averages among the samples, as presented in the univariate analysis in Section 4.1.1. There is, however, some difficulties related to the use of EV to EBITDA for this purpose. Even though it is a widespread valuation metric both in the literature and in practice, EV to EBITDA is suboptimal when applied to large heterogeneous samples. First, the metric is not equally relevant for all industries. Second, it is not equally relevant for companies at different life cycle stages, i.e. growth companies are often valued according to other methods and metrics because of the frequent lack of earnings. Third, the EV to EBITDA multiple can yield distorted results due to firm specific characteristics such as leasing versus owning, even though the valuation is applied to companies within the same industry. Hence, the insignificant results may merely be the effect of the variable not fully capturing the relative valuation of the sample companies.

As expected, the stock market return is one of the main distinguishing factors between boom period LBO firms and financial crisis LBO firms. However, since it is also a distinguishing factor for the control groups over the two time periods, we draw the conclusion that stocks in general, and not only the stocks of LBO firms, outperformed during the boom period compared to during the financial crisis. EV to EBITDA was also found to be significantly lower for the financial crisis LBO firms compared to the boom period LBO firms, but not for the control group samples across time periods.

#### **4.1.4.4 Tax Benefit Hypothesis**

Similar to the growth prospects hypothesis, the tax benefit hypothesis was found to be one of the motives for taking a company private, supported during both the boom period and the financial crisis when using the firms' tax level as a proxy. This is consistent with the results of Halpern et al. (1999) and Nadant and Perdreau (2006) even though the data used in the study by Halpern et al. (1999) is from before the US tax reform in 1986 and the study by Nadant and Perdreau (2006) is done on French data and therefore from another tax regime. These results could also be explained by the findings in Jenkinson and Stucke (2011), indicating that the tax benefit is included in the premium and that private equity companies therefore have an advantage when bidding against other non-private equity firms. Hence, if the target company has the potential to benefit from tax reductions when debt is raised in the LBO, private equity firms are generally able to pay more than strategic buyers.

Interestingly, the tax level is significantly higher for the LBO firms that were taken private during the financial crisis as opposed to during the boom period. There is however no significant difference when comparing the tax variable across time periods for the control group

samples. Hence, the differing tax variable for LBO firms does not seem to be the result of the financial crisis itself, but rather the result of private equity investors putting more emphasis on this factor during the crisis. The reason for this we believe is twofold. First, the tax benefit hypothesis has its foundation in that private equity firms are able to lever their targets, increase the interest payments and thereby take advantage of the subsequent tax shield. Their ability of doing so increases during the financial crisis where the cost of borrowing and spreads spike (Ivashina and Scharfstein, 2010), which results in both greater interest payments and tax shields. However, this does not necessarily mean that private equity companies increase their lending, in US dollars, during a financial crisis as opposed to during a boom period, as both the size of acquired companies and the transaction sizes go down during a financial crisis (see e.g. Table 4). Second, the value creation from tax shields is, as opposed to other sources of value creation, relatively tangible and easy to foresee and model. Hence, during the unstable market conditions of a financial crisis we believe that private equity firms tend to pursue target companies with these relatively simple sources of value creation rather than companies demanding significant operational adjustments.

The results do not show support for LBO firms having lower leverage before the transaction than firms remaining public. Hence, the theory that private equity firms target companies with little debt to be able to increase the debt level and therefore obtain a larger tax benefit is not supported. However, this could be due to that even if the firm is already levered prior the transaction, the incremental debt raised in the deal is enough to offset the tax expense. Opler and Titman (1993), for example, found that in many LBOs, firms took on more debt than necessary to eliminate their taxable income.

Furthermore, the insignificant difference in leverage is consistent with earlier studies by Halpern et al. (1999) and Rao, Waters and Payne (1995). Gleason et al. (2007) even found that firms going private had higher financial leverage than their public counterparts. They argue that these firms benefit from going private by using the relatively inexpensive debt available to private equity investors to restructure the firm (Gleason et al., 2007). The study of Ivashina and Kovner (2011) could provide further support for this explanation. In the study, the authors argued that private equity firms receive favorable loan terms in the form of lower interest rates and weaker debt covenants due to their oftentimes good relationship with the bank. Private equity firms' repeated interactions with the banks reduces inefficiencies from information asymmetry, and leads to better terms as the banks want to sell other fee-based services to the private equity firms (Ivashina and Kovner, 2011). Consequently, even if the firm is already levered, these results indicate that the firm will still benefit from better lending conditions after the LBO, which raises the value of the firm.

#### **4.1.4.5 Financial Distress Hypothesis**

The results suggest that the expected cost of financial distress unexpectedly had a positive correlation to the probability of going through an LBO during the financial crisis. Furthermore, the coefficient of the dummy variable proxying for financial distress risk is, also contrary to our expectations, positive during the financial crisis. The results therefore indicate that during the financial crisis, having a high risk of financial distress increased the likelihood of becoming an LBO target. Equivalently, this indicates that private equity firms pursued distressed or near distressed targets during the crisis, which as discussed in Section 2.2.5 is a direct contradiction to the hypothesis. This trend could be explained by the findings in Tykvová and Borell (2012) as well as in Hotchkiss et al. (2014), concluding that private equity backed companies are better at handling financial distress risk. Since, as illustrated by Table 7 in Section 4.1.3, LBO firms were both more distressed and undervalued during the financial crisis compared to during the boom period, the crisis provides private equity firms with a good opportunity of acquiring firms in or near financial distress at relatively low valuations, enabling them to use their expertise and good bank relationships, as discussed in Subsection 4.1.4.5, to manage the financial distress risk. This provides a possible explanation for the attractiveness of distressed assets during the financial crisis. However, as mentioned in Section 3.1, we acknowledge the existence of survivorship bias in the control group samples, which might be extra noticeable with regards to the financial distress risk hypothesis. With the bias in mind, there is a risk of the financial distress risk in the control group being slightly understated.

#### **4.1.4.6 Cyclical Hypothesis**

LBO firms during the financial crisis were, as expected, more stable in terms of operating margins compared to the public control group. However, this difference was found insignificant during the boom period. This is not surprising since the increased interest rates and spreads arguably made private equity firms put more emphasis on the target firms' ability of covering interest payments during the financial crisis. Spontaneously, one might believe that the cyclical variable should be strongly correlated with the financial distress risk variable, therefore expecting the same sign on the two regression coefficients; opposite of what was observed for the financial crisis sample in Section 4.1.2. However, the correlation between these two variables was found to be weak for the LBO firms during the financial crisis, possibly because of the distinction between financially distressed firms and cyclical firms; a cyclical firm does not necessarily have to be financially distressed. Hence, our results indicate that private equity firms show a preference for non-cyclical firms, even though the initial thought may be that this contradicts the results with regards to the financial distress hypothesis.

Furthermore, the standard deviation of operating margins is, as expected, different between the LBO firms of the financial crisis and those of the boom period. Since the same pattern is identified for the control group firms we draw the conclusion that firms in general suffered from more volatile margins during the financial crisis compared to during the boom period, which is reasonable considering the lackluster performance and business conditions.

## **4.2 Industry Analysis**

In this section, we extend the analysis to identify any possible differences with regards to LBO motives between the service industry and the manufacturing industry. First, we estimate logistic regression models comparing the LBO firms with the control group firms for each of the two industries. Further, we assess whether there exist any differences between the time periods with regards to the LBO motives within the two industries.

Similar to the logistic regressions for the full sample, the dependent variable takes the value 1 if the firm was bought out and 0 otherwise. However, in this section we isolate the service companies that, as explained in Section 3.1, have SIC codes between 7000 and 9999, and manufacturing firms with SIC codes of between 2000 and 4000.

#### 4.2.1.1 Service Industry

Table 9 outlines the initial and final models for the service industry over the two time periods.

**Table 9:** Logistic regression models for service companies

| Variables       | Expected Sign | Model V Service 2006-2007 | Model VI Service 2006-2007 | Model V Service 2008-2010 | Model VI Service 2008-2010 |
|-----------------|---------------|---------------------------|----------------------------|---------------------------|----------------------------|
| <i>Constant</i> |               | 0.441                     | 1.275                      | 1.287                     | <b>1.268*</b>              |
| <i>fcf</i>      | +             | -2.957                    |                            | -0.697                    |                            |
| <i>growth</i>   | -             | -0.314                    |                            | 0.172                     |                            |
| <i>mtb</i>      | -             | -0.869                    | <b>-1.208**</b>            | <b>-1.406**</b>           | <b>-1.014**</b>            |
| <i>capex</i>    | +             | 3.809                     |                            | -11.189                   | <b>-16.157*</b>            |
| <i>grdummy</i>  | +             | 0.608                     |                            | -0.524                    |                            |
| <i>return</i>   | -             | -0.756                    | -0.645                     | 0.608                     |                            |
| <i>evebitda</i> | -             | -0.057                    | -0.051                     | 0.019                     |                            |
| <i>tax</i>      | +             | <b>23.061*</b>            | <b>25.727**</b>            | <b>29.931**</b>           | <b>30.593***</b>           |
| <i>lev</i>      | -             | 0.061                     |                            | -0.255                    |                            |
| <i>intang</i>   | -             | <b>3.348*</b>             | <b>2.610*</b>              | 0.124                     |                            |
| <i>altdummy</i> | -             | 1.988                     | <b>2.195*</b>              | 1.257                     | <b>1.228*</b>              |
| <i>stdmarg</i>  | -             | 3.209                     |                            | 2.636                     |                            |
| Number of obs.  |               | 72                        | 72                         | 62                        | 62                         |
| Pseudo $R^2$    |               | 0.272                     | 0.247                      | 0.221                     | 0.196                      |

**Notes:** The table shows logistic regression models comparing the LBO firms classified as service companies with the control group companies classified as service companies during the boom period (Model V 2006-2007 and Model VI 2006-2007) and during the financial crisis (Model V 2008-2010 and Model VI 2008-2010). Model V 2006-2007 and Model V 2008-2010 include all variables, whereas Model VI 2006-2007 and Model VI 2008-2010 only include the variables significant at the 20% level. Estimated coefficients are shown under each model. \* indicates significance at the 10% level; \*\* indicates significance at the 5% level; \*\*\* indicates significance at the 1% level. The variables included in Model VI 2006-2007 and Model VI 2008-2010 but not bold are significant at the 20% level.

The tax level and the market to book ratio are significantly affecting the probability of service firms getting bought out, both during the boom period and during the financial crisis. These results were expected according to the tax benefit hypothesis as well as the growth prospects hypothesis, and were also identified for the full sample. Hence, these two hypotheses are, for service companies as for the full sample, two of the most evident motives behind LBOs. Furthermore, the variable *altdummy*, indicating relatively high risk of financial distress, is unexpectedly increasing the probability of a company belonging to the LBO sample, which is also consistent over both time periods. The variable had a similar effect on the full sample during the financial crisis, which is in contradiction to the financial distress hypothesis. In explaining the private equity firms' tendency to target service firms in or close to financial distress, the same logic as for the full sample can be applied, namely that the private equity firms have a relative competitive advantage in managing financial distress risk.

Model VI 2006-2007 shows that LBO firms from the service industry during the boom period were more likely to be undervalued compared to the service firms remaining publicly owned. Moreover, service firms with higher intangible assets relative to total assets were more likely to get bought out, which is opposite of our expectations according to the financial distress hypothesis. However, another possible explanation to this variable's significance in determining the LBO probability, not directly related to financial distress costs as originally intended, is the attractiveness of service firms with a relatively high proportion of intangible assets. As Lev and Daum (2003) note, intangible assets represents a firm's capabilities and future potential. This is more prominent in the service industry, in which the companies' values to a greater extent are based on intangible assets. Hence, it may be in the interest of private equity companies to acquire and develop these assets, and subsequently realize the future gains. This provides an alternative explanation as to why the variable *intang* is significant in determining the LBO outcome for service firms during the boom period, when it was not supported for the full sample.

Capital expenditures were, as illustrated in Model VI 2008-2010, negatively correlated to the probability of getting acquired during the financial crisis, which contradicts the growth prospects hypothesis. However, as discussed in the full sample analysis (Section 4.1.4.2), capital expenditures do not capture external investments such as acquisitions, which weakens the variable's relevance as a proxy for growth prospects. This is especially prominent in the service industry, where firms generally have low capital expenditures. Another reasonable explanation to this finding is provided by Ng (2014), who expected, and got results that support, LBO firms to have lower capital expenditures since it signals low growth opportunities. Nadant and Perdreau (2006) further argue that LBO targets' activities must not require heavy investments, and that new investments have to be limited during the LBO, which also serves as an explanation for the LBO firms' lower capital expenditures levels.

#### 4.2.1.2 Manufacturing Industry

Table 10 shows the results of logistic regression models for the manufacturing industry over the two time periods.

**Table 10:** Logistic regression models for manufacturing companies

| Variables             | Expected Sign | Model VII<br>Manufacturing<br>06-07 | Model VIII<br>Manufacturing<br>06-07 | Model VII<br>Manufacturing<br>08-10 | Model VIII<br>Manufacturing<br>08-10 |
|-----------------------|---------------|-------------------------------------|--------------------------------------|-------------------------------------|--------------------------------------|
| <i>Constant</i>       |               | 0.278                               | 0.863                                | -7.386                              | -2.126                               |
| <i>fcf</i>            | +             | -9.693                              |                                      | -15.420                             | -2.364                               |
| <i>growth</i>         | -             | 3.562                               |                                      | 3.370                               |                                      |
| <i>mtb</i>            | -             | 0.195                               |                                      | 3.764                               |                                      |
| <i>capex</i>          | +             | -15.882                             | -20.270                              | -37.033                             | -14.577                              |
| <i>grdummy</i>        | +             | 0.427                               |                                      | 12.262                              |                                      |
| <i>return</i>         | -             | <b>-1.885*</b>                      | <b>-1.137*</b>                       | -5.051                              |                                      |
| <i>evebitda</i>       | -             | 0.427                               |                                      | -0.338                              |                                      |
| <i>tax</i>            | +             | 15.390                              |                                      | 134.893                             | <b>66.871**</b>                      |
| <i>lev</i>            | -             | <b>1.524*</b>                       | <b>0.953*</b>                        | -0.766                              | -0.253                               |
| <i>intang</i>         | -             | -1.092                              |                                      | 22.887                              | <b>7.671*</b>                        |
| <i>altdummy</i>       | -             | <b>-5.274*</b>                      | <b>-3.779**</b>                      | -2.626                              |                                      |
| <i>stdmarg</i>        | -             | 10.280                              |                                      | -36.757                             |                                      |
| Number of obs.        |               | 50                                  | 50                                   | 28                                  | 28                                   |
| Pseudo R <sup>2</sup> |               | 0.223                               | 0.161                                | 0.606                               | 0.320                                |

**Notes:** The table shows logistic regression models comparing the LBO firms classified as manufacturing companies with the control group companies classified as manufacturing companies during the boom period (Model VII 2006-2007 and Model VIII 2006-2007) and during the financial crisis (Model VII 2008-2010 and Model VIII 2008-2010). Model VII 2006-2007 and Model VII 2008-2010 include all variables, whereas Model VIII 2006-2007 and Model VIII 2008-2010 only include the variables significant at the 20% level. Estimated coefficients are shown under each model. \* indicates significance at the 10% level; \*\* indicates significance at the 5% level; \*\*\* indicates significance at the 1% level. The variables included in Model VIII 2006-2007 and Model VIII 2008-2010 but not bold are significant at the 20% level.

Interestingly, market to book is insignificant in affecting the LBO probability of a manufacturing firm, which is contrasting the findings with regards to the full sample and for the service industry. In addition, the probability of getting bought out is surprisingly negatively correlated to the level of capital expenditures during both time periods. Hence, the growth prospects hypothesis that is one of the most significant LBO motives for both the full sample and for the service industry, is not supported as a motive behind LBOs of manufacturing companies. The variable *tax* expectedly shows a positive correlation with the probability of getting bought out, but only during the financial crisis. This means that neither the growth prospects hypothesis, as discussed above, nor the tax benefit hypothesis can be supported for manufacturing firms during the boom period. Instead, the main motives are the undervaluation hypothesis, as proxied by the variable *return*, and the financial distress hypothesis, as proxied by *altdummy*. The undervaluation hypothesis is supported for the full sample, for the

manufacturing industry as well as for the service industry during the boom period. However, the financial distress dummy coefficient is, unlike in all other models, only found to be significantly negative in Model VIII 06-07. This finding is expected according to the financial distress hypothesis, but also provides contrasting evidence since financially distressed firms were found to be more attractive for private equity investors for the full sample during the financial crisis and for service companies during the boom period.

LBO firms from the manufacturing industry also had higher financial leverage than their public counterparts during the boom period which, although contradicts the tax benefit hypothesis, could be explained by previous research and the theory of these companies benefiting from going private by using the relatively cheap debt accessible to private equity firms to restructure the firm. However, this theory is not as applicable during the financial crisis where debt financing became more expensive, which serves as a possible explanation as to why the manufacturing LBO firms during the financial crisis were less leveraged than their public counterparts.

The free cash flow variable negatively affected the probability of manufacturing companies getting acquired during the financial crisis, opposite of what is expected according to the free cash flow hypothesis. This variable had the same effect on the full sample model for the financial crisis, but no significance was found in the model isolating the service companies. Furthermore, the variable *intang* unexpectedly showed that manufacturing firms with a higher proportion of intangible assets were more likely to be acquired during the financial crisis, which is consistent with the results from the full sample analysis. However, the variable had no explanatory power for the service industry during the financial crisis.

#### **4.2.1.3 Difference between the Time Periods**

To identify factors distinguishing service and manufacturing companies between the boom period and the financial crisis, we estimated logistic regression models with the binary dependent variable taking the value 1 if the firm originates from the financial crisis sample and 0 otherwise. Table 11 shows the four models, which in essence compare the LBO firms of the service and manufacturing industries over the two time periods.

**Table 11:** Logistic regression models for LBO firms between time periods

| Variables       | Model IX<br>Service<br>LBO | Model X<br>Service<br>LBO | Model IX<br>Manufacturing<br>LBO | Model X<br>Manufacturing<br>LBO |
|-----------------|----------------------------|---------------------------|----------------------------------|---------------------------------|
| <i>Constant</i> | −0.807                     | −0.240                    | −0.514                           | <b>−1.715**</b>                 |
| <i>fcf</i>      | 3.028                      |                           | −3.279                           |                                 |
| <i>growth</i>   | −0.824                     |                           | −1.936                           |                                 |
| <i>mtb</i>      | 0.330                      |                           | −0.774                           |                                 |
| <i>capex</i>    | <b>−20.215*</b>            | −15.921                   | 9.745                            |                                 |
| <i>grdummy</i>  | −1.394                     | <b>−1.156*</b>            | −1.279                           |                                 |
| <i>return</i>   | <b>−2.322***</b>           | <b>−2.173***</b>          | <b>−5.983**</b>                  | <b>−4.146**</b>                 |
| <i>evebitda</i> | −0.020                     |                           | −0.218                           |                                 |
| <i>tax</i>      | 18.775                     | <b>19.730*</b>            | 36.508                           |                                 |
| <i>lev</i>      | 0.062                      |                           | −0.109                           |                                 |
| <i>intang</i>   | 0.965                      |                           | 6.561                            |                                 |
| <i>altdummy</i> | <b>1.827**</b>             | <b>1.563**</b>            | −3.312                           |                                 |
| <i>stdmarg</i>  | −4.845                     |                           | 18.363                           | <b>15.641*</b>                  |
| Number of obs.  | 67                         | 67                        | 39                               | 39                              |
| Pseudo $R^2$    | 0.287                      | 0.264                     | 0.464                            | 0.371                           |

**Notes:** The table shows two logistic regression models comparing the service LBO firms during the boom period with the service LBO firms during financial crisis (Model IX Service and Model X Service) and two models comparing the manufacturing LBO firms during the boom period with the manufacturing LBO firms during the financial crisis (Model IX Manufacturing and Model X Manufacturing). Model IX Service and Model IX Manufacturing include all variables, whereas Model X Service and Model X Manufacturing only include the variables significant at the 20% level. Estimated coefficients are shown under each model. \* indicates significance at the 10% level; \*\* indicates significance at the 5% level; \*\*\* indicates significance at the 1% level. The variables included in Model X Service and Model X Manufacturing but not bold are significant at the 20% level.

Model X Service reveals several differences between the service LBO firms during the boom period and those during the financial crisis. The service companies that were bought out during the financial crisis underperformed, as measured by the variable *return*, those that were acquired during the boom period. Both the full LBO sample and the control groups showed the same characteristics, indicating that this is an effect of the poorly performing stock market during the financial crisis. Furthermore, the service companies acquired during the financial crisis had lower capital expenditures and lower growth prospects than the service companies that went through an LBO during the boom period, which is expected when considering the macroeconomic climate. However, these variables have little explanatory power in determining the outcome LBO in the two time periods, and are therefore not analyzed in further detailed.

The differing characteristics of the service LBO firms between the two time periods, as outlined in Model X Service in Table 11, largely follows the identified differences between the two time periods for the full LBO sample, as discussed in Section 4.1.4. First, private equity investors tended to, to a larger extent, target financially distressed or near financially distressed service companies during the financial crisis compared to during the boom period. Second, the LBOs

of service companies during the financial crisis were, to a larger extent, motivated by the tax benefit hypothesis.

The manufacturing LBO firms, however, are, as shown in Model X Manufacturing, difficult to distinguish between the two time periods. The only two distinguishing factors are the stock market performance and the standard deviation of margins; both of which are also significant for the full LBO sample, the control groups and for the service industry. Hence, the evidence of private equity firms to a greater extent targeting financially distressed manufacturing companies during the financial crisis is inconclusive, as is the relative importance of the tax benefit hypothesis during this time period. This contrasts the findings for the full LBO sample as well as for the service industry, where these hypotheses were found to be more prominent during the financial crisis as opposed to during the boom period.

## **5 Summary and Conclusion**

The subject of LBO motives and value creation following LBO transactions has been a frequent topic in the corporate finance literature ever since the LBO phenomenon gained foothold in the society during the 1980s. The distinguishing factors between firms that go private through an LBO and comparable companies that stay in public ownership have been investigated, however, the results have rarely been compared across time periods and between industries. In this thesis, we seek to fill that gap in the existing literature by not only investigating the distinguishing factors between LBO firms and public firms, but also by separating and comparing the results for two distinct time periods and for two industries.

Using a sample of 145 LBO transactions in the US between 2006 and 2010, we compare the pre-LBO characteristics of firms that went private through an LBO with those of comparable firms that remained public. We contribute to the existing literature by extending the analysis to include two contrasting time periods; one of which was characterized by favorable macroeconomic conditions and significant LBO activity, and one that was shadowed by economic slowdown and low LBO activity. The distinction between time periods allows us to investigate what firm specific characteristics act as motives for LBOs during the respective time periods, and subsequently how they change between the periods. Furthermore, we contribute by analyzing the characteristics of LBO firms across the two time periods separately for the service industry and the manufacturing industry.

The results indicate that there are distinguishing firm specific characteristics between LBO firms and public firms. Irrespective of time period, both the tax benefit hypothesis and the growth prospects hypothesis are supported. Hence, firms that to a larger extent are able to

benefit from tax savings and firms with low growth prospects are more likely to be targeted for an LBO. However, the tax benefit hypothesis is a stronger motive for LBOs during financial crises, arguably due to the relatively forthright realization of tax benefits compared to other sources of value creation.

Furthermore, the results indicate that the LBO motives and the firm specific characteristics of LBO targets differ between periods of different macroeconomic environment. The undervaluation hypothesis, stating that undervalued firms are more likely to go through an LBO, is supported only during boom periods. Hence, private equity investors tend to pursue undervalued targets during boom periods, but not to the same extent during financial crises. On the other hand, the cyclical hypothesis, suggesting that less cyclical firms are more attractive in the eyes of private equity firms, is significant during financial crises but not during boom periods. Furthermore, a firm's risk of financial distress is, contrary to our expectations, positively correlated with the likelihood of going private through an LBO during a financial crisis.

When further extending the analysis by examining the service and the manufacturing industry separately, the results are contrasting and permeated by industry specific trends. In the service industry, the tax benefit hypothesis and the low growth prospect hypothesis are supported both during a boom period and during a financial crisis. However, manufacturing companies are evidently not pursued based on neither low growth prospects nor the possible tax benefits during a boom period. During a financial crisis, the tax benefit hypothesis, but not the growth prospects hypothesis, receives support. Furthermore, service firms in or near financial distress are more likely to be bought out through an LBO during both periods, whereas private equity investors, on the contrary, show a preference for manufacturing firms with low risk of financial distress during a boom period.

Furthermore, the analysis brings about interesting findings in terms of homogeneity. LBO firms are, as opposed to the control group firms, harder to distinguish among, indicating that the LBO firms as a group is more homogeneous than is the group of public firms. Moreover, the manufacturing LBO firms show similar characteristics over both a boom period and a financial crisis whereas the service firms between the two time periods have several distinguishing factors.

Consequently, the firm characteristics and motives explaining why firms go private through an LBO are both sensitive to the macroeconomic environment and the specific industry. Hence, generalizing characteristics of LBO firms over time periods with different prevailing macroeconomic conditions and over industries might be problematic, and might also explain

why earlier studies, even though examining the same hypotheses, show inconsistent results. We believe that future research could benefit from taking into account the sensitivity of LBO motives with regards to the macroeconomic environment and to industries.

Desirable further research would, as our study exclusively examines financial characteristics, be in the field of non-financial characteristics and LBOs. We find it reasonable that non-financial characteristics also motivate LBOs, and further research within the area would therefore constitute a good complement to our study. Furthermore, our study could be replicated with transactions in other countries, in order to investigate if the results could be internationally generalized. A third area of interest for further research would, by adding a sample of strategic transactions to our sample, be the comparison of acquisition motives between strategic and financial buyers.

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## 7 Appendix

### Appendix A: Variables

**Table A1:** Detailed description of included variables

| Variable        | Definition                                                                                               | Details                                                                                                                                                       |
|-----------------|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>fcf</i>      | Free cash flow <sub>t-1</sub> / Revenue <sub>t-1</sub>                                                   | Free cash flow is defined as EBITDA – income taxes – interest expense – dividends                                                                             |
| <i>growth</i>   | $(\text{Revenue}_{t-1} / \text{Revenue}_{t-3})^{\wedge} (1 / (t-1 - t-3)) - 1$                           | –                                                                                                                                                             |
| <i>mtb</i>      | (Market capitalization <sub>t-1</sub> + Total liabilities <sub>t-1</sub> ) / Total assets <sub>t-1</sub> | Market capitalization is defined as Share price * Number of shares outstanding. Total liabilities includes all short- and long-term liabilities               |
| <i>capex</i>    | Capital expenditures <sub>t-1</sub> / Revenue <sub>t-1</sub>                                             | Capital expenditures is defined as the funds used to acquire fixed assets (acquisitions are not included)                                                     |
| <i>grdummy</i>  | Equals 1 if <i>fcf</i> > sample median <i>fcf</i> and <i>mtb</i> < sample median <i>mtb</i>              | Sample median refers to the time period sample, i.e. the LBO firms and CG firms of the time period combined                                                   |
| <i>return</i>   | (Total return index <sub>t-1</sub> / Total return index <sub>t-3</sub> ) – 1                             | Total return index measures the theoretical growth in value of a holding, assuming that dividends are reinvested at the closing price of the ex-dividend date |
| <i>evebitda</i> | Enterprise value <sub>t-1</sub> / EBITDA <sub>t-1</sub>                                                  | Enterprise value is defined as Market capitalization + net debt + preferred stock + minority interest                                                         |
| <i>tax</i>      | Income taxes <sub>t-1</sub> / Revenue <sub>t-1</sub>                                                     | –                                                                                                                                                             |
| <i>lev</i>      | Total debt <sub>t-1</sub> / Total equity <sub>t-1</sub>                                                  | Total debt includes all interest-bearing debt and capitalized lease obligations                                                                               |
| <i>intang</i>   | Intangible assets <sub>t-1</sub> / Total assets <sub>t-1</sub>                                           | –                                                                                                                                                             |
| <i>altdummy</i> | Equals 1 if Altman's Z-score indicates that the firm is in the “distress” zone                           | See details below <sup>1)</sup>                                                                                                                               |
| <i>stdmarg</i>  | Standard deviation of the EBITDA margin between t–1 and t–4                                              | EBITDA margin is defined as EBITDA / Revenue                                                                                                                  |

**Notes:** t-1 is defined as the fiscal year-end prior to the transaction announcement. EBITDA is defined as Earnings Before Interest, Taxes, Depreciation and Amortization. All data were retrieved from Datastream. Earnings measures exclude goodwill and other asset impairments.

<sup>1)</sup> Bankruptcy prediction according to Altman's Z-score:

In his paper titled "Financial ratios, discriminant analysis and the prediction of corporate bankruptcy" from 1968, Edward Altman presents a bankruptcy prediction model based on financial ratios. The model, that was built based on observations from the manufacturing industry, is based on five variables and coefficients according to the formula below.

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + X_5$$

$$X_1 = \text{Working capital/Total assets}$$

$$X_2 = \text{Retained earnings/Total assets}$$

$$X_3 = \text{Earnings before interest and taxes/Total assets}$$

$$X_4 = \text{Market value of equity/Book value of total debt}$$

$$X_5 = \text{Sales/Total assets}$$

In this original Z-score model, Altman defines a company with a Z-score of over 2.99 to be in the "safe" zone and a Z-score of below 1.80 to be in the "distress" zone. All values in between are defined as the "grey" zone.

In 2000, Altman, in his paper titled "Predicting Financial Distress of Companies: Revisiting the Z-score", adapted the original Z-score model for non-manufacturing companies. This model, denoted the Z''-score model, includes the same variables as the original model, however, the coefficients have changed according to below.

$$Z'' = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$$

In the Z''-score model, a firm is regarded to be in the "safe" zone if it has a Z-value of over 2.60. The "distress" zone is defined as a Z-score below 1.1, and all values in between is defined as the "grey" zone.

Consequently, in this thesis, the variable *altdummy* takes on the value 1 if, in the case of a manufacturing firm, the firm has a Z-score of less than 1.80 or, equivalently, a Z-score of below 1.10 in the case of non-manufacturers.

## Appendix B: Transactions

**Table A2:** Overview of the included transactions

| Target company                | Date       | Target company                | Date       |
|-------------------------------|------------|-------------------------------|------------|
| Burlington Coat Factory       | 18.01.2006 | Bright Horizons Family Sol.   | 14.01.2008 |
| The Sports Authority          | 22.01.2006 | Mantron                       | 15.01.2008 |
| Knape & Vogt Manufacturing    | 09.02.2006 | Lifecore Biomedical           | 15.01.2008 |
| Checkers Drive-in Restaurants | 16.02.2006 | NuCO2                         | 29.01.2008 |
| Thomas Nelson                 | 20.02.2006 | ESS Technology                | 22.02.2008 |
| Education Management          | 06.03.2006 | Getty Images                  | 25.02.2008 |
| Marsh Supermarkets            | 20.04.2006 | AirNet Cargo Charter Services | 31.03.2008 |
| Aramark                       | 01.05.2006 | TriZetto                      | 11.04.2008 |
| Expert Global Solutions       | 15.05.2006 | Angelica                      | 22.05.2008 |
| West Corporation              | 31.05.2006 | Accelerated Payment Tech.     | 09.06.2008 |
| Concorde Career Colleges      | 21.06.2006 | Apria Healthcare Group        | 19.06.2008 |
| Univision Communications      | 26.06.2006 | Meadow Valley                 | 28.07.2008 |
| DJO Global                    | 30.06.2006 | Nevada Chemicals              | 08.09.2008 |
| Encore Medical                | 30.06.2006 | SM&A                          | 31.10.2008 |
| Michaels Stores               | 30.06.2006 | Avigen                        | 15.01.2009 |
| PETCO Animal Supplies         | 14.07.2006 | R.G. Barry                    | 29.01.2009 |
| WatchGuard Technologies       | 24.07.2006 | InVentiv Health Clinical      | 03.02.2009 |
| HCA                           | 25.07.2006 | SumTotal Systems              | 03.04.2009 |
| Zomax                         | 08.08.2006 | Entrust                       | 13.04.2009 |
| Aleris                        | 08.08.2006 | MTS Medication Technologies   | 10.08.2009 |
| Lone Star Steakhouse & Saloon | 18.08.2006 | Charlotte Russe               | 24.08.2009 |
| The Oilgear Company           | 28.08.2006 | Parallel Petroleum            | 15.09.2009 |
| Rotonics Manufacturing        | 29.08.2006 | GenTek                        | 28.09.2009 |
| Intergraph                    | 31.08.2006 | Allion Healthcare             | 18.10.2009 |
| MacDermid                     | 05.09.2006 | IMS Health                    | 05.11.2009 |
| Metrologic Instruments        | 11.09.2006 | QuadraMed                     | 08.12.2009 |
| Freescale Semiconductor       | 15.09.2006 | Lodgian                       | 22.01.2010 |
| Educate                       | 25.09.2006 | RCN                           | 05.03.2010 |
| Caesars Entertainment         | 03.10.2006 | Infogroup                     | 08.03.2010 |
| Open Solutions                | 15.10.2006 | BSN Sports                    | 15.03.2010 |
| Ventyx                        | 23.10.2006 | Edmentum                      | 26.03.2010 |
| Yankee Holding                | 24.10.2006 | BWAY                          | 29.03.2010 |
| Reinhold Industries           | 02.11.2006 | Delta Tucker                  | 10.04.2010 |
| Moscow CableCom               | 04.11.2006 | CKE Restaurants               | 24.04.2010 |
| OSI Restaurant Partners       | 05.11.2006 | Protection One                | 26.04.2010 |
| The Reader's Digest Assoc.    | 16.11.2006 | Interactive Data              | 04.05.2010 |
| Netsmart Technologies         | 18.11.2006 | InVentiv Health               | 06.05.2010 |
| National Home Health Care     | 28.11.2006 | Rubio's Restaurants           | 10.05.2010 |
| Station Casinos               | 02.12.2006 | Virtual Radiologic            | 17.05.2010 |
| Sabre Holdings                | 12.12.2006 | EF Johnson Technologies       | 17.05.2010 |
| Biomet                        | 18.12.2006 | SonicWALL                     | 02.06.2010 |
| ADESA                         | 22.12.2006 | OMNI Energy Services          | 04.06.2010 |
| CPAC                          | 26.12.2006 | Rewards Network               | 09.06.2010 |

|                                   |            |                           |            |
|-----------------------------------|------------|---------------------------|------------|
| United Surgical Partners Intl.    | 08.01.2007 | Alloy                     | 24.06.2010 |
| Intl. Architectural Group         | 09.01.2007 | Playboy Enterprises       | 12.07.2010 |
| Laureate Education                | 29.01.2007 | NBTY                      | 15.07.2010 |
| Wellco Enterprises                | 06.02.2007 | Health Grades             | 28.07.2010 |
| Central Parking                   | 20.02.2007 | Res-Care                  | 14.08.2010 |
| SafeNet                           | 05.03.2007 | Prospect Medical Holding  | 16.08.2010 |
| The Topps Company                 | 06.03.2007 | Phoenix Technologies      | 17.08.2010 |
| Dollar General                    | 12.03.2007 | Burger King Worldwide     | 02.09.2010 |
| The ServiceMaster Company         | 19.03.2007 | Internet Brands           | 20.09.2010 |
| Claire's Stores                   | 20.03.2007 | Victor Technologies Group | 05.10.2010 |
| Kronos                            | 22.03.2007 | Gymboree                  | 11.10.2010 |
| Vertrue                           | 22.03.2007 | Commercial Barge Line     | 18.10.2010 |
| Healthvision                      | 01.04.2007 | CommScope                 | 27.10.2010 |
| First Data                        | 02.04.2007 | Syniverse                 | 28.10.2010 |
| Embarcadero Technologies          | 05.04.2007 | VersoGenics               | 02.11.2010 |
| Catalina Marketing                | 17.04.2007 | J. Crew Group             | 23.11.2010 |
| Symbion                           | 24.04.2007 | CPI International         | 26.11.2010 |
| Pediatric Services of America     | 26.04.2007 | Matrixx Initiatives       | 14.12.2010 |
| MITY Enterprises                  | 02.05.2007 | Jo-Ann Stores             | 23.12.2010 |
| Bausch & Lomb                     | 16.05.2007 |                           |            |
| Alltel                            | 21.05.2007 |                           |            |
| Aeroflex                          | 25.05.2007 |                           |            |
| Ceridian                          | 30.05.2007 |                           |            |
| 1-800 CONTACTS                    | 04.06.2007 |                           |            |
| Avaya                             | 05.06.2007 |                           |            |
| Coinmach Service                  | 15.06.2007 |                           |            |
| Guitar Center                     | 27.06.2007 |                           |            |
| HCR ManorCare                     | 02.07.2007 |                           |            |
| Hilton Worldwide                  | 05.07.2007 |                           |            |
| Sequa                             | 10.07.2007 |                           |            |
| PRA Health Sciences               | 24.07.2007 |                           |            |
| Ryerson                           | 24.07.2007 |                           |            |
| Deb Shops                         | 26.07.2007 |                           |            |
| CompyDyne                         | 06.08.2007 |                           |            |
| Midwest Air Group                 | 17.08.2007 |                           |            |
| Kellwood Company                  | 19.09.2007 |                           |            |
| Printronic                        | 01.10.2007 |                           |            |
| 21 <sup>st</sup> Century Oncology | 22.10.2007 |                           |            |
| MegaPath Group                    | 28.10.2007 |                           |            |
| Restoration Hardware              | 08.11.2007 |                           |            |

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**Notes:** Date refers to the transaction's announcement date.