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The Performance of Reverse Leveraged Buyouts – An Agency Perspective

An Empirical Analysis of the Public-to-private, Divisional and Private-to-private RLBOs

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Abstract

Since the first LBO wave hit the public markets in the start of the 1980s, relatively little attention in systematic studies have been paid to the long-run performance of LBOs after the IPO. As the ownership disperses and leverage decreases following the IPO, mitigated agency costs could be expected to reappear. Hence, the agency perspective could be assumed to be an appropriate model to explain the post-IPO performance of LBOs.

We carry out an extensive investigation to measure the ex-post IPO performance of reverse leveraged buyouts (a firm that has been acquired through a leveraged buyout and subsequently taken public). Studying a comprehensive sample of 197 public-to-private, 240 divisional and 349 private-to-private (which of 72 are European) RLBOs from 1980-2015, we compare them to each other, classic IPOs, and an industry-matched sample. For this purpose, we apply the event study methodology and track the abnormal operating and stock performance after the IPO. Next, to assess the explanatory power of the agency perspective, we conduct cross-sectional regression analyses.

Our results are summarized as follows: (1) The public-to-private and divisional RLBOs consistently outperform the classic IPOs and the industry-matched sample in the long-term. (2) The private-to-private RLBOs outperform the public-to-private and divisional RLBOs in the short-term and underperform in the long-term. (3) The public-to-private and divisional RLBOs operating performance deteriorates after one-year following the IPO, while the private-to-private RLBOs declines after the IPO. (4) Public-to-private and private-to-private RLBOs held private for a short period underperform. (5) RLBOs listed after the year 2000 appear to perform superior compared to those listed in the 1990s and 1980s. (6) RLBOs listed by the three most active buyout funds in our sample outperform. (7) Finally, European RLBOs perform significantly worse than American.

Cross-sectional regression analysis shows a significant negative association between performance and the change in leverage and the largest shareholder's ownership and a positive association between performance and the management's ownership. As such, the agency perspective can only to some degree be applied to explain the ex-post IPO performance of the RLBOs.

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1. Introduction

1.1 Background

The impact of buyout funds has been a topic of great discussion since the start of the 1980s when leveraged buyouts (LBOs) started taking off. The increasing success and influence of the buyout funds has ignited an intense public debate, particularly when large acquisitions or exits were on the horizon. To date, much of the discussion has focused on a few troubled RLBOs, such as CHC Group, which First Reserve Corp took private in a deal worth $3,7 billion in 2008. The companies said they believed the transaction to be "the largest-ever buyout in the oilfield services industry" and the transaction involved substantial leverage. First Reserve Corp took CHC Group back public in 2014. Two years later, in 2016, the Canadian company filed for chapter 11 and reported that they could "no longer bear the weight of it burdensome debt structure", after a fatal crash of one of its helicopters in Norway forced the company to ground much of its fleet (Palank & Cameron, 2016). A drop in aircraft and employees, as well as a broader restructuring that targeted more than 2 billion in debt followed. These stock offerings, called reverse leveraged buyouts (RLBOs), made almost one-fifth of the new IPOs coming to the market in 2017 (Ritter J. R., 2018).

Other discussions have focused on that buyout funds push overleveraged companies too quickly into the public markets. For instance, New York Times (Sorkin, 2005) reports:

"Several high-profile quick flips have left critics wondering whether buyout firms were using such offerings simply to line their pockets, rather than using the proceeds to support companies. Earlier (in 2005), the Blackstone Group sold a German chemicals company, the Celanese Corporation, to the public after owning it for less than 12 months. The firm quadrupled its money and all of the proceeds from the offering were used to pay out a special dividend to Blackstone. Mr. Kravis's firm, Kohlberg Kravis Roberts and Company, also quadrupled its money by flipping PanAmSat, the satellite company it owned for less than a year."

As such, buyout funds have typically been associated with scenarios of high leverage, dividends, short-term investment horizon and minimal transparency. This orientation is also reflected in the previous literature, where several studies have attempted to determine whether the buyout funds

create value, transfer wealth (from tax authorities, employees, and bondholders) or exploit information asymmetries. Although the literature has conflicting views, the consensus appears to be that buyouts are associated with value creation. Surprisingly, RLBO offerings have attracted little attention in the academic literature in recent years, despite the considerable attention devoted to the long-run performance of IPOs, the historical determinants of LBOs and on the LBO as a viable organization form. The existing literature on RLBOs has focused on explaining the stock return development subsequent to the IPO, or relating operating performance to the agency theorem and information asymmetries. Further, the existing literature has mixed the three types of RLBOs, public-to-private, divisional and private-to-private. The modest number of offerings studied also limited the earlier studies to draw systematic conclusions about the characteristics that made the RLBOs successful. Given the devotion to the agency perspective in the early studies of value creation during the holding period, it is surprising that this approach has not been applied more extensively to explain the performance following the IPO. The agency theorem has previously been used to explain the changes in operating performance during buyout fund ownership, based on realignment benefits and monitoring of the management. As such, it is logical that also the changes in operating performance post-IPO would also be associated with these incentives. Thus, if agency costs were mitigated during the private ownership period, they could be expected to reappear following the IPO as ownership is again dispersed.

From the paragraph above, there are at least two noteworthy observations. First, the previous studies on RLBOs have mixed the three types of RLBOs. This is quite reasonable as the sample sizes have been limited. However, since these RLBOs could reflect different attributes, it seems natural to analyze them separately. Second, the agency theorem has only infrequently been applied to explain the performance post-IPO. Further, it seems important to investigate whether the RLBO performance has changed throughout the years, as there are limited of RLBO studies on offerings after the 1990s. Finally, the performance of the European RLBOs has not previously been compared to the performance of the American RLBOs.

1.2 Problem statement

The research question will be the core of our thesis and serve as an overall guide to our research in the data collection, the chosen methodology and the discussion of the results. This thesis aims to provide a comprehensive answer to this question.

"Are the public-to-private, divisional and private-to-private RLBOs different from each other and classic IPOs in terms of performance post-IPO, and can the differences and development in performance be explained by agency theory?"

The research gives rise to the following sub-questions:

- What results have previous researchers found on the performance of RLBOs, value creation in LBOs and RLBOs and how can it be related to our thesis?
- Which methods maximize reliability and validity of our results, and what are good proxies for the presence of agency costs?
- How do the companies that are quickly "flipped" perform?
- Has the RLBOs' performance and characteristics changed over time?
- How do European RLBOs perform compared to the American?

1.3 Definitions

Reverse leveraged buyout (RLBO)

Previous literature has different definitions of a reverse leveraged buyout. Mian and Rosenfeld (1993) define; "a reverse leveraged buyout occurs when either a publicly traded firm or a division within one converts to private ownership via a leveraged buyout (LBO) and subsequently goes public". Holthausen and Larcker (1996) on the other hand, define an RLBO as "firms making their first public offering after previously completing a leveraged buyout". The difference is thus that Holthausen and Larcker (1996) also include private-to-private RLBOs, firms that have completed a leveraged buyout after previously held private. We define the following RLBOs in this thesis:

Public-to-private RLBO

A public-to-private RLBO has been taken private by a buyout fund or management group through the process of a leveraged buyout, and subsequently re-listed by the same buyout fund or management group.

Divisional RLBO

A division of a public company that has been taken private by a buyout fund or management through the process of a leveraged buyout, and subsequently re-listed as a separate company by the same buyout fund or management group.

Private-to-private RLBO

A company that has been privately held (equity not publicly listed), acquired by a buyout fund or management group through a leveraged buyout and subsequently taken public. For instance, a firm that has been taken private by a buyout fund, sold to another buyout fund and then listed again would be defined as a private-to-private RLBO.

Buyout fund

A buyout fund is defined as the party that conducts the LBO, through which it acquires a controlling stake in their portfolio company. A buyout fund is organized as a limited partnership where institutional investors are limited partners, and the investment partners are general partners. The limited partners are passive investors, and the investment partners are active investors that specialize in identifying, structuring and managing the buyout funds investments (Fenn, Liang, & Prowse, 1995).

1.4 Disposition

To guide the reader through the thesis, it has been divided into eight chapters. Chapter 1 aims at clarifying the purpose of the research and presents the background necessary for the reader to put this into the right context, as well as present the problem statement. Chapter 2 describes the evolution of the US buyout market, previous literature on value creation in LBOs, the implication of an IPO exit and the empirical performance of LBOs and RLBOs. Chapter 3 introduces the hypotheses. Section 4 describes the empirical methodology of the thesis, including a description and discussion of the models. Chapter 5 introduces the data selection process and description of the data. Chapter 6 presents the empirical findings, including interpretation and analyses of the results. Chapter 7 presents the cross-sectional regressions and explains the variances in returns. Finally, a summarizing conclusion is presented in chapter 8.

2. Literature review

2.1 The evolution of the US buyout market

The US buyout market has changed significantly from the early 1980s till today regarding funds under management, the degree of competitiveness and amount of the transactions. As the public debt markets opened in the 1980s, the first leveraged buyout wave hit the public markets in the US. Following Cao and Lerner (2009), the buyout industry was comprised of relatively few buyout funds. These firms identified transactions through contact with executives and spent weeks and months to analyze the proposed deal. They would then structure the deal with 85-90% of the total purchase price in the form of debt. As a result, even the smallest improvement in the stock market, inflation or performance would lead to substantial profits for the buyout firm. Hostile takeovers were normal, and the buyout funds were branded as corporate raiders[1]. Kaplan (1997) reports that in the first half of the 1980s, buyout companies experienced significantly improved operating performance and few defaults. Adjusting for the overall stock market, these early buyouts generated abnormally positive returns. Jensen (1989) with his influential paper "The Eclipse of the Public Corporation" predicted that the buyout industry would develop to become the prevailing ownership structure of the future with concentrated ownership, incentive driven professionals and a lean and efficient organization.

The first leveraged buyout boom soon after peaked with KKR's $25 billion acquisition of RJR Nabisco in 1989. In the early 1990s, the LBO market collapsed following the crash of the junk bond market. The following years have been more challenging for buyout groups in terms of competition, and subsequently, lower returns, in addition to LBO market crashes in 2000 and 2008. Fundraising by US buyout firms in 2005 was nine times bigger than in 1987, and the returns from the investments have decreased significantly. In 1980, Kohlberg, Kravis and Roberts was the biggest fund in the world with $135 million under management, but as of 2017, there were three funds all with more than $125 billion assets under management[2]. Many explain the deterioration in return with the increased competition for transactions and more conservative use of leverage than previously. Sellers of firms are aware of the numerous buyout funds, and auctions with the support of an investment bank have

[1] Buyout funds like KKR and Forstmann Little were referred to as "Barbarians at the Gate" in a bestseller by Bryan Burrough and John Helyar about the RJR Nabisco acquisition.
[2] Apollo Group, Carlyle Group and KKR (Statista, 2017)

later been more normal. Hence, the prices of the firms and consequently the risk for the buyout funds has increased significantly since the early 1980s.

2.2 Value creation in LBOs

The motivation for LBO transactions are wealth gains, but the origin of these are perceived differently. Following Renneboog and Vansteenkiste (2017), six main explanatory models have been suggested for value creations in LBOs. These are; (1) tax saving; (2) the reduction of agency costs; (3) wealth transfers from bondholders and employees; (4) transaction costs reduction; (5) takeover defenses; (6) undervaluation. The value creation origins will be presented in the following, but the main attention will be devoted to the agency theorem, as this constitutes the underlying assumption of the problem statement.

2.2.1 Tax benefit hypothesis

As an LBO takes place with a substantial amount of increase in leverage, the rise in interest deductions may constitute a significant source of wealth gains. The interest tax shield reduces the total tax burden. Kaplan (1989) estimates that the tax benefits of the US public-to-private transactions to be between 21% and 72% of the premium paid to the shareholders to take the company private. He further adds that the tax benefits would also be obtained without going private as well. Lowenstein (1985) however, is critical of LBOs and calls for a restriction in tax benefits, stating that tax benefits are so large as to dispense the need to create the other, real gains. He argues that LBOs do not create wealth, it is only the result of wealth transfers. In short, the tax benefit hypothesis states that the wealth gains related to LBOs are tax benefits associated with capital structure underlying the transaction.

2.2.2 The principal-agency hypothesis

The principal-agency problem has existed since the evolution of joint-stock companies. The underlying logic of the principal-agency theorem was already in 1776 described when Adam Smith commented on the conflict of interest between managers and stockholders in a stock company. Berle and Means (1932) described the potential adverse effects associated with the dispersion of ownership and control in the typical 20th-century corporation. They argued that the management may use the property of the firm for their benefit, which will create a conflict between the principal and agent.

The public corporation is characterized by having dispersed ownership and by ownership separated from management. The shareholders have a residual claim on their holdings but do not involve in the firm's short-term decisions. The management's responsibilities are to control the company's business and day-to-day operations with a fiduciary duty to act in the best interest of the shareholders. The shareholders can influence the company by participating in the election of the board of directors. The board of directors are responsible for monitoring and controlling the management. The management is controlled by the board of directors which in turn is controlled by the shareholders. These ideas are even more formalized by Jensen and Meckling (1976) who show that this separation of ownership can be modeled as an agency relationship where the shareholders are the principal and the management is the agent. They suggest that when the manager-entrepreneur is the sole residual claimant, he extracts pecuniary rents and non-pecuniary benefits, with the optimum mix of the marginal costs and marginal utility associated with the increase in the type of benefit. If the manager-entrepreneur sells a fraction of the residual claim to outsiders, the marginal cost of the non-pecuniary benefits decreases as he now only bears a fraction of these costs. As a consequence, the manager increases his private benefits which reduces the value of the firm. This effect can, however, be minimized by monitoring or bonding. The principal may structure the agent's contract with incentives consistent with the principal's interests. This is defined as the bonding cost. The principal may also expend resources to monitor the agent, defined as the monitoring cost. The residual loss is defined as the loss occurring when the agent promotes its self-interest despite monitoring and bonding. The authors define the cost of bonding, monitoring and the residual loss as agency costs incurred for the shareholders. The shareholders expand the use of funds to set up a framework such as the shareholders' expectations of the uncertainty of the management's actions is reduced. The underlying idea is thus that increased managerial ownership could improve performance as the management has a greater stake in any value-increasing actions that are taken. The need to realign the incentives for the management and the stockholders is an essential factor in LBOs.

Grossman and Hart (1980) describe the free-rider problem in the monitoring of the management. Large corporations are typically characterized by a dispersed ownership structure with minority investors. If the shareholders are many and small, their incentive, ability and power to monitor and influence the management is low. Unless the shareholders experience a marginal gain from incurring the costs of monitoring, the probability of shareholders remaining passive and thus the free-riding

increases, which in turn reinforces the agency problem. After an LBO, the equity ownership resides in fewer hands, and the investors will have stronger incentives and more information to actively invest in monitoring management. Jensen and Meckling (1976) and Grossman and Hart (1980)'s theories suggest that the wealth gains of an LBO are largely the result of the increased quality of control.

Jensen (1989) argues that the higher the concentration of equity is for the active investor, the closer the monitoring and leads to a more active representation in the board of directors. He defines an active investor as a person or party who "monitors management, sits on the board, is sometimes involved in dismissing the management, is often intimately involved in the strategic direction of the company and on occasion even manages". The close monitoring and involvement in the firm even offer the opportunity to obtain direct access to confidential company information. Thompson and Wright (1991) suggest that the increase in incentives for the management goes along with an improvement in corporate governance structures in buyout companies to increase the quality of monitoring. DeAngelo, DeAngelo and Rice (1984) argue that buyout specialists as professional active investors have a competitive advantage over third-party equity investors in monitoring managers. Thus, the control function of the buyout fund may not only be more intensive but also of higher quality.

Further, Jensen (1989) argues that managers have incentives to retain cash flow and grow the firm beyond its optimal size – the so-called "empire building" theory – which is in direct conflict with the interest of the shareholders. This problem is most severe in cash-generating industries with low future growth prospects, which he argues are the prime candidates for an LBO. By exchanging debt for equity, managers promise to pay out the cash flow rather than spending them on negative NPV projects. By reducing the funds available for the management to allocate, the probability of incurring a residual loss also decreases. The risk of default in LBOs only serves as a motivating factor to make the firm more efficient. Jensen further states that "many of the benefits of an LBO seems to be the control function of debt". The leverage forces the company to generate high enough cash flows to service the debt payments and avoid default. Acquiring a company by conducting an LBO and taking control of it enables the buyout fund to implement organizational and capital structural changes, which mitigates agency costs and improves efficiency. According to Jensen (1989), LBOs resolve the "central weakness of the public corporation, the conflict between managers and shareholders". The shareholders and management's incentives are aligned either by the buyout fund taking active positions in the board of directors or by requiring the management to invest a significant portion of

their wealth in the company. Hence, the management's opportunistic behavior in terms of deriving pecuniary benefits is decreased. Also, the buyout funds typically implement management remuneration packages which are highly sensitive to performance. Lowenstein (1985) with his carrot-and-stick theory argue that the carrot represents increased managerial share ownership, allowing managers to reap more of the benefits from their efforts. The stick first appears when the firms borrow heavily to effectuate this incentive. This forces the managers to run the company efficiently and avoid default.

Phan and Hill (1995) support Jensen (1989)'s studies in the short-term. They find that LBO targets show increased efficiency in the short-run, which they derive to changes in company goals and decrease in organizational complexity and centralization. They do however argue that these efficiency improvements decline somewhat in the long run. Cotter and Peck (2001) show that when the buyout fund controls the majority of the equity, the LBO is financed with less debt and more by equity. They argue that monitoring by the buyout fund rather than restrictive debt covenants is less likely to lead to financial distress, and avoids the bankruptcy costs associated with extensive debt financing. They also report that the buyout funds have greater representation on smaller boards.

On the other hand, Holthausen and Larcker (1996) argue that relying on substantial debt to motivate managers may bring significant agency costs of debt as it gives the managers the incentive to substitute high-risk projects for low-risk projects. They argue that managers select projects by choosing less risky projects to avoid the potential loss of their firms or jobs which could rise if the firm cannot meet its debt service payments, which is more likely if the manager has chosen risky projects. Hence, leverage should only be extended to the point where the marginal gain is equal to the marginal loss. Whether increased leverage provides incentive effects, and increase or decrease agency costs is thus an empirical issue.

Morck, Shleifer and Vishny (1988) investigate the relationship between management ownership and market valuation of the firm with a sample of 371 Fortune 500 companies in 1980, as measured by Tobin's Q[3]. They estimate a piecewise linear regression in which the dependent variable is Tobin's Q and the primary independent variable is the fraction of shares owned by the management. They find that there seems to be a positive relationship between ownership and Q in the 0% to 5%, a

[3] Tobin's Q is measured as the total market value of the firm divided by the total asset value

negative relation in the 5% to 25% range and a positive relation beyond 25% (statistically significant at 1%, 5%, and 10% level respectively). One interpretation of these results is that conditions necessary for entrenchment (voting power, control of the board, finder status) are significantly correlated with managerial ownership beyond 5% and up to 25% and thus dominate the incentive effects. Contrarily, increased managerial ownership under 5% and beyond 25% leads to improved performance or value and dominates the entrenchment effect.

The entrenchment effect and the associated conflicts reflect an equivalent agency problem to that of the conflict between shareholders and management. Shleifer and Vishny (1997) argue that the large investors represent their own interest, which not necessarily coincide with the interest of the other shareholders, or with the interest of employees and managers. Further, as ownership gets beyond a certain point, large owners gain nearly full control of the company and are wealthy enough to prefer to use the firms to generate private benefits of control that are not shared by the other shareholders. Whenever there is a single controlling shareholder, it can be expected that it will try to expropriate the minority shareholders. As such, for the LBO to create value, the benefit of the aligned interests of shareholders and management must be greater than the effects of increased entrenchment of the shareholders. Moreover, the existing shareholders should anticipate the risk of the entrenchment effect after the transaction as well as the benefit of potentially free riding when an LBO is proposed by a buyout fund.

Wruck (1989) studies the relationship between ownership structure and firm value when a private sale of equity is declared. The author studies a sample of 48 firms that made a private sale of equity between 1975 and 1985. She finds indications of a positive relationship between ownership concentration and firm value. The concentration of ownership in an LBO enables the buyout fund to have an active presence, either by taking seats on the board of directors or the management team. Such a presence may enable the buyout fund to make quick decisions and implement new and more efficient strategies and organizational changes.

On the contrary, Fama and Jensen (1985) argue that increased managerial equity ownership can result in a decrease in financial performance due to the management's risk aversion and the potential under-diversification of the management's wealth. Furthermore, Demsetz (1983) and Fama and Jensen (1983) argue that if the management's equity ownership is concentrated, the manager may have

effective control over the organization disciplining mechanisms. For instance, the market for corporate control and managerial labor markets may be rendered ineffective, which could result in a decline in performance as well.

2.2.3 Wealth transfers hypothesis

The wealth transfer hypothesis perceives the gains associated with the LBO transaction as wealth being transferred from bondholders or employees to the shareholders of the buyout fund. Shleifer and Summers (1988) argue that hostile takeovers and other control transactions can transfer wealth from the employees to the shareholders by firing employees and/or reducing wages. However, Kaplan (1989) finds that the median change in employment in buyouts is only 0.9% (increase), and for buyouts that do not conduct any divestitures, employment increases 4.9%. Another stakeholder group which could be subject to a wealth transfer is the bondholders. The potential wealth loss experienced by the bondholders is due to the increased default risk associated with the increase in leverage in an LBO. Asquith and Wizman (1990) find that wealth losses only accrue to bonds that do not have protective covenants against increases in leverage. Bonds that have protective covenants experience increases in price on the announcement of the buyout. KKR (1989) reports that most bondholders have sought protection against an issuer increasing leverage, hence forcing the buyout funds to obtain bondholders consent or repurchase bonds at a significant premium.

2.2.4 Transaction costs hypothesis

DeAngelo, DeAngelo and Rice (1984) suggest that the significant transaction costs of maintaining a stock exchange listing can be an incentive of going private. As such, they suggest that the cost of being listed in perpetuity has a present value of $1 million which clearly could constitute a significant gain if the company went private.

2.2.5 Takeover defense hypothesis

Lowenstein (1985) examines 28 large MBOs between 1979 and 1984 and finds that the premiums offered above the pre-MBO stock prices were significantly higher when there were three or more competing bids. He further reported that some corporations have gone private via an MBO “as a final defensive measure against a hostile shareholder or tender offer”. Afraid of losing their jobs when a hostile takeover makes a bid, the management may decide to take the company private. Copeland and Weston (1979) report that no firms with insiders owning over 30% of the company had ever been

subject to a hostile takeover. In short, the takeover defense hypothesis suggests that the value creation in LBOs are the management willing to buy out the other shareholders.

2.2.6 Undervaluation hypothesis

There may be asymmetric information between the management and the outsiders about the true value of the firm. It is possible that the management, which has superior inside information and knows the true distribution of future return, realizes that the share price is undervalued compared to the true potential of the firm. Lowenstein (1985) argues that the management may depress the share price pre-MBO by employing specific accounting and financing techniques. By manipulating dividends, refusing to meet analysts or even depressing earnings, managers can use the information asymmetry to their advantage before the MBO. DeAngelo (1986) finds no evidence of manipulation by management prior to an MBO. Marais, Schipper and Smith (1989) suggest that the stock-price increase incurring when an MBO subsequently fail are not permanent, as one would suggest if buyouts reflected prior knowledge of an increase in cash flow. In short, the undervaluation hypothesis suggests that the wealth gains from an LBO result from the potentially more efficient use of the firm's assets. There are, however, a number of reasons to believe that this hazard has diminished over time, for instance, the increased professionalism and the auction process in LBOs. Lee (1992) argues that the auction process involves extensive disclosure requirements, which makes depressing and manipulation of earnings difficult.

2.3 Implications of an IPO exit and timing of exit

A buyout fund mainly has three options for realizing its portfolio investments. First, it can sell to another buyout fund that believes they can further increase the value of the investment. Second, it can sell to a strategic buyer who has prospects of synergies for the firm. Third, the buyout fund can conduct an IPO and sell the shares of the firm to the public. Exiting by conducting an IPO of the investment has decreased in popularity. Kaplan and Stromberg (2009) report that only 10% of the buyout funds' investments between 2000 and 2005 were realized by listing on a stock exchange. In comparison, 25% of the LBOs between 1985 and 1989 were listed.

Myers and Majluf (1984) argue that insiders have private information (not reflected in share prices) about the value of the firm's assets. Hence, at a given point in time, the firm's shares may be valued to high or too low relative to the information available to the insiders. As a consequence, there is an

incentive for the insiders to issue equity when the stock price is too high relative to the private information. This could indicate that the buyout funds list their investment when they expect the market to value the company high. A study by Guo, Hotchkiss and Song (2011) supports this theory. They find that post-1980s public-private LBO transactions only experienced modest increases in operating performance. The transactions still generated large returns to the buyout funds, suggesting that the buyout funds have an ability to buy low and sell high. Leland and Pyle (1977) argue that in a world with asymmetric information, ownership retention in an IPO is an important signaling device for outside investors. Thus, the buyout funds can be expected to retain large stakes in RLBOs, and the IPO only represents a partial exit. The buyout funds typically have a lockup period for a time following the IPO, when they cannot sell any shares. Downes and Heinckel (1982) support this theory and find that firms where the entrepreneurs retain high fractional ownership, have higher value and offering price.

Degeorge and Zeckhauser (1993) identify two possible explanations for the improvement in operating performance pre-IPO and timing of the IPO. First, they argue that outperformance by RLBOs may be due to managers using their private information to plan the IPO. The management may boost performance shortly before the offering. The authors discuss the issues in terms of information asymmetry and IPO timing. Secondly, there may be a "pure selection" effect, which implies a selection of listing the better LBOs. They argue that this effect might explain why poorly performing LBOs rarely go public and why those that choose to go public experience unusually strong performance. Here they introduce two explaining phenomena, behavioral effects, and debt management. The behavioral effect suggests that buyers are assumed to be reluctant to buy a company with poor performance. Similarly, sellers are reluctant to sell a company at a low IPO price, when they could have received a better price previously. Their debt overhang theory suggests that if the RLBO holds risky debt, old equity holders shun an IPO as it involves only a wealth transfer to the old debt holders. Degeorge and Zeckhauser (1993) conclude that the managers benefit from the information asymmetry during the pre-offering year and that RLBOs may experience performance manipulation. They reject the potential explanation of "pure selection" due to behavioral and debt overhang effects as they find no significant association between RLBO performance and risky debt.

Cao (2011) studies a sample of 594 RLBOs and investigates whether buyout funds' exit strategies affect their restructuring efforts, and in turn, the value creation as critics claim that buyout funds use

market timing to buy high and sell low, accordingly to the IPO market conditions. In the first analysis, the author looks at the performance timing hypothesis; the buyout funds wait for a peak in operating performance before reversing the leveraged buyout. As Degeorge and Zeckhauser (1993) find patterns of deterioration in operating performance for RLBOs after the offering, Cao (2011) tests the hypothesis by looking at RLBOs' operating performance. For testing this hypothesis, the author studies if the buyout funds take advantage of some temporary improvement in operating performance that leads to high equity valuations, consistent with Degeorge and Zeckhauser (1993) conclusion. Second, he examines the "market timing hypothesis"; the leveraged buyout restructuring period is shortened when IPO market conditions are favorable. Following this hypothesis, buyout funds are assumed to sell immature LBOs to get quick cash returns. To test the market timing hypothesis, the author examines the relationship between post-offering declines in RLBO performance and market conditions. Thus, he assumes there is a negative relationship between LBO duration (used as the proxy for restructuring efforts inside the LBO) and market returns. Cao (2011) does not find any deterioration in the RLBOs operating performance following the IPO. The market timing hypothesis is supported by Cao (2011) as he finds a negative relation between favorable IPO market conditions and leveraged buyout duration. Further, he finds that the probability of bankruptcy is higher for LBOs with shorter LBO duration. Performance of these companies appears to undergo greater deterioration.

The literature related to IPO performance is relevant to our topic, as RLBOs are a particular kind of IPO. One well-documented anomaly in finance is the long-run underperformance of IPOs. Ritter (1991) studies a sample of 1526 IPOs that went public in the US between 1975 and 1984. He finds that the IPOs produce an average initial return of 16,4% from the offering price to the first-day trading. In the three years after going public, the IPOs provide a return of 34,47% (measured from the first-day closing). This is significantly lower than the control sample matched by industry and market value, which produces an average return of 61,86%. Ritter (1991) explains that this pattern is especially concentrated among relatively young companies, especially those going public in the high-volume years of the 1980s and that large IPOs exhibit normal performance. He further argues that his findings are consistent with the hypothesis that investors are irrationally overoptimistic about the potential of particular industries. Ritter and Welch (2002) study a sample of 6249 IPOs between 1980 and 2001 and find similar results as Ritter (1991). They find that the market conditions are the most important factor in the decision of going public and deny that the first day returns can be explained with asymmetrical information. They further report that IPO studies are not only sensitive to

methodology but also the exact time-period studied. One can arrive at different conclusions depending on whether and how one includes 1999, 2000 and 2001.

Brav and Gompers (1997) study a sample of 4341 IPOs from 1972 to 1992 and separate between venture-backed IPOs and non-venture backed IPOs. They focus the study on the potential impact of venture funds on performance, the robustness of the assumed IPO underperformance and investigate the sources of the underperformance. The authors report that venture-backed IPOs outperform non-venture-backed IPOs over a five-year period. They provide two possible explanations for this pattern. Firstly, venture-backed IPOs are less sensitive to investor sentiment as they present more information to investors and have the security of stronger institutional investor sentiment. Secondly, venture funds are dependent on their reputation and should thus be less tempted to overprice their shares. They further explain that the underperformance especially appears to be concentrated among small non-venture-backed IPOs with market capitalization under fifty million dollars.

2.4 The performance of LBOs

Several papers in the earlier literature are quite relevant to this thesis. The purpose of the following empirical literature is to determine if leveraged buyouts previously have been associated with improved performance. If this is the case, and the agency theorem can explain this, it could indicate that the same pattern can incur for the RLBOs.

Kaplan (1989) examines the changes in operating performance of MBOs three years after the buyout. Based on a sample of 48 management buyouts (MBOs) from 1980 to 1986, he finds that they experience increases in operating income and net cash flow as well as reductions in capital expenditures both alone and adjusted to an industry benchmark. The findings of significantly improved operating performance are consistent with studies as Baker and Wruck (1989), Bull (1989) and Zahra (1995). Smith (1990) finds similar results with her sample of 58 MBOs between 1977 and 1986. The MBOs experience significantly improved performance in operating cash flow in the first year after the buyout and is subsequently sustained. Opler (1992) also finds substantial improvements in operating cash flow based on his sample of 44 going-private transactions, both in standalone analysis and compared with an industry benchmark. Lichtenberg and Siegel (1990) have another approach in a study of LBOs from 1981 to 1986. They study the total factor productivity for manufacturing plants, instead of operating measures to assess the performance of the LBOs. They

find significantly higher productivity (14%) over a five-year span following the buyout and even higher productivity for MBOs (20%). Finally, Guo, Hotchkiss and Song (2011) examine the operating performance of 94 LBOs between 1990 and 2006. They find similar results, but much smaller improvements in operating and cash flow margins (similar or slightly better than benchmark firms) than in the 1980s.

The early studies of performance indicate that LBOs experience improvements in performance following buyouts and this result appears consistent in both operating performance and productivity measures. Three different explanations are hypothesized as to why the LBOs experience superior performance; (1), the agency perspective (2) the existence of information asymmetries and (3) tax benefit hypothesis[4].

Kaplan (1989) dismisses the wealth transfer explanation and undervaluation hypothesis and favors that the improvements in operating performance are due to the agency perspective. He studies the level of capital expenditures pre- and post-buyout and finds that it is significantly reduced post-buyout (statistically insignificant). He interprets the finding as a possible reduction in agency costs. If the firms have positive free cash flow at the time of the buyout, a decrease in CAPEX could indicate that management no longer invests in subpar NPV projects. Further, he finds that the management's median equity holdings increase from 6% pre-buyout to 23% post-buyout. The incentives for the management are increased following the buyout, which could be the reason for the improvement in performance. Kaplan (1989) also finds that 72% of the non-completed MBOs in his sample were taken over by third-parties, indicating an active market for corporate control that limits the degree of underpricing and denying the takeover defense hypothesis.

Smith (1990) also favors the agency perspective explanation. Similar to Kaplan (1989), she finds that CAPEX decreases post-buyout, as well as evidence of working capital tightening following the buyout. The increase in the ratio of sales to net working capital from year -1 to year 1 is 24%, statistically significant at 1% level. Interestingly, she also finds that operating cash flow per employee increases both before and after adjusting for industry (only significant from the year before the LBO to the year after the LBO at 1% level). The increase is not accompanied by a large reduction in the number of employees. This denies the wealth transfer hypothesis from employees to shareholders and

[4] The agency and the tax benefit hypotheses are favored by Opler (1992)

leads towards the agency perspective explanation. It should be noted that Smith (1990) and Kaplan (1989)'s samples are very similar.

Bull (1989) has an entrepreneurial explanation for the improvement in operating performance. He argues that entrepreneurial managers will behave in a manner that will create wealth and a valued position for them. Their level of success may not be accomplishable alone with cost reductions and tax shields. He further states that entrepreneurs will achieve great success and exploit opportunities before others see them in an innovative matter. So, even though he observes indications of agency costs being mitigated, this cost reduction is not believed to be equivalent to value creation.

Lichtenberg and Siegel (1989) find that the productivity increase for manufacturing plants is associated with a simultaneous reduction in the nonproduction wages and increase in production wages. The change in relative wages leads Lichtenberg and Siegel (1989) to conclude that LBOs are "organizational innovations" that are "relatively production-labor using and nonproduction labor saving". Further, they argue that increased productivity may be due to increased intensity and utilization of all employees input, due to increased sensitivity of their financial rewards to their performance and more intensive monitoring of managers by the shareholders. In short, Lichtenberg and Siegel (1989) favor the agency perspective by the buyout fund/management improving the organizational efficiency and monitoring of the management.

Baker and Wruck (1989) have another approach than the large-sample studies previously cited. They find support for the relationship between organizational changes and performance in a case study of a divisional buyout, O.M. Scott and Sons Company. They report that changes in incentive, monitoring, and organizational structure lead to improved performance, again indicating that the agency theorem has explanatory power.

Finally, Guo, Hotchkiss and Song (2011) find that median, performance adjusted net cash flow to sales improves 5,36%, 14,3%, and 10,35% in year 1, 2 and 3, following the buyout, though with considerable variances in performance. Kaplan (1989)'s sample firms, on the other hand, improved 45,5%, 72,5%, and 28,3%. They explain that many of the buyouts in the early 1980s were firms with relatively poor performance pre-buyout, but report that the improvements in operating performance for LBOs have decreased significantly since the 1980s. They also find that that improvement in cash

flow is greater for LBOs with a larger increase in the level of leverage which is consistent with Jensen (1989)'s theories.

To summarize, these studies indicate that the operating performance of LBOs improve significantly when the development is examined in pre- to post-buyout levels. The results appear consistent and independent across performance measures. Overall, the authors seem to favor the agency theorem explanation. Kaplan (1989) and Smith (1990) finds that CAPEX levels following the buyout decreases. This could indicate a more disciplined investment approach or less room for spending due to the higher levels of leverage. Smith (1990) also find a decrease in net working capital following the buyout which also is consistent with the agency theory. Lichtenberg and Siegel (1989) find improvements in organizational efficiency and monitoring as well as better alignments between shareholders and management. They further find that the rise in productivity is more pronounced for management buyouts than for LBOs. As Renneboog and Vansteenkiste (2017) argue, most studies on value creation in LBOs have been conducted based on samples in the 1980s, and to which extent this can be related to the current context can be questioned. Guo, Hotchkiss and Song (2011) addresses Renneboog and Vansteenkiste (2017)'s concern and find evidence of the improvement in operating performance in the 1980s has decreased significantly in the 1990s and 2000s.

2.5 The performance of RLBOs

Kaplan (1992) examines 183 LBOs between 1979 and 1986 and documents that a significant fraction of firms undergoing an LBO went public once again. He argues that most LBOs over a long-term will eventually return to public trading, becoming a reverse LBO. The following studies on the performance of RLBOs are the most relevant to this thesis.

Muscarella and Vetsuypens (1990) study a sample of 72 RLBOs with a primary focus on the private period. They find improvements in operating performance in absolute and relative terms. The sample firms had a median increase in operating margin of 23,5% from the LBO to the time of the IPO. Similarly, to Kaplan (1989) and Smith (1990), they report that the improvements are partly due to reductions in CAPEX. As 75% of their sample consists of divisional RLBOs, they suggest that the improved operating performance is a result of wealth creation rather than wealth transfer. They argue that changing to private ownership, with a resulting change in governance structure enables owners of the LBOs to improve asset utilization and redirect sources towards higher value uses. Further, the

authors observed that the buyout funds implemented a variety of incentive compensation plans to the management, consistent with previous agency theory studies. The new organizational structure appears to be more efficient than their public predecessor, by aligning incentives and reducing costs. Unlike Kaplan (1989) and Smith (1990), they do not dismiss the information asymmetry hypothesis, but they clearly emphasize with the agency theorem explanation.

Degeorge and Zeckhauser (1993) investigate the performance of 62 RLBOs over a two-year period between 1983 and 1987. They find a 7% increase in the operating performance for the RLBO sample one year before the IPO to the time of the IPO, while their industry matched sample shows a decline of 1,24% (the industry-matched sample contains only 21 firms). The difference is statistically significant. The RLBO sample also further outperform a relative matched sample of ongoing LBOs. However, they find that the RLBOs perform worse than the industry-matched sample the year after the IPO. The RLBO sample experiences a decrease of 3%, significant at a 5% level. The pattern is thus that RLBOs seem to outperform up to the time of the IPO and disappoint afterward. The authors provide two possible explanations for this pattern, information asymmetry, and the agency perspective. The agency explanation is not consistent with the fact that the development in performance does not correspond to changes in management equity positions nor leverage. They neither find a significant increase in CAPEX, dismissing the idea of investments having been postponed to after the IPO to service debt payments. They further argue that that the decline could be due to information asymmetries between owners and the market, which is consistent with the declining operating performance post-IPO. Degeorge and Zeckhauser (1993) hence examine if the stock performance is anticipated by the market (using cumulative abnormal returns (CARs)). They find that the RLBO sample outperforms the industry-matched sample with an excess return of 15.22 percent (not statistically significant). The positive stock performance implies that the market is not surprised by the pattern of decreasing operating performance after the IPO, dismissing the information asymmetry explanation.

Mian and Rosenfeld (1993) also examine the long-run investment stock performance from a sample of 85 RLBOs between 1983 and 1988. Similar to Degeorge and Zeckhauser (1993), they examine the performance over a three-year period using CARs. The RLBO sample outperforms an industry-matched sample 4,65%, 21,96% and 21,05% for the first, second and third years, respectively. The excess return is statistically significant after 18 months following the IPO. The results are consistent

with Degeorge and Zeckhauser (1993) but statistically stronger. The superior returns are being interpreted in different ways. First, they investigate Muscarella and Vetsuypens (1990)'s observation that LBOs sell at a higher price at the IPO than the cost of the takeover. If this couldn't be attributed to improved efficiencies, but rather because of information asymmetry, then the RLBO sample should underperform the IPO sample. This is clearly not the case for this study. Second, the authors investigate if the outperformance is due to takeover activity of RLBOs. In their sample, 33 of the 85 firms were taken over within a three-year period following the RLBO. They also find that the excess return for the taken over firms are over 100%, whereas the firms not taken over have an excess return of 0%. This is important since takeovers typically are associated with significant premiums and this could indicate that the full excess return is driven by takeover premiums. The results show that the full sample excess returns are driven by takeover premiums, but it does not disprove that value was created in the holding period.

Holthausen and Larcker (1996) study the performance and change in organizational structure of a sample of 90 RLBOs between 1983 and 1988 (sample includes private-to-private RLBOs). Different to the other studies previously referenced, they also investigate the explanatory power of leverage and managerial equity positions in addition to performance. They find that the mean leverage ratio falls from 83% prior to the IPO to 56% after the IPO. The average ownership of management and other insiders drops from 75% to 49% after the IPO (from 36% to 24% for operating managers and 39% to 25% for non-management insiders). Even though leverage and insider equity ownership falls substantially after the IPO, they are relatively high compared to other traded public firms. The authors have a hypothesis that the structure of incentives is associated with changes in performance. To investigate this, they study the development of levels and changes in operating performance and firm characteristics. Similar to Degeorge and Zeckhauser (1993), they find that the RLBOs operating performance is superior to their industry counterparts in the year before the IPO. Further, they find differences in median operating performance following the IPO suggesting that the RLBO sample continues to outperform although they find indications of deterioration. The RLBO sample experiences significant declines from the year before IPO to t0, t1, t2, and t3. They explain that the decline in performance is because RLBOs gradually lose their typical LBO characteristics and evolve towards the typical firm of the industry. Holthausen and Larcker (1996) also investigate the CAPEX, R&D and advertising expenditures as well as working capital. RLBO firms spend significantly less than industry peers on CAPEX in the year prior to the IPO, but for later years, there are no significant

differences. However, there is a great increase in capital expenditures in the year of the IPO and one-year following. Advertising expenditures are higher for RLBO firms than industry peers in every year. R&D expenditures or employees are not statistically significant for any year. Interestingly, they find that the industry adjusted working capital ratio is significantly negative in every year indicating that RLBO firms carry substantially less working capital than industry peers. The changes in CAPEX and working capital could suggest that the IPOs typically are conducted to finance these.

Also, Holthausen and Larcker (1996) conduct a cross-sectional analysis of changes in performance, ownership, and leverage. Here they find no evidence of that changes in leverage is associated with changes in accounting performance. However, they find that the change in percentage ownership by operating management and non-management is significant and positively related to changes in accounting performance. The greater the decline in percentage ownership by management, the greater decline in subsequent accounting performance. This pattern may be explained by the lower incentive structure implied by the dispersion of ownership following the IPO. Further, they find weak significance of a negative association between management equity ownership and changes in working capital and no evidence of an association between ownership and CAPEX. However, they find strong significance of a negative association between non-management ownership and both working capital and CAPEX. This indicates that when managerial ownership decreases, CAPEX and working capital increases. They suggest that the reason for this pattern is that managerial ownership is negatively correlated with capital raised, and thus the negative association between working capital and CAPEX may be due to cash infusion, which they deny with a control variable for cash infusion. The results are consistent when adjusting for the industry effects.

Finally, they find that the sample outperforms an industry-matched sample for the four years following the IPO (buy-and-hold return), although there is some evidence of a decline in performance. The returns are insignificant after 12 months, but statistically significant after 24, 36 and 48 months. Consistent with Degeorge and Zeckhauser (1993) and Mian and Rosenfeld (1993), there is no evidence of significant negative returns, which indicates that there is no evidence of informational asymmetry. Similar to Mian and Rosenfeld (1993), they indicate that the positive returns are coming primarily from the subset of firms that delist, most of which are acquired. In unreported regressions, they find that cross-sectional variation of changes in leverage and changes in the percentage of equity owned by managers have no ability to explain stock performance. This indicates that the market

anticipates the changes in organizational structures at the time of the IPO. Different from Degeorge and Zeckhauser (1993), they do not support that the decline in operating performance can be explained by manager opportunism. They argue that the use of timing and information asymmetry should result in negative excess stock price performance following the offering, which is not the case in this study.

Bruton, Keels and Scifres (2002) study an RLBO sample of 39 firms with an agency perspective both during the private ownership and after the return to the public market. Their results are highly consistent with Holthausen and Larcker (1996)'s results. They find that the management ownership drops from 22% to 16% following the buyout and total insider ownership drops from 68% to 49%, which indicates that the agency problems could increase. Further, they find that the RLBO firms' profit margin grew significantly during the private period, from an average 10,36% to 13,26%. These results remained statistically significant controlled for industry and matched-firms profit margins. The three years following the IPO, the profit margin fell from 13,26% to 10,52%, statistically significant controlled for industry and matched-firms. Similarly, SG&A expenditures fell significantly in the private period and increased the three years following the IPO (only significant in t3). They indicate that this pattern is due to the firm's concern for efficiency and that the agency perspective is an appropriate explanatory model for the development in the operating performance of RLBOs.

Cao and Lerner (2009) study the stock performance of 496 RLBOs between 1980 and 2002 (includes private-to-private transactions). They study the performance by measuring the buy-and-hold returns and find that their RLBO sample outperforms other IPOs, but is only statistically significant in the first year after the IPO. The superior performance is not confined to a single period but exists in the 1980s, 1990s and 2000s. Cao and Lerner (2009) also address Mian and Rosenfeld (1993)'s concerns that the excess returns are driven by premiums paid by subsequent takeovers. However, they find that for the remaining RLBOs (252 firms) that survive the 60 months, the market-adjusted return is positive and significant after t1, t2, and t3. They also find that the RLBOs that went public within a year after the LBO ("quick flips") perform much worse than firms kept longer than one year. The difference is however not significant. At the same time, companies that were kept private longer than median years (around three years) seem to underperform the other RLBOs. The authors also conduct cross-sectional regressions to determine associations across RLBO offerings. They represent the

performance through a wealth relative and use the length of holding period, market capitalization, leverage, underwriter reputation, size of buyout fund and equity ownership of the buyout fund pre-IPO as explanatory variables. They find no evidence of any association between performance and underwriter reputation, market capitalization nor equity ownership of the buyout fund. They do however find a weak statistically significant (10% level) association between the size of buyout fund and performance. This result indicates that offerings from larger buyout funds tend to perform better.

The preceding review leads to the following conclusions. First, Muscarella and Vetsuypens (1990), Degeorge and Zeckhauser (1993) and Holthausen and Larcker (1996) find statistically superior operating performance prior to the IPO. Following the IPO, Degeorge and Zeckhauser (1993)'s sample underperformed the matched sample. Holthausen and Larcker (1996) however, find that their sample's operating performance declined but still outperformed their matches. These findings are both consistent with agency theory and the information asymmetry hypothesis. Degeorge and Zeckhauser (1993) emphasized with the information asymmetry explanation, considering they did not find any differences in the level of CAPEX. Holthausen and Larcker (1996) find that the CAPEX levels increased significantly following the IPO, supporting the agency perspective. They further find that CAPEX and net working capital increases are associated with decreases in management ownership. These findings also support the agency perspective. Holthausen and Larcker (1996) also find a positive association between managerial ownership and operating performance. Overall, the results of operating performance and firm characteristics tend to favor the agency perspective. Second, Degeorge and Zeckhauser (1993), Mian and Rosenfeld (1993), Holthausen and Larcker (1996) and Cao and Lerner (2009) find that RLBOs perform as well as or better than their matched sample, dismissing the information asymmetry explanation. Mian and Rosenfeld (1993) and Holthausen and Larcker (1996) find that the excess return is highly driven by premiums paid in takeovers. Cao and Lerner (2009) on the other hand, also test for a sample of firms not being taken over and find that the RLBOs still outperform its matched sample. The information asymmetry hypothesis suggests that RLBOs should underperform post-IPO since the buyout funds have superior information. The authors, however, find no such evidence of negative excess return. Holthausen and Larcker (1996) and Cao and Lerner (2009) perform a cross-sectional analysis of returns for the RLBOs. Holthausen and Larcker (1996) find that the change in management's equity and operating performance has a positive association. The greater the decline in ownership, the greater the decline in performance. This suggests that the equity ownership by management may play a particular role

in the firms' performance over the buyout cycle and impact the type of restructuring activities chosen. Cao and Lerner (2009) find no evidence that the agency theorem has explanatory power in their cross-sectional regressions.

3. Hypotheses

3.1 Performance

Given the problem statement, we would like to investigate the operating and stock performance of the public-to-private, divisional and private-to-private RLBOs compared to each other, the classic IPO, industry-matched sample, and the risk-adjusted market index, respectively in hypothesis 1.1, 1.2, and 1.3. The findings of these hypotheses will be the core of the thesis and later be applied as dependent variables in the cross-sectional regressions. As the literature review indicates, previous research has diverse conclusions on the operating performance, but there are commonalities. For the stock price performance, however, the previous literature is consistent on that RLBOs outperform classic IPOs and industry-matched peers.

Hypothesis 1.1: The public-to-private, divisional and private-to-private RLBOs outperform the classic IPOs, their industry-matched relatives, and the risk-adjusted market index.

Previous literature has mixed the three types of RLBOs. As the public-to-private, divisional and private-to-private RLBOs have all been subject to an LBO, no significant differences in the long-term performance are expected.

Hypothesis 1.2: No significant differences between the long-term performance of the public-to-private, divisional and private-to-private RLBOs.

Investors are generally expected to have more information about the public-to-private and divisional RLBOs than the private-to-private, as they have previously been listed.

Hypothesis 1.3: A higher degree of underpricing reflected in the short-term stock performance after the IPO for the private-to-private compared to the public-to-private and divisional RLBOs.

3.2 Accounting characteristics

Previous literature is consistent regarding the decrease in capital expenditures in the private period, but inconsistent on the capital expenditures level after the IPO. Agency theory argues that as the leverage and equity ownership decreases, the agent's incentive to invest in subpar NPV projects and cross-subsidizing increase, to grow the size of the company. As such, the RLBOs should experience a significant sales growth and increase in capital expenditures following the IPO.

Hypothesis 2.1: The capital expenditure ratio decreases from the year prior to the LBO to the IPO (public-to-private only), and increases after the IPO.

Hypothesis 2.2: The public-to-private RLBOs annual sales growth is higher after the IPO than in the private period.

Previous literature has previously found a deterioration in the operating performance after the IPO. Following Jensen (1989) this pattern could be associated with the dispersion of equity ownership and lower leverage.

Hypothesis 2.3: The operating performance decreases following the IPO.

3.3 Time held private

The introduction addresses the question whether it is possible for the buyout firm to create value in the target firm during a short amount of time. Following Cao (2011), RLBOs are expected to perform worse when the buyout fund spends less time on the restructuring process and lists the investment due to favorable IPO conditions. Previous literature has also indicated that quick-flips - companies held private less than one-year - underperform.

Hypothesis 3.1: Quick-flips underperform the RLBOs that are held private longer than one-year, both in terms of accounting and stock performance.

Hypothesis 3.2: RLBOs held private longer than median years (for the respective RLBOs types) outperform RLBOs held shorter than median.

3.4 Yearly effects

Previous literature has already indicated that the buyout market of the 1990s and 2000s[5] is very different from that of the 1980s. This is mainly due to a higher degree of competition and capital employed, which may affect the returns of the buyout groups but not necessarily the performance after the IPO. The development could, however, be subject to yearly effects over the three decades[6]. Previous literature has found no evidence of such effects.

Hypothesis 4.1: No significant differences in performance between the RLBOs listed in the 1980s, 1990s, and 2000s.

3.5 Repetitiveness of the acquiring buyout group

Following Brav and Gompers (1997), a buyout fund that conducts many public exits should be more familiar with the private-to-public mechanism and less tempted to overprice the shares, to keep up a good reputation of quality for future IPO exits. Further, it is expected that they have a stronger institutional investor sentiment. In terms of the operating performance, it is possible that they are better at aligning the management's interests, monitoring, and correction of the management's behavior. Given this, we analyze the companies listed by the three most active buyout funds in our sample; Kohlberg Kravis Roberts (KKR), Bain Capital and Warburg Pincus LLC[7].

Hypothesis 5.1: RLBOs acquired and taken public by the three most active buyout funds outperform the other RLBOs.

3.6 European RLBOs

Following Kaplan and Stromberg (2009), the American buyout fund industry is more mature and developed than the European. This should however not affect the performance after the IPO. The outperformance (found in previous RLBO studies) is not expected to be an American phenomenon.

Hypothesis 6.1: The European RLBOs perform similarly to the American RLBOs.

[5] The 2000s are defined as 2000-2015.
[6] An alternative approach could be to split up the years into the different LBO waves (1980-1992, 1993-2002, 2003-2007, 2008-2015). The results are presented in Appendix 21 and 22
[7] Buyout funds with more than 10 transactions in our sample are presented in Appendix 2

4. Methodology

4.1 Introduction

Overall, the analysis in this thesis can be divided into two major components. First, we analyze the operating and stock performance of the RLBOs by separating them into subgroups based on different characteristics. This will be achieved by an event study. In this part, hypothesis 1.1-6.1 will be tested. Second, we run cross-sectional regressions where we regress the performance measure calculated in part one on various proxies for agency costs. The remaining hypotheses require the findings of the event study. By running these regressions, we will be able to test hypotheses 7.1-7.9, presented in section 7. We will start by explaining the methodology of the first part and proceed with an elaboration of the cross-sectional regression analysis.

4.2 Event study

There is not a resolute method to measure the IPO-performance of firms. The form of this research is that of an event study based on the occurrence of a specific event, being an LBO or IPO. Therefore, the performance and characteristics will be examined using the year prior to the IPO as the base year, the performance at the year of the IPO, one-year after and so on. The event study examines the abnormal performance of the firms before (accounting performance only) and after the event. By comparing the actual return with the expected return, we can identify whether the RLBOs outperform their matched samples and the market both in terms of the accounting and stock performance.

4.2.1 Event study in a five-step process

An event study can in broad be divided into a five-step process. This process is relatively standardized, but as every event study is different, the process explained below is explicitly adjusted for our RLBO-study, with inspiration from Bowman (1983):

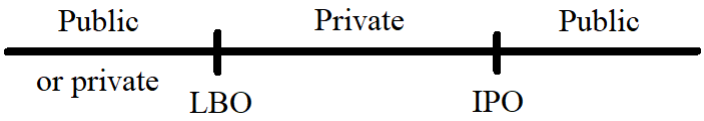
1. Identify the event and variables of interest
2. Calculate expected returns
3. Estimate the abnormal return
4. Organize and group the excess returns
5. Analyze the results

In the first step, information about the event – the (post LBO) IPO - and the variables of interest are collected. An important decision is to define which variables we believe most likely will be associated with the presence of agency costs as well as how to measure the post-IPO performance. The second step is the calculation of the expected return. Here, appropriate models and methods are discussed. The chosen data from step one is applied, and we analyze the results and validity of the estimates from the selected models. In step three, the abnormal returns are calculated. The abnormal returns are obtained as the difference between the observed and calculated expected return. The fourth step is to organize, accumulate and study the distributions of the abnormal returns before the results are statistically tested in various ways in step five. In the following, we will guide through the five steps in more detail.

4.2.2 Determine the event and variables of interest

In this step, the dates and variables of interest are collected and conducted to analyze the operating performance of RLBOs relative to the main event date, which is from the year prior to the LBO to three-years following the IPO for the public-to-private RLBOs. For the divisional and private-to-private RLBOs, the operating performance from the year before IPO to three years after the IPO will be analyzed. It is not possible or of relevance analyzing data prior to the LBO as these RLBOs were either held private or as a division in a large public company. As the event is an IPO, the stock performance cannot be compared pre-event, as the equity was not publicly listed. Operating performance, however, can be measured both pre- and post-IPO, but as disclosure requirements are limited as a private company, only the prospectus information is considered. Prospectus information varies between firms, including the amount of pre-IPO years of accounting statements the company publishes. As such, due to the availability of data, only data one-year before the LBO and IPO will be used in the analysis of the operating performance. Thus, the majority of the thesis will focus on the time after the IPO. The base year for the analysis is the year prior to the IPO, as this is the last year full fiscal year before ownership is dispersed. Similarly, the year after the IPO is the full fiscal year ownership is dispersed. In terms of the stock performance, the returns will be analyzed one day, thirty days, six months, one- and three-years following the IPO. These dates are somewhat similar to previous RLBO literature and give an indication on both the short-term and long-term stock price performance of RLBOs.

A graphic illustration of the RLBO cycle is included below. The public-to-private and divisional RLBOs have been public before the LBO, while the private-to-private has been private.



Measures of the RLBOs' performance are separated into two distinct categories of available variables; accounting variables and stock return variables. To assess the ex-post IPO performance of RLBOs both the operating performance and stock performance are considered. There are two main differences between the accounting variables and the stock return variables. The accounting variables represent the historical performance of the firms, while the stock return both reflect the historical performance but also incorporates the market's expectations. Thus, it is of interest to analyze both the stock return and the accounting performance of the RLBOs.

Accounting performance variables

In terms of examining the development post-IPO, as well as conducting the cross-sectional regression analysis, the variables defined as dependent are those which an increased agency costs presence should be reflected. As there are several proxies for agency cost presence, the variables have to be chosen prudently.

Operating performance

We recognize that no single measure could capture the firm operating performance completely. Thus, within these constraints, we choose three accounting measures that have been included in previous LBO and RLBO studies[8]. The three measures are operating income before depreciation to sales, cash flow to sales and pre-tax net income to sales.

[8] Operating income to sales - Muscarella and Vetsuypens (1990)
Operating cash flow to sales - Holthausen & Larcker (1996)
Pre-tax net income to sales - Bruton, Keels & Schifres (2002)

Operating income to sales

The operating income to sales represents the ability of the firm to generate income before taking into consideration the effects of capital structure, extraordinary items, income taxes and depreciation of assets.

$$Operating\ margin\ (pre-depreciation)_t = \frac{Operating\ income\ before\ depreciation_t}{Sales_t}$$

Operating cash flow to sales

Free cash flow is theoretically suggested to be associated with the presence of agency costs by Jensen (1989). The operating cash flow is chosen, as the Compustat database has limited data available on the firms' free cash flow. We include this alternative accounting performance measure because it is harder for the management to manipulate than the operating margin and is directly affected by changes in working capital. However, as the cash flow is not accrued, variability in this ratio is higher than for the operating margin ratio. The Compustat database does not have cash flow data pre-1990.

$$Operating\ cash\ flow\ to\ sales_t = \frac{Operating\ CF_t}{Sales_t}$$

Pre-tax net income

Similar to the operating cash flow to sales, pre-tax net income is affected by the capital structure of the firm. Pre-tax net income is measured instead of after tax-net income as changes in the tax rate originating from a change in tax laws is an external factor that companies are unable to influence. A change in corporate tax rate can affect the bottom line significantly without the firm performing differently.

$$Pre-tax\ net\ income\ margin_t = \frac{Pre-tax\ net\ income_t}{Sales_t}$$

Other accounting variables

Leverage ratio

The leverage ratio is a central variable in agency theory, and LBOs are associated with a significant amount of debt. The Compustat database has limited data available on the public companies' total

debt before 2000. In order to obtain information for as many companies as possible, total liabilities are used instead, as a significant fraction of the sample went public prior to the year 2000. The leverage ratio is measured as:

$$Leverage\ ratio = \frac{Total\ liabilities_t}{Total\ assets_t}$$

Capital expenditures to total assets

Capital expenditures are investments in property, plant, and equipment, and has in previous literature been suggested as an indicator of agency presence. The capital expenditures to total assets ratio express how much CAPEX is spent in year t, relative to the book size of the company.

$$CAPEX\ ratio_t = \frac{CAPEX_t}{Total\ Assets_t}$$

Sales growth

The annual sales growth is a rough proxy for growth and a central measure in agency theory. As the sales can grow even when the firm is performing poorly, it is mainly used as a measure of growth rather than operating performance.

$$Annual\ sales\ growth_t = \frac{Sales_t}{Sales_{t-1}} - 1$$

Discussion of performance measures

In Barber and Lyon (1996)'s research of event study methods, the authors compare various accounting terms and methods in order to evaluate company performance. They assess three issues researchers face in an event study; determining a performance measure, an appropriate benchmark, and an efficient statistical test.

First, when evaluating empirical rejection rates, they find that comparing changes over time produces more powerful test statistics than comparing them in levels. This implies comparing the change in performance from a base year for a main sample to the benchmark. This could be comparing the change in the RLBOs and classic IPOs performance three-years following the IPO from the year prior

to the IPO. Second, they compare operating performance versus earnings as the performance metric. As the capital structure, taxes, and other special items affect the net income, but not operating income, they suggest that the operating income is the most efficient proxy of company performance. It should also be unscaled (by shares outstanding) in order to avoid issues with stock splits and similar.

Furthermore, they discuss three challenges associated with operating income divided by total assets (ROA), which has been one of the common performance measures used in previous LBO and RLBO studies. First, the denominator, the value of the assets, is measured according to the price paid for the assets in the past. The operating income, on the other hand, is measured in the current year. They argue that an improvement could be to replace the cost of the assets in the denominator with an alternative item. Second, they address the concern that not all of the firm's assets are operating assets. For instance, the cash and marketable securities post on the balance sheet is not an operating asset. As the denominator would be smaller if assets are adjusted for this, operating performance is understated by including it. Third, operating income can be the subject of earnings manipulation by management, thus not reflecting the true operating income of the firm. This is a product of accrual-based accounting. Some of the alternatives to ROA that Barber and Lyon (1996) discusses are operating income over sales, and cash flow over average assets. The benefit of operating income over sales is that it overcomes the two first challenges, as both sales and operating income are recorded from the same fiscal year, and both are from the income statement. The drawback, however, is that it is not an exact measure of the assets' productivity. Applying operating cash flow in the numerator is another alternative, which mitigates the third problem, as cash flows are more difficult to manipulate by management. Conducting tests for statistical power of the proxies for operating performance, findings show that ROA and return on sales gives adequate results. Cash flow in the numerator, on the other hand, provide significantly less powerful results.

Conversely to most previous studies on RLBOs, the main operating performance measure in this thesis will be the operating income ratio. This is mainly due to two factors. First, it reduces the two issues addressed by Barber and Lyon (1996), regarding measuring performance with the total assets in the denominator. Second, Barber and Lyon (1996) discuss specifically which measures to use in the event of recent security issuance. In this case, they report that firms seem to achieve a significant increase in assets as new funds are fueled into the company in the stock issuance. It can potentially take months or years before this capital is fully invested into projects that generate income for the

firm, which implies that the operating income, measured of the total assets will be understated for some time after the IPO. Thus, the comparison between the three years after the IPO will be biased. As such, the return on sales is the best measure for the RLBOs and classic IPOs operating performance, but the two other measures are included for comparison.

Ownership structure

Following Jensen (1989) and Jensen and Meckling (1976), the ownership structure is an important determinant of agency presence. The change in the largest shareholders' equity and the management's equity are in this thesis used as proxies for principal presence, monitoring, alignment of interests and managerial holdings. The management's ownership is defined as the equity holdings of the operating management and other employees (if disclosed) and excludes directors from, e.g., the buyout fund. The largest shareholder is defined as the largest buyout fund or the management as a group if the management conducts the buyout. If several buyout funds conducted the buyout, only the buyout fund with the largest equity position is reported.

Stock performance

Following Barber and Lyon (1997), stock performance is measured as buy-and-hold abnormal returns. The authors investigate the empirical power and specifications of test statistics in event studies designed to estimate long-run abnormal returns.

The buy-and-hold return (BHAR) for stock i, for period t, is defined as:

$$BHAR_{i,T} = [\prod_{t=1}^{T}(1 + R_{i,t})] - 1$$

Where:

$$R_{i,t} = \frac{P_{i,t} - P_{i,0} + \sum_{s=0}^{t} D_{i,s}}{P_{i,0}}$$

If a company delists within time t, the delisting price is the price at time t.

An alternative approach could potentially have been to measure the cumulative abnormal returns (CARs), which are monthly abnormal returns added together. Cumulative abnormal return for stock i, during period T, is defined as:

$$CAR_{i,T} = \sum_{t=1}^{T} \left(R_{i,t} - R_{bench,t}\right)$$

Following Barber and Lyon (1997), buy-and-hold returns should be measured instead of cumulative abnormal returns, as they include the effects of compounding. The authors argue that cumulative abnormal returns are biased predictors of buy-and-hold returns and that the bias only increases by the time. CARs have previously been used in studies on the performance of IPOs by Ritter (1991) and in studies of the performance of RLBOs by Degeorge and Zeckhauser (1993) and Mian and Rosenfeld (1993). It appears that the Barber and Lyon (1997)'s study had some influence, as Cao and Lerner (2009) measure the RLBOs stock performance by BHAR.

4.2.3 Calculate the expected return

Estimating the true stock return of a company is difficult by nature, and various models have been proposed to estimate it. We apply three methods to calculate the expected return. First, we compare a sample of 1823 IPOs with the RLBOs. Second, we match the RLBOs with the IPOs based on size, industry and IPO year. Finally, we estimate the single index market model for each RLBO to calculate the market-adjusted abnormal return. In the following, we briefly discuss alternative methods before elaborating on the chosen model and its procedures and assumptions.

Barber and Lyon (1997) argue that the use of reference portfolios as comparisons, such as a market index that is value-weighted, or portfolios only based on size, yields problematic long-run abnormal return calculations. Three issues stand out: First, in terms of analyzing the three-year returns, the sample firms (in our case the RLBOs) have been listed for three years, whereas the index with a high certainty includes firms that have been listed subsequently to this period. The authors address this problem as the new listing bias, addressing to Ritter (1991)'s study of the long-term IPO performance. He documents that IPOs underperform the market in the long-term. This creates a positive bias for the sample when calculating abnormal returns. Secondly, indexes are rebalanced at given time intervals (often monthly). If the index is evenly weighted, well-performing firms are sold, and poor performers are bought. This is not the case for the RLBO sample firms. The study of the effect of

rebalancing has shown to create a negative bias when calculating abnormal returns. Thirdly, there is a bias related to the skewness of the sample firms. Individual firms can be observed to have returns that surpass 100%. This is, however, extremely uncommon for a market index. Thus, this creates a positive bias in the abnormal return calculation. Overall, it is difficult to measure the total effect, as the magnitude of each issue is unknown. The primary focus of this thesis will following Barber and Lyon (1997) be devoted to the industry-matched and IPO-adjusted abnormal return.

Matching

The primary purpose of matching the RLBO sample is to enable relative comparison between the RLBO sample and an appropriate benchmark, as well as control for variables that could bias the cross-sectional regression analysis. Typically, in event studies, industry affiliation and firm size have been used as matching criteria. The link between firm size and performance is sensible as it could be expected that the size of a firm's assets is related to the existence of economies of scale, thereby implying that larger firms are more profitable than smaller firms. This has also been shown empirically by Barber and Lyon (1996), who indicate that firm size influences performance. The reasoning behind matching on industry affiliation that firms in different industries are exposed to distinct exogenous factors which affect their performance.

Barber and Lyon (1997) argue that an efficient method to calculate the abnormal returns is by comparing the sample with a control firm approach to estimate the expected return. One or more firms can be identified by a particular set of characteristics that match the sample firm. By conducting this procedure for the RLBO sample, all three biases previously described by Barber and Lyon (1997) are eliminated. The method requires that both the sample and control firm is listed during a time interval of relative closeness, such that the new listing bias vanishes when analyzing the long-term returns. No rebalancing is required throughout the period, and both the sample firm and the firm or (small) group of firms are as likely to appreciate largely in price, such that the other two biases go away as well. Barber, Lyon and Tsai (1999) document that comparing the samples only based on the size of the company and the book-to-market ratio is not sufficient to obtain well-specified statistics for non-random samples. Also, they recommend matching companies on one or more of pre-event performance, sales growth or industry. Pre-event accounting performance is relevant, as it can be expected that the RLBO sample will display characteristics at the year prior to the IPO, in terms of

operating performance compared to the classic IPOs. A similar approach is proposed by Ghosh (2001) who matches the companies on three-digit SIC, 25% to 200% deviation limit on assets and IPO year.

Following the example of Barber and Lyon (1997), Barber, Lyon and Tsai (1999) and Ghosh (2001), the industry-matched benchmark sample will be created by matching on IPO year, industry affiliation and pre-event size. Industry affiliation will be measured by US SICs, and firm size will be measured in terms of total assets at the year before the IPO. Both the operating performance and stock performance are matched on these terms. We assume that by having such similar characteristics, each pair should have some level of dependence. Operating in the same or similar industry, going public in the same economic environment, and being of a similar size are factors that affect each of the two companies similarly. As this procedure includes all firms in the other IPO sample that have similar characteristics being in the matched group, this will secure independence of the observations outside each pair.

Single index market model

Despite Barber and Lyon (1997)'s critics about index-matching, Dyckman, Philbrick and Stephan (1984) argue index-adjusted abnormal returns to be a precise estimation method in event studies. As such, we compare the RLBOs with a relevant market-index. However, we emphasize that the main focus is towards the industry and classic IPO adjusted performance. In addition, two features are different to Barber and Lyon (1997)'s analysis. First, we use the S&P 500 as the comparison index which is value-weighted, not equally weighted, which should reduce the rebalancing bias. The second feature is risk-adjusting the market returns for each RLBO, such that abnormal returns are calculated after the systematic risk is included in the calculation. This should improve the comparison, and thus reflect the expected return.

To adjust the RLBO sample for risk, an appropriate model needs to be estimated, such that valid results are obtained. A model that has frequently been used in previous research is the single index market model. Alternative models that could have been used is the Capital Asset Pricing Model or models inspired by Arbitrage Pricing Theory. MacKinlay (1997) argues that the capital asset pricing model has validity trouble concerning its restrictions, and the arbitrage pricing theory struggles with little added explanatory power for variables in excess of the market. As such, the market model is a

satisfying option. The market model estimates a linear relation between stock returns of individual companies and a market portfolio:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + u_{it}, i = 1, \dots, N \; and \; t = 1, \dots, T$$

The stock return of the individual company is $R_{i,t}$, the return of the market for the relevant period is $R_{m,t}$, α_i is the intercept for the return of company i, β_i is the slope coefficient, and $u_{i,t}$ is the unsystematic component that is the abnormal return.

Assumptions necessary for estimating the single index market model are:

1. Linear in parameters
2. No perfect collinearity
3. Zero conditional mean
4. Homoscedasticity
5. No serial correlation

The first assumption states that the time series process follows a model that is linear in its parameters. If the parameters are not linear, the model cannot be estimated by OLS. However, by estimating the linear market model, this assumption is not violated. The second assumption specifies that there cannot be any perfect collinearity between any of the regressors. This means that there can be no linear relationship between two variables or one and several of the other variables. This also excludes that any variables can be constant, for instance thinly traded stocks. Partial correlation between two or more variables is acceptable. It is also possible to have two variables that are related, but in a nonlinear way. The single index market model only contains one independent variable, and hence excludes collinearity in the regressors. The volatility in the S&P 500 is large enough to avoid any violation of assumption two. For the stock returns used as dependent variable, there might be periods of thin liquidity. This should be solved by estimating the model with a time frame of three years with weekly data. For the companies that have gone private within the three-year period, the one-year beta is estimated.

Assumption number three states that the expected value of the residual, given the independent variables, is zero: $E(u_t|r_{mt}) = 0, \; t = 1,2, \dots, n$. More specifically, this assumption indicates that the correlation between the residual at time t and every independent variable for every time period has to

be zero. As such, the parameters exhibit strict exogeneity. Two possible causes for violation of this assumption could be the omitted variable bias and measurement error. The fourth assumption requires a constant residual variance, given the independent variable. Thus, the variance of the residuals cannot vary with different values of the regressors. If this assumption does not hold, there are heteroskedastic errors in the model estimation. This assumption is important for inference, but it is possible to apply robust standard errors in the cases where heteroscedasticity is present. Finally, the last assumption is regarding serial correlation in the residuals: $\mathrm{Corr}(u_t, u_s) = 0, \text{for all } t \neq s$. It is required for inference on the estimators. A violation of assumption five will, however, not bias the betas. They will still also be consistent and asymptotically normally distributed.

Ideally, we would estimate the parameters before the LBO to calculate the expected return of the RLBOs after the IPO. A challenge, however, arises as there is no pre-event information regarding sample returns for estimation of the model. For divisional and private-to-private RLBOs, there are simply no available data prior to the IPO. In terms of the public-to-private RLBOs, there is available stock price data, as they have been listed previously. However, these companies go through significant changes in the privatization period. These changes could be spin-offs, acquisitions or even mergers with other companies, and thus be a completely different firm than before the LBO. As such, the pre-LBO data on the public-to-private firms might not be representable for the company that is relisted after the privatization period. Thus, the model has to be estimated for the period after the IPO. We assume that the market can infer the riskiness of the companies based on the fundamental data that is provided by the prospectus.

4.2.4 Measure the abnormal return

Abnormal operating performance

The industry- and classic IPO-adjusted operating performance is calculated as:

$$\mathrm{AP_t} = \mathrm{P}_{i,t} - P_{comp,t}$$

Where $\mathrm{P}_{i,t}$ is the operating margin of the RLBO i, and $\mathrm{P}_{comp,t}$ is the operating performance of the industry, IPO year and size matched peer.

Abnormal buy-and-hold return

In terms of the buy-and-hold industry- and IPO-adjusted abnormal return, the excess BHAR return is calculated as:

$$BHAR(i,T) = \prod_{t=1}^{T}(1 + R_{i,t}) - \prod_{t=1}^{T}(1 + R_{comp,t})$$

Where $R_{i,t}$ is defined as the return of the RLBO and:

$$R_{comp,t} = \frac{P_{comp,t} - P_{comp,0} + \sum_{s=0}^{t} D_{comp,s}}{P_{comp,0}}$$

Where $R_{comp,t}$ is the return of the comparable company at time period t.

Single index market model

As emphasized above in the market model, the actual return is explained by alpha (α_i) and the market return ($R_{m,t}$) multiplied by the firm-specific factor (β_i). The beta is calculated as the historical covariance between the firm and market return from the estimated period. The residuals, i.e. the error term represents the abnormal return. We can re-order the equation to solve for the abnormal return.

$$\mathrm{R_{i,t}} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t}$$
$$\varepsilon_{i,t} = \mathrm{R_{i,t}} - \alpha_i + \beta_i$$
$$\varepsilon_{i,t} = \mathrm{AR_{i,t}}$$
$$A\mathrm{R_{i,t}} = R_{i,t} - (\alpha_i + \beta_i R_{m,t})$$

4.2.5 Organize and group the excess returns

Testing for the statistical significance of the abnormal returns, an efficient statistical hypotheses test must be used to produce meaningful comparisons between the groups. The stock return data is not expected to exhibit a normal distribution as the downside is limited and the upside is in theory unlimited. As returns are calculated for three years at the most, there might be a significant number of the observations that create a long positive tail. Thus, either the data must be transformed, or statistical tests that do not assume normally distributed samples must be applied.

A possible transformation solution is winsorizing the data, such that the parametric t-test can be used for inference. Cowan and Sergeant (2001) evaluate an approach where abnormal returns are winsorized to improve the specification of statistical tests. This will contribute to lower the skewness bias discussed by Barber and Lyon (1997). The winsorization procedure reduces the weight of the most extreme values that exceed a certain threshold, but without removing them entirely as a trimmed mean would do. The researchers set this threshold to three standard deviations from the mean on the upside and downside. The reasoning for this is that a normally distributed sample should include 99,73% of the sample with this winsorization limit. This method decreases the standard deviation, skewness, and kurtosis and gives the sample a distribution that is closer to normal, albeit not fully. The deviation from a normal distribution is larger for smaller samples. A symmetric winsorization for data below 2,5 percentile and above the 97,5-percentile, was compared and preferred above the three standard deviations winsorization[9].

4.2.6 Analyze the results

Non-parametric tests

In Barber and Lyon (1996)'s study of event studies, the authors test both parametric and non-parametric tests in this context of operating performance and find that the non-parametric tests provide the most powerful statistics. If the data after log-transforming and winsorizing is still not normally distributed, a nonparametric test is thus a legitimate alternative. In the following section, we separate between a dependent sample test (paired) and an independent sample test (unpaired).

Wilcoxon signed rank test

The Wilcoxon signed rank test is a nonparametric statistical hypothesis test that is used for comparison between two samples that are related (Wilcoxon, 1945). It does not require normality in the data, or homoscedastic variance, which is why it is a preferred alternative to the Student's t-test. It tests for significant differences in the two samples with paired observations. The null hypothesis states that the difference between the median of the two samples is zero, i.e. zero abnormal return. Four assumptions are required to conduct the Wilcoxon signed rank test. First, the samples have to be dependent, meaning that the data points are paired and originate from the same population. The second is that the pairs are randomly drawn and that they are independent across observations.

[9] The winsorized data is presented in Appendix 3

However, if there are cross-sectional correlation between the observations, test statistics can be over- or understated. Thirdly, the distribution of the two samples must be symmetrical. Finally, the variable must be of ordinal scale or higher, such that it is possible to say if one value is higher, the same, or lower than the other. In our thesis, the samples that are matched represent the same economic figure, so the distribution of both should be quite similar, as the amount of observations is relatively large. All values that we compare are of the interval scale, which is higher than ordinal.

The Wilcoxon signed rank test is defined as:

$$\mu_R = \frac{n_1(n_1 + n_2 + 1)}{2}$$

$$\sigma_R = \sqrt{\frac{n_1 n_2(n_1 + n_2 + 1)}{12}}$$

$$Z = \frac{R - \mu_R}{\sigma_R}$$

Where R is the sum of the ranks of data in the smaller sample n1 and n2.

Mann-Whitney U test

The RLBOs are also adjusted for the classic IPOs performance. This comparison is unpaired and unmatched, simply to analyze if the RLBOs, in general, perform better than the non-buyout fund backed-IPOs. Like the Wilcoxon signed-rank test, the Mann-Whitney U test (frequently called the Wilcoxon rank-sum test) is also non-parametric. The test examines the difference in mean rank between the two samples for statistical significance. The null hypothesis is that the distributions of the two groups are equal, while the alternative hypothesis states that the medians are unequal.

The Mann-Whitney U test is defined as:

$$U_1 = n_1 n_2 + \frac{n_1(n_1 + 1)}{2} - R_1$$

$$U_2 = n_1 n_2 + \frac{n_2(n_2 + 1)}{2} - R_2$$

Where n_1 and n_2 is the number of scores in the first condition and second condition and R1, and R2 is the sum of the ranks of the scores in the first and second condition.

The assumptions required are similar as for the Wilcoxon signed-rank test, although with one exception. The variables must be at least of ordinal level and there must be two groups, i.e. the RLBOs and the classic IPOs. Observations must be independent of each other. Lastly, the shape of the distribution of each group needs to be similar. The Wilcoxon rank-sum test is conducted when two unmatched samples are compared.

4.3 Cross-sectional regressions

We formulate our problem statement in a way that enables us to perform cross-sectional regressions on the association of agency costs with the variance of stock and operating performance and the change in capital expenditures. For the cross-sectional regression analysis, we will use the multiple linear regression models, which is defined as:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \cdots + \beta_k x_k + u$$

Six assumptions need to be fulfilled for the estimated parameters to be reliable. The classic linear regression model (CLRM) conditions are:

1. Linearity in parameters
2. Random sampling
3. No perfect collinearity
4. Zero conditional mean
5. Homoscedasticity
6. Normality

Assumption number one requires that the population model is linear in its parameters. The betas have to be linear. Assumption number two says that the sample size n of (y, x_1, x_2,…, x_k) comes from a random selection of the total population. It can fail if the sample does not represent the underlying population. We do not expect to have included all existing RLBOs. There is a possibility that larger and/or more visible deals are overrepresented in our sample of firms. However, there is no way to check if this is the case. Our sample of other IPOs have no other criteria than listed in the selected time period and size, and should, therefore, meet the requirements. The third assumption states that two or more independent variables cannot be perfectly collinear.

The fourth assumption requires that the error term u has a zero conditional mean, given any values of the independent variables. If the relationship between the regressors and the dependent variable is specified wrongly, an estimation problem arises. If an omitted variable is correlated with one or more of the regressors, assumption four fails, and the estimators will be biased. As long as there is no omitted variable bias, the independent variables are exogenous if the error term has an expected value of zero. If this assumption does not hold, they are endogenous. Considering that stock returns are volatile and affected by a large number of variables, there is a reasonable chance that our model will not include all the important explanatory variables. Thus, careful consideration of each explanatory variable will be required to ensure that they do not correlate with any important omitted variables.

Assumption number five concerns homoscedasticity and requires that the error term u, given any value of the explanatory variable, has equal variance. Thus, the variance is independent of the level of any of the regressors. If this is not satisfied, the model is heteroskedastic. A failure of this assumption will not bias the estimators, but statistical inference will not be possible. If this is the case, an alternative is to use standard errors that are robust against heteroscedasticity. Finally, the sixth assumption states that the unobserved error is normally distributed, and has zero mean and constant variance σ^2. If this assumption is violated, OLS is still a valid method. However, it will not necessarily be the most efficient estimation. The distribution of the t statistic is not exactly t for the sample. This implies that the t-tests conducted to estimate the significance of the parameters are not valid. However, for large sample sizes, the t statistic have approximately t statistic. It also appears that the signs of the parameters and their relative magnitude and significance are somewhat consistent across the models.

The first four assumptions are required to obtain unbiased estimators. If the RLBO sample is collected correctly and the regressions are correctly specified, the estimators should be close the "true" population value. The failure of only one of them will lead to biasedness. Over-specifying the relationship by including an irrelevant regressor will not affect the unbiasedness of the other estimators. However, it needs to be avoided to not negatively affect the variances of the estimators. Adding the fifth assumption allows us to calculate the variance of the estimators, which make hypotheses tests and confidence intervals possible to compute.

To be certain that the CLRM assumptions are met in our analysis, a range of tests will be conducted such that the reliability of our results is maximized. The first test is the Ramsey RESET (regression equation specification error test) test, which examines the estimated model for omitted variable bias in the form of nonlinear combinations of the independent variables. It regresses the dependent variable on the fitted model raised to the power of 2, …, k. Furthermore, an F-test is conducted on the coefficients, where the null hypothesis states that the original model is correctly specified. The second test is the variance-inflation factor (VIF), which quantifies the seriousness of multicollinearity in the regression analysis. It tests for the variance for a model with several regressors, divided by the variance of a one-regressor model. It states how much the variance of an estimated regression coefficient is increased because of multicollinearity. Usually, a VIF over 10 indicates problems related to multicollinearity. Thirdly, the Breusch-Pagan test examines heteroscedasticity in the error term. Thus, it checks whether the error variance is dependent on the values of the explanatory variables. The Breusch-Pagan test is a chi-squared test, with the null hypothesis stating homoscedasticity. A regression of the squared residuals on the regressors will reveal the degree of heteroskedastic errors. Finally, the Shapiro-Wilk test examines the residual distribution in the estimated regression model. The residuals are estimated and further investigated to see whether they are normally distributed. If the p-value is low, the null hypothesis of a residual normal distribution is rejected (Woolridge, 2006).

5. Data

5.1 Selection process

This study is to our knowledge the most extensive and most up-to-date sample of RLBOs with stock, accounting, and ownership data. The observation period, January 1980-March 2015, is set to depict the changing nature and cycles of the buyout industry and includes booms and busts, such as the rise and fall of the junk bond market, the ups and downs of the dot-com crisis and the swelling and bursting of the global financial crisis. No observations before 1980 have been included as previous studies suggest that RLBO transactions appeared infrequently before the 1980s (Renneboog & Vansteenkiste, 2017). The latter cut-off is to ensure a minimum of three years of data.

Collecting data for this research is a time-consuming activity for several reasons. There has previously been limited research on the topic, and the data we are looking after has to satisfy specific qualities. We are also looking for several qualitative features that cannot necessarily be identified in databases. The buyout industry is known for wanting to keep the attention to a minimum regarding their transactions and how they manage their portfolio companies. Besides, it has become harder to distinguish between leveraged buyouts and venture capital investments, as it is no longer uncommon that venture funds engage in LBOs.

The RLBO dataset was collected from several sources. Jerry Cao from the Sun Yat-Sen University (SYSU) and writer of "The Performance of Leveraged Buyouts" provided us with a sample of 469 US-based RBLOs (sample is tilted towards private-to-private firms). Further, we downloaded a dataset of companies from Capital IQ, that had been subject to an LBO and later been listed. We also compared Ritter's venture- and buyout fund-backed IPO list with FACTIVA to identify if the companies matched out criteria. Finally, we screened FACTIVA and buyout funds' web pages to supplement the sample. To ensure comparability with previous studies, such as Mian and Rosenfeld (1993) and Holthausen and Larcker (1996), we set up the following criteria:

- The transaction is backed by at least one buyout fund or the management group
- The transaction involves leverage. To eliminate transactions with characteristics more similar venture capital conducted by buyout groups, we screened transaction comments and searched news databases.

Finally, the whole sample was screened through FACTIVA to separate the companies into public-to-private, divisional and private-to-private RLBOs, as defined in section 1.3. If there were any inconsistencies with the criteria, the RLBOs were eliminated from the sample. The final sample consists of 861 RLBOs in total, of which 227 public-to-private, 265 divisional and 369 private-to-private. Of these, 86 RLBOs are European.

Accounting data was collected from the Compustat database. Stock price data was collected through the Center for Research in Security Prices' database (CRSP) and Capital IQ. Data for 1 day, 30 days, 6 months, 1 year and 3 years following the IPO were collected in order to analyze both the short-term and long-term stock performance. The IPO offering prices were obtained through screening the FACTIVA database. The ownership data and lock-up period were obtained through manually

screening the prospectuses filed with the U.S. Securities and Exchange Commission (SEC). It was not possible to identify ownership data or the lock-up period of the RLBOs conducting an IPO before 1996 or for any of the European RLBOs. The final stock return sample consists of 713 US RLBOs and 72 European RLBOs (US: 170 public-to-private, 220 divisional and 323 private-to-private). Moreover, the sample of 680 US RLBOs and 69 European RLBOs has available accounting data (US: 176 public-to-private, 190 divisional and 314 private-to-private). Finally, the smaller sample of 454 US RLBOs is used whenever IPO ownership and governance data is analyzed. The European data is not presented unless otherwise is stated.

5.1.1 Data selection limitations

Although we sought to collect a comprehensive sample resembling the total population of US and European RLBOs during 1980-2015, our dataset might be subject to selection biases. Large transactions that attract more attention are possibly overrepresented, especially during the earlier years as the coverage in financial databases, such as Capital IQ tend to be less comprehensive before the 2000s. In addition, CRSP and Compustat have limited data on companies listed before 1990.

5.1.2 Supplemental Data

The benchmark sample of non-buyout backed American IPOs (defined as classic IPOs) was conducted from the Capital IQ database (post-1996) and Ritter's IPO list (pre-1996) and after eliminating American Depository Receipts, Real Estate Investment Trusts, closed-end funds and unit offering as well as IPOs with offering size less than $1,5 million, assets less than $5 million and market cap less than $5 million includes 1823 IPOs. The stock returns were obtained from Capital IQ and CRSP, and the IPO prices from FACTIVA. In addition, the market benchmark data is collected from Capital IQ and CRSP database. The market model was estimated using Bloomberg. The accounting data was obtained from the Compustat database.

5.2 Matching

In terms of the matching classical IPO sample, the yearly distribution seems to be biased towards many IPOs from 1997 to 2000, prior to the dotcom bubble. This is consistent with Ritter (1991), who argues that the number of public offerings increases significantly when investors are overoptimistic about particular industries. As Ritter and Welch (2002) argue; IPO studies not only are sensitive to methodology but also the exact time-period chosen.

Ghosh (2001) proposes to match the companies on three-digit SIC, 25% to 200% deviation limit on assets and IPO year. It is unfortunately not possible to match every RLBO on these conditions due to a limited number of IPOs available for matching. Several RLBOs can if matched on IPO year, only be matched on either two- or one-digit SIC. The RLBOs that could be matched on total assets are matched. In terms of the stock performance analysis, if the percentage deviations are skipped 250 RLBOs can be matched on IPO year and three-digit SICs, an additional 196 RLBOs can be matched on IPO year and two-digit SIC and an additional 257 RLBOs can be matched on IPO year and one-digit SIC. Similarly, for the accounting data sample, 232 can be matched on IPO year and three-digit SICs, 186 on IPO year and two-digit SIC and finally, 282 can be matched on IPO year and one-digit SIC. Almost the entire sample can thus be matched if the requirements are relaxed. Ideally, the entire sample would be matched on IPO year, three-digit SICs and within the tolerated deviations as proposed by Ghosh (2001) on total assets. As mentioned, this is not case for this sample as there is a clear tradeoff between proximity of matches and data availability. Clarke (1989) argues that the US SIC system works best in terms of delineating the broad industry characteristics (one- and two-digit SICs), compared to its ability to capture the finer differences (three- and four-digit SICs). As such, this could imply that the drop-off between matching on three-, two- and one-digits could be tolerated. A few of the RLBOs, particularly in years with fewer IPOs, simply cannot be matched due to missing IPOs that matches the 1 digit SIC and/or year.

5.3 Sample characteristics

In an attempt to better describe the chosen data in our sample and study the differences between the RLBOs and classic IPOs, we present the final data sample with descriptive statistics. The accounting performance and differences through time will be presented more thoroughly in section 6.1.

	Public-to-Private	Divisional	Private-to-Private	Classic IPOs
	Median	Median	Median	Median
No. of observations	176	190	314	1823
Market Cap at IPO date ($ million)	582,0	476,7	278,1	189,7
Total Assets	461,2	134,6	135,8	29,3
Leverage ratio				
Pre-IPO debt/ TA	87,6 %	84,5 %	79,4 %	53,7 %
Post-IPO debt/ TA	69,7 %	62,1 %	54,7 %	28,9 %
Change in debt/ TA	-15,0 %	-16,1 %	-20,3 %	-24,8 %
Capital Exp./ TA				
Pre-IPO CAPEX/TA	3,2 %	3,4 %	4,2 %	5,3 %
Post-IPO CAPEX/TA	3,7 %	4,2 %	5,4 %	4,5 %
Change CAPEX/TA	0,6 %	0,7 %	0,6 %	-0,1 %
Operating Income/ Sales				
Pre-IPO	14,1 %	13,0 %	12,4 %	9,9 %
Post-IPO	15,6 %	14,5 %	14,1 %	11,2 %
Change	1,5 %	1,5 %	1,7 %	1,3 %
Equity ownership				
Pre-IPO buyout specialist	62,4 %	63,2 %	58,6 %	
Post-IPO buyout specialist	43,8 %	39,3 %	39,5 %	
Change in buyout specialists'	-18,6 %	-23,9 %	-19,1 %	
Pre-IPO insiders	22,6 %	57,5 %	68,5 %	
Post-IPO insiders	15,5 %	36,8 %	44,4 %	
Change in insiders equity	-7,1 %	-20,7 %	-24,1 %	
Pre-IPO management	4,1 %	5,2 %	14,1 %	
Post-IPO management	2,4 %	4,5 %	10,8 %	
Change in management's equity	-0,9 %	-1,8 %	-2,9 %	
Years Private	4,5	2,8	2,9	
Lockup Period (in months)	6	6	6	
Acquired, Delisted or Bankrupt	28	42	50	291

Table 1 reports median annual (pre-IPO is the year before the IPO and post-IPO is the year after the IPO) levels of selected variables for the RLBO and classic IPO sample

Table 1 provides descriptive characteristics for market capitalization, total assets, changes in leverage, capital expenditures, operating income, ownership prior and after the IPO, lock-up period and years held private of the RLBOs and classic IPOs. The leverage ratio appears to decrease significantly from the year before the IPO to year after the IPO for all the RLBOs. The median leverage ratio falls from 87,6% to 69,7% for the public-to-private RLBOs. The divisional RLBOs have a median leverage ratio of 84,5% prior to the IPO, which decreases to 62,1% post-IPO. The private-to-private leverage ratio decreases from 79,4% to 54,7%. Thus, the public-to-private appears to be most levered both before and after the IPO and the private-to-private RLBOs appears to be the

least leveraged. In comparison, the sample of classic IPOs decreases leverage from 53,7% to 28,9%. The results indicate that the classic IPO has significantly lower leverage than the RLBOs both pre- and post-IPO.

In terms of size, the public-to-private RLBOs are considerably larger than the divisional and private-to-private RLBOs at the time of the IPO, as they have both higher market cap and assets. The divisional RLBOs are bigger than the private-to-private. The RLBOs are significantly larger than the classic IPOs.

The median capital expenditures/ total assets ratio increases from pre-IPO to the year after the IPO by 0,6% and 0,7% for all the RLBOs. The private-to-private RLBOs appear to have the highest level of capital expenditures after the IPO. The classic IPOs CAPEX decreases, but has a higher level than the public-to-private and divisional RLBOs after the IPO.

The same pattern emerges for the operating income/ sales. The public-to-private RLBOs have higher operating income/sales ratio than the divisional, which again have higher than the private-to-private. The RLBOs have overall higher operating income than the classic IPOs. The operating income seems to increase from pre- to post-IPO.

In terms of ownership, there are substantial differences in the concentration of ownership following the time of IPO. The buyout funds ownership stake increases or remains unchanged in only 11 out of 454 transactions. The divisional RLBOs have the highest decline in ownership, as the median ownership falls from 63,2% to 39,3%. The public-to-private RLBOs have the most modest decrease, decreasing from 62,4% to 43,8%. The private-to-private's largest shareholder decreases their ownership from 58,6% to 39,5%. With regard to insiders' ownership, the public-to-private's ownership declines from 22,6% before the IPO to 15,5% after the IPO. Similarly, the divisional and private-to-private RLBOs decrease their ownership from 57,5% and 68,5% to 36,8% and 44,4% respectively. Insiders include officers, directors, management and their relatives and all holdings votes by these people. The equity ownership of the buyout specialist, like Bain Capital or KKR, would be included in the insiders' holdings because of their representation on the board of directors. The high insiders' ownership could indicate that the buyout funds actively monitor the managers. As ownership data for RLBOs listed prior to 1996 is not available, changes through time cannot be

analyzed.

The management's equity holdings also decrease following the IPO. The public-to-private has the smallest change in management's holdings and the lowest holdings post-IPO, decreasing from 4,1% to 2,4%. The divisional RLBOs management decreases holdings from 5,2% to 4,5%. The private-to-private RLBOs management's equity holdings decline from 14,1% to 10,8%. The results indicate that the private-to-private RLBOs have significantly higher management equity holdings than the other RLBOs. The changes in management's ownership and the largest shareholder is inversely correlated (correlation of -0,206). This implies that, even though both management's and largest shareholders' equity generally declines, larger declines in one group tend to be associated with smaller declines (or increases) in the other group.

In comparison, Holthausen and Larcker (1996) find that insiders' equity ownership declines from 75% to 49%. Bruton, Keels and Scifres (2002) report that the insiders' ownership decreases from 68% to 49%. Cao and Lerner (2009) find that the buyout funds equity position decreases from 55% to 38% after the IPO and insiders' ownership decreases from 66% to 36% after the IPO. McConnell and Servaes (1990), on the other hand, report median insider ownership of 5% for approximately 1000 nonfinancial public companies. The results thus imply that the insiders' equity ownership is still relatively large relative to the typical public corporation.

The median public-to-private RLBO is held private for 4,5 years, significantly longer than the divisional and private-to-private RLBOs which are only held private respectively 2,8 and 2,9 years. A possible reason for this could be that the private-to-private and divisional RLBOs are acquired for the sole purpose of being listed as a separate company soon after the acquisition. The public-to-private, on the other hand, could be acquired to conduct major structural and organizational changes as the delisting and listing process is comprehensive. Further, the public-to-private firms tend to be larger and could take longer time to restructure, improve efficiency and go public again. Our analysis indicates that 13,0% of buyouts reemerge publicly within one year, and 30,7% reemerge within two years. In comparison, Kaplan and Stromberg (2009) find that around 13% of the transactions in their sample are held private less than two years. Mian and Rosenfeld (1993) and Holthausen and Larcker (1996) report that their sample is held private for median 22 months (1,84 years). Cao and Lerner (2009) report a median time of staying private for 3,08 years. The longest period an RLBO has been

held private in our sample is 17 years, which was Aramark Corp by management. The fastest flip was conducted by Hicks, Muse, Tate and Furst, Inc, taking Regency Energy Partners LP public, only 59 days after the LBO.

	Median holding time (in years)			
	1980's	1990's	2000's	Overall
Public-to-Private	2,9	4,4	4,7	4,5
Divisional	2,3	3,1	2,7	2,8
Private-to-Private	1,6	2,6	3,2	2,9

Table 2 presents the median years held private in the 1980s, 1990s, and 2000s

Table 2 indicates that the median holding time has increased significantly for each decade. In the 1980s the median holding time for public-to-private was only 2,9 years, which has increased to 4,7 years in the 2000s. Similarly, the private-to-private holding time has doubled from 1,6 to 3,2 years. Wright, et al. (1994) argues that the length of the LBO held private, is contingent on the firm's management, ownership, financial standing as well as competitive and other market factors. It is hard to believe that these factors have changed significantly since the 1980s. There could, however, be other reasons for the increasing private holding time. First, as the competition has increased, the buyout funds have to pay more for their investments. Hence, it may take a longer time to earn the required return on the investments. Second, the financial crisis and dotcom crisis could have influenced the holding time significantly due to weak market conditions. The median lock-up period for the buyout funds, insiders and management are six months for all the types of RLBOs.

Industry Classification	Public-to-Private		Divisional		Private-to-Private		Classic IPOs	
Agriculture, Forestry and Fishing	1	1%	1	0%	2	1%	21	1%
Mining	1	1%	9	4%	17	5%	63	3%
Construction	5	3%	3	1%	2	1%	18	1%
Manufacturing	62	36%	121	54%	117	35%	513	28%
Transportation, Communications,	14	8%	13	6%	29	9%	119	7%
Wholesale Trade	7	4%	9	4%	15	4%	67	4%
Retail Trade	38	22%	18	8%	47	14%	99	5%
Finance, Insurance and Real Esta	11	6%	15	7%	33	10%	340	19%
Services	35	20%	35	16%	71	21%	487	27%
Public Administration	0	0%	0	0%	1	0%	1	0%
Nonclassifiable	0	0%	0	0%	1	0%	90	5%
Total	174		224		335		1818	

Table 3 shows the industry distribution for the public-to-private, divisional and private-to-private RLBOs and classic IPOs

In terms of the industry distribution, the ten most frequent SICs constitute only 16% of the sample. We recognize that overrepresentation by one industry could bias this study's results as buyouts have been concentrated in certain sectors historically. However, the diverse collection of firms in our sample ensures that industry bias is unlikely. Following Jensen (1989), buyouts can be expected for companies with relatively high and stable cash flow (have the ability to service increased debt payments), low leverage and low research and development expenditures. This pattern also emerges from the industry distribution as only 5% of the sample are high technology companies. In comparison, 16,8% of the classic IPOs operate in this industry. The pattern is further confirmed in the industry distribution by the high share of manufacturing companies for the RLBOs compared to the high share of service companies of classical IPOs. The share of finance, insurance, and real estate companies is significantly higher for the classic IPOs than the RLBOs. Finally, another industry with stable cash flow and low R&D expenses is the retail trade, which also has a significantly higher share for the RLBOs than classic IPOs. The results indicate that the industry distributions of the RLBOs and classic IPO have some differences.

Denis (1994) reports that over time, there have been LBO waves[10], "where the buyout funds have done a series of transactions in a single industry: for instance, many RLBOs and LBOs in the 1980s were concentrated in the food retail industry". This pattern is also apparent in our sample as the retail trade public-to-private and private-to-private RLBOs decreases from the 1980s and 1990s to the 2000s[11]. Similarly, the fraction of manufacturing companies decreases significantly from the 1980s and 1990s to the 2000s. In comparison, the RLBOs operating in the services industry increases significantly in the 2000s. This pattern, although weaker, also emerges for the classic IPOs.

In terms of the RLBOs delisted, acquired or filed for bankruptcy, 25 of the public-to-private RLBOs (out of 176), 41 of the divisional (out of 190) and 40 of the private-to-private (out of 314) were acquired within three years. In comparison, 291 of the classic IPOs were delisted within the three years. A significant number of these firms filed for bankruptcy after the dotcom crisis. Out of the RLBOs, 3 public-to-private, 1 divisional and 9 private-to-private RLBOs filed for bankruptcy. Kaplan and Stromberg (2009) report that 6% of their sample ended in bankruptcy or reorganization. This

[10] For instance, Carlyle Group established its reputation through transactions in the defense industry, while First Reserve Corp focuses on the oil & gas industry

[11] See Appendix 4, 5 and 6 for the industry distributions in the 1980s, 1990s and 2000s

finding could suggest that especially the public-to-private and divisional RLBOs are more robust firms than other LBOs and classic IPOs even though they are more levered. From the yearly distribution of RLBOs and IPOs, two patterns emerge. Firstly, RLBO activity increased significantly during the 1990s and 2000s. Second, The RLBOs relative to IPOs remained low during the 1990s but increased significantly in the 2000s[12].

Overall, the RLBOs appear to be larger, more levered, have lower capital expenditures and higher operating income ratio than classic IPOs. The public-to-private appears to be bigger, more levered and has lower insider and management ownership. They also have higher operating income and lower capital expenditures. The divisional appear to be in between the public-to-private and private-to-private RLBOs. The private-to-private RLBOs seem to have characteristics most similar to the classic IPOs in terms of size, leverage, and CAPEX levels.

Finally, studying the sample characteristics, these RLBOs appear to be hybrid organizations that retain some of the characteristics of the LBO organizations.

6. Empirical Findings

From a portfolio strategy perspective, the mean return of the RLBOs is the most relevant statistic. However, in judging whether these returns are likely to be repeated in future replications of RLBO studies, the median provides more information about the performance of the sample in general. Hence, the main attention will be devoted to the median returns.

Examining the distributions of both the operating and stock performance show that operating margins and buy-and-hold returns of the RLBOs and classic IPOs do not appear to be normally distributed. The buy-and-hold RLBO, industry and classic IPO stock returns are right-skewed, while the operating income ratio, industry- and classic IPO matched samples are left-skewed, despite attempts of winsorizing the sample. The apparent skewness is also indicated by the seemingly clear differences in average and median. In tests of normality, there are no indications that the returns follow a normal distribution for any of the periods. The non-parametric tests are used to determine the significance of

[12] See Appendix 1 for yearly distributions of the RLBOs and IPOs

the median test values.

6.1 Operating performance

6.1.1 Public-to-private

	Public-to-private					
	LBO-1	**IPO-1**	**IPO**	**IPO+1**	**IPO+2**	**IPO+3**
Leverage	57,6 %	87,6 %	72,1 %	69,7 %		
Annual sales growth		6,3 %	9,6 %	10,0 %	7,7 %	9,0 %
Operating CF-to-sales	8,9 %	6,3 %	6,7 %	8,9 %	7,9 %	9,2 %
Pre-tax NI margin	6,5 %	2,1 %	3,9 %	7,0 %	6,6 %	6,0 %
CAPEX ratio	4,0 %	3,2 %	3,3 %	3,7 %		

Table 4 reports the median accounting variables of the public-to-private RLBOs.

The leverage ratio of the public-to-private RLBOs increases significantly from 57,6% the year before the LBO to 87,6% the year prior to the IPO. From IPO-1 to the year after the IPO, the leverage ratio decreases from 87,6% to 69,7%. Interestingly, the RLBOs have higher leverage after the second IPO than before the LBO. The pattern is thus that the leverage ratio increases significantly after the LBO, and is reduced after the IPO.

The annual sales growth increases significantly after the IPO, rising from 6,3% in the private period to 10% the year after the IPO. The operating cash flow margin and pre-tax net income decrease from the year prior to the LBO to the year before the LBO. As the bottom line is influenced by the capital structure and the debt payments, a decrease is natural as long as the debt is high. After the IPO, they improve significantly.

In terms of the capital expenditures/total assets ratio, it decreases from the time of the LBO to the year prior to the IPO (significant at 1% level). The median RLBOs ratio, however, increases by 0,6% subsequently to the IPO (significant at 1% level). The results indicate that the capital expenditures decrease in the private period and then increase after the IPO.

		LBO-1	IPO-1	IPO	IPO+1	IPO+2	IPO+3
RLBO Raw OP	Median	12,0 %	14,1 %	14,7 %	15,6 %	14,8 %	14,9 %
	Winsorized	12,6 %	16,0 %	16,7 %	16,8 %	16,6 %	16,9 %
Industry-adj. OP	Median		7,1 %****	6,2 %****	8,4 %****	9,6 %****	9,7 %****
IPO-adj. OP	Median		4,2 %****	3,1 %****	4,3 %****	4,7 %****	4,3 %****

Table 5 reports the median raw, industry-adjusted and IPO-adjusted operating performance of the public-to-private RLBOs. *, **, ***, **** indicate significance at a 15%, 10%, 5% and 1% level respectively.

Table 5 shows the raw operating performance, industry-adjusted and IPO-adjusted excess operating performance for the public-to-private RLBOs. The results indicate that they outperform their industry-matched relatives and the IPO sample for all periods. The Wilcoxon tests indicate that the differences are statistically significant at a 1% level. The raw operating performance appears to increase significantly from the LBO to the year prior to the IPO. The performance deteriorates after one-year following the IPO. The industry-adjusted and IPO-adjusted performance, however, improves post-IPO, suggesting that the deterioration in the industry-matched and classic IPOs performance exceeds the public-to-private RLBOs'.

In terms of the changes in the excess operating performance, the Wilcoxon test indicates that there is evidence of a significant difference in the change in median operating performance compared to the change in the industry-matched. The results suggest that the RLBOs perform significantly better than the industry-adjusted sample from the year prior to the year of the IPO (significant at 1% level). There is no evidence of any significant improvements in performance compared to the IPO sample's performance. Thus, the tests indicate that the yearly improvements in the RLBOs operating performance are not better than the IPO-matched samples yearly improvement in performance after the IPO (IPO-1 as base year)[13].

[13] See Appendix 7-14 for changes in performance

6.1.2 Divisional

	Divisional				
	IPO-1	**IPO**	**IPO+1**	**IPO+2**	**IPO+3**
Leverage	84,5 %	66,2 %	62,1 %		
Annual sales growth		13,9 %	13,4 %	10,7 %	7,6 %
Operating CF-to-sales	6,6 %	7,7 %	8,3 %	7,5 %	7,8 %
Pre-tax NI margin	2,8 %	5,7 %	7,0 %	6,1 %	5,4 %
CAPEX ratio	3,4 %	4,4 %	4,2 %		

Table 6 reports the median accounting variables of the divisional RLBOs.

The results in Table 6 appear to be very similar to the public-to-private RLBOs. The leverage ratio is slightly lower both pre-and post-IPO, decreasing from 84,5% to 62,1%. The operating cash flow ratio appears to increase significantly from the year prior to the IPO, but decreases two- and three-years following the offering. Net income margin also increases significantly from the year prior to the IPO to the year after the IPO and deteriorates thereafter. The median company's capital expenditures increase by 0,7% from IPO-1 to IPO+1, significant at 1% level.

		IPO-1	**IPO**	**IPO+1**	**IPO+2**	**IPO+3**
RLBO Raw OP	Median	13,0 %	13,5 %	14,5 %	13,8 %	13,3 %
	Winsorized	14,2 %	15,6 %	15,2 %	15,3 %	14,9 %
Industry-adj. OP	Median	5,0 %****	3,8 %****	5,4 %****	9,9 %****	6,6 %****
IPO-adj. OP	Median	3,2 %****	1,9 %****	3,3 %****	3,7 %****	2,8 %****

Table 7 reports the median raw, industry-adjusted and IPO-adjusted operating performance of the divisional RLBOs. *, **, ***, **** indicate significance at a 15%, 10%, 5% and 1% level respectively.

As for the public-to-private RLBOs, the raw operating income ratio appears to peak the year after the IPO and decreases two- and three years following the offering. The operating margins are consistently around one-percent lower than the public-to-private RLBOs. The industry-adjusted and IPO-adjusted excess performance declines significantly three-years following the IPO. The Wilcoxon tests indicate that the divisional RLBOs outperform their matched relatives and the classic IPOs, statistically significant at a 1% level in every period. Testing for changes in performance subsequent to the IPO compared to the matched relatives and classic IPOs indicates that the RLBOs improvement in performance is statistically significant at a 10% level compared to the industry-adjusted sample in the year of the IPO.

6.1.3 Private-to-private

	Private-to-private				
	IPO-1	**IPO**	**IPO+1**	**IPO+2**	**IPO+3**
Leverage	79,4 %	59,7 %	54,7 %		
Annual sales growth		19,2 %	21,5 %	15,0 %	11,7 %
Operating CF-to-sales	6,4 %	6,6 %	7,8 %	7,7 %	8,0 %
Pre-tax NI margin	2,6 %	4,9 %	7,5 %	5,7 %	5,2 %
CAPEX ratio	4,2 %	4,4 %	5,4 %		

Table 8 reports the median accounting variables of the private-to-private RLBOs.

The same patterns as for the public-to-private and divisional RLBOs emerges for the private-to-private. The leverage ratio decreases from 79,4% to 54,7% after the IPO. Operating cash flow ratio improves significantly between the year prior to the IPO and the year after the IPO and remains stable. The pre-tax net income margin, however, appears to deteriorate two- and three years after the IPO. The median company's capital expenditures increase by 0,6% after the IPO, significant at 1% level.

		IPO-1	**IPO**	**IPO+1**	**IPO+2**	**IPO+3**
RLBO Raw OP	Median	12,4 %	14,2 %	14,1 %	13,0 %	13,4 %
	Winsorized	13,4 %	15,9 %	14,9 %	13,9 %	14,1 %
Industry-adj. OP	Median	4,9 %****	4,8 %****	5,7 %****	4,9 %****	5,8 %****
IPO-adj. OP	Median	2,5 %****	2,6 %****	2,9 %****	2,9 %****	2,8 %****

Table 9 reports the median raw, industry-adjusted and IPO-adjusted operating performance of private-to-private RLBOs. *, **, ***, **** indicate significance at a 15%, 10%, 5% and 1% level respectively.

Different to the public-to-private and divisional RLBOs, the operating margin appears to deteriorate after the IPO, not the year after the IPO. The operating margins overall seem to be lower than the public-to-private and divisional RLBOs. The Wilcoxon tests indicate that the private-to-private RLBOs outperform the industry matched sample and the IPO sample, statistically significant at a 1% level. The changes in performance relative to the changes in industry and IPO sample's sample is however insignificant.

6.1.4 Quick flips

	Quick-Flip				
	IPO-1	**IPO**	**IPO+1**	**IPO+2**	**IPO+3**
Leverage	68,4 %	61,0 %	57,1 %		
Annual sales growth		0,0 %	24,2 %	8,5 %	7,2 %
Operating CF-to-sales	6,1 %	8,0 %	10,2 %	8,2 %	7,8 %
Pre-tax NI margin	1,7 %	3,7 %	6,5 %	5,4 %	2,8 %
CAPEX ratio	4,0 %	4,0 %	5,5 %		
	Non-Quick-Flip				
Leverage	83,6 %	65,7 %	61,7 %		
Annual sales growth		15,6 %	13,5 %	10,2 %	9,6 %
Operating CF-to-sales	6,5 %	6,8 %	7,9 %	7,7 %	8,4 %
Pre-tax NI margin	2,7 %	5,0 %	7,3 %	6,1 %	5,6 %
CAPEX ratio	3,6 %	4,1 %	4,5 %		

Table 10 reports the median accounting variables of the quick-flips.

Table 10 shows the descriptive accounting variables for the quick-flips[14] compared with the non-quick flips. The RLBOs that are held private longer than one year have higher leverage pre-IPO and post-IPO. The annual sales growth is significantly higher for the quick-flips in IPO+1 but lower in other years. In terms of operating cash flows to sales, the ratio appears to peak one year after the offering for the quick-flipped RLBOs. The non-quick-flips' operating cash flow seems to improve significantly in IPO+3. The pre-tax net income margins of both types are similar, as the margin declines after IPO+1. The capital expenditures ratio increases significantly after the IPO for both types but is 1pp higher for the quick-flips than the non-quick flips.

[14] There are 8 public-to-private, 27 divisional and 56 private-to-private quick-flips in our sample (with data available)

	Quick-Flip				
	IPO-1	**IPO**	**IPO+1**	**IPO+2**	**IPO+3**
Public-to-Private	11,0 %	14,6 %	14,0 %	15,8 %	14,2 %
Divisional	22,7 %	23,1 %	21,5 %	15,7 %	16,2 %
Private-to-Private	10,3 %	11,2 %	12,6 %	10,5 %	9,8 %
	Non-Quick-Flip				
Public-to-Private	14,3 %	14,7 %	15,6 %	14,5 %	14,9 %
Divisional	12,3 %	13,1 %	14,0 %	13,6 %	13,1 %
Private-to-Private	12,8 %	14,4 %	14,2 %	13,2 %	13,9 %
	Excess OP				
Public-to-Private	-3,3 %	-0,2 %	-1,6 %	1,3 %	-0,6 %
Divisional	10,5 %***	10,0 %***	7,6 %***	2,1 %	3,0 %
Private-to-Private	-2,4 %	-3,2 %	-1,6 %	-2,7 %	-4,0 %

Table 11 reports the median operating performance of RLBOs held private longer and shorter than one year. *, **, ***, **** indicate significance at a 15%, 10%, 5% and 1% level respectively.

As Cao and Lerner (2009) find that RLBOs held less than a year perform worse than those held longer than one year based on buy-and-hold stock performance, it is thus of interest, to analyze whether this is true for the operating performance as well. The public-to-private RLBOs quick-flips underperform non-quick flips in every period except IPO+2 (statistically insignificant). The quick-flips' operating margin is however 1,3 percentage points (pp) higher two years after the IPO. The divisional quick-flips tend to perform better across all five periods compared to the non-quick flips. The excess performance is statistically significant in IPO-1, IPO, and IPO+1. The opposite pattern emerges for the private-to-private RLBOs. The quick-flips underperform the non-quick flips in all periods. The underperformance is, however, statistically insignificant. The quick-flips' public-to-private's change in performance is superior of the non-quick-flips (IPO-1 as base year), but statistically insignificant. The divisional RLBOs change in performance is inferior and statistically significant in IPO+1, compared to the non-quick-flips.

	Shorter than median				
	IPO-1	**IPO+1**	**IPO+1**	**IPO+2**	**IPO+3**
Public-to-Private	14,1 %	15,5 %	16,8 %	15,5 %	15,4 %
Divisional	14,0 %	15,0 %	15,7 %	15,0 %	16,0 %
Private-to-Private	13,0 %	14,7 %	14,4 %	12,8 %	12,9 %
	Longer than median				
Public-to-Private	13,5 %	12,2 %	15,0 %	14,0 %	14,5 %
Divisional	11,4 %	12,4 %	13,3 %	13,2 %	11,5 %
Private-to-Private	12,1 %	14,1 %	13,9 %	13,3 %	13,9 %
	Excess OP				
Public-to-Private	0,7 %	3,3 %	1,7 %	1,5 %	0,9 %
Divisional	2,6 %	2,6 %	2,5 %	1,8 %	4,4 %***
Private-to-Private	0,9 %	0,6 %	0,4 %	-0,5 %	-1,0 %

Table 12 reports the median operating performance of RLBOs held private longer and shorter than median (4,5 years for the public-to-private, 2,8 years for the divisional and 2,9 years for the private-to-private). *, **, ***, **** indicate significance at a 15%, 10%, 5% and 1% level respectively.

The descriptive accounting performance of the RLBOs held longer and shorter than median is very similar[15]. Studying the operating performance of the RLBOs that are held private longer than median indicates that the divisional RLBOs held shorter outperform those that are held longer. The excess performance is statistically significant at a 5% level, three years following the IPO. The improvement in operating performance of the divisional RLBOs held shorter than median, from the year of the IPO to IPO+3, compared to those held longer than median is statistically significant at a 5% level. There are no significant differences in the public-to-private or private-to-private RLBOs. The public-to-private RLBOs held shorter appear to have slightly higher operating margin than those held longer than median. The private-to-private held private shorter performs better prior to the IPO, in the IPO year and the year after the IPO. They, however, perform worse two and three years after the IPO.

[15] See Appendix 15 for the descriptive accounting performance on the RLBOs held longer and shorter than median

6.1.5 Operating performance in the 1980s, 1990s, and 2000s

	1980's				
	IPO-1	**IPO**	**IPO+1**	**IPO+2**	**IPO+3**
Leverage	86,7 %	66,5 %	63,9 %		
Annual sales growth		16,2 %	15,8 %	11,2 %	10,5 %
Operating CF-to-sales					
Pre-tax NI margin	5,1 %	6,9 %	6,8 %	6,1 %	5,5 %
CAPEX ratio	5,2 %	5,1 %	4,9 %		
	1990's				
Leverage	83,6 %	61,4 %	56,2 %		
Annual sales growth		13,5 %	12,7 %	8,9 %	8,4 %
Operating CF-to-sales	5,2 %	5,8 %	6,1 %	6,1 %	6,1 %
Pre-tax NI margin	2,7 %	5,4 %	7,3 %	5,8 %	4,6 %
CAPEX ratio	3,7 %	4,5 %	5,2 %		
	2000's				
Leverage	80,5 %	69,0 %	64,6 %		
Annual sales growth		16,4 %	18,2 %	13,9 %	10,9 %
Operating CF-to-sales	8,2 %	8,4 %	10,2 %	10,9 %	10,8 %
Pre-tax NI margin	2,1 %	3,9 %	7,2 %	6,4 %	6,0 %
CAPEX ratio	3,4 %	3,3 %	3,5 %		

Table 13 reports RLBOs median descriptive accounting variables in the 1980s, 1990s, and 2000s.

Table 13 shows the descriptive accounting statistics for the RLBOs listed in the 1980s, 1990s, and 2000s. The leverage ratios appear to be higher in the 1980s before the IPO and higher after the IPO in the 2000s. The annual sales growth appears to be greater in the 2000s. The operating cash flow to sales ratio increases significantly from the 1990s to the 2000s. The pre-tax net income ratio appears to be very much alike in all the three decades. The capital expenditures ratio decreases slightly from 5,2% to 4,9% in the 1980s. In the 1990s, the CAPEX ratio increases significantly from 3,7% to 5,2%, while in the 2000s, the ratio increases from 3,4% to 3,5% after the IPO. As such, the capital expenditures seem to be consistently lower in the 2000s than in the 1990s and 2000s. This can be due to the lower fraction of manufacturing companies and a higher fraction of services companies in the 2000s, as explained in the “sample characteristics” section.

	1980s			1990s			2000s		
	IPO-1	**IPO+1**	**IPO+3**	**IPO-1**	**IPO+1**	**IPO+3**	**IPO-1**	**IPO+1**	**IPO+3**
Public-to-Private	12,4 %	8,8 %	10,8 %	12,4 %	14,5 %	11,8 %	15,7 %	16,6 %	18,3 %
Divisional	12,3 %	14,2 %	12,7 %	10,8 %	13,2 %	12,6 %	16,6 %	17,2 %	15,7 %
Private-to-Private	12,8 %	11,1 %	8,1 %	12,0 %	13,9 %	11,9 %	13,0 %	14,5 %	14,7 %
Classical IPOs	13,1 %	11,5 %	8,2 %	8,5 %	9,5 %	8,4 %	11,7 %	14,8 %	16,4 %

Table 14 reports the median operating performance in the 1980s, 1990s, and 2000s for the public-to-private, divisional and the private-to-private RLBOs

Overall, the results indicate that the operating margins in the 2000s are significantly higher than in the 1990s and 1980s for the RLBOs and classic IPOs. The public-to-private and private-to-private RLBOs performed better in the 1990s than in the 1980s. The opposite pattern emerges for the divisional RLBOs. In the 1980s, the public-to-private, private-to-private RLBOs and classic IPOs operating margin decreased after the IPO[16]. Overall, the operating margin and cash flow to sales of the RLBOs appear to be higher and even increases following the IPO in the 2000s (except for the divisional RLBOs). In the tests of differences in the operating margin between the decades, the operating income ratios in the 2000s are significantly higher than in the 1990s at a 1% level before and after the IPO. The 2000s outperform the 1980s after the IPO at a 10% level. There are no significant differences between the 1990s and 1980s[17].

[16] This is consistent with Degeorge & Zeckhauser (1993)'s findings

[17] The tests are based on the three types of RLBOs as a group due to the sample sizes

6.1.6 Repetitiveness of the acquiring buyout group

	KKR, Bain and Warburg Pincus				
	IPO-1	**IPO**	**IPO+1**	**IPO+2**	**IPO+3**
Leverage	89,1 %	75,8 %	74,0 %		
Annual sales growth		9,4 %	9,8 %	6,9 %	7,8 %
Operating CF-to-sales	9,2 %	8,5 %	11,0 %	11,7 %	12,5 %
Pre-tax NI margin	1,5 %	7,8 %	8,9 %	9,2 %	2,6 %
CAPEX ratio	3,5 %	3,6 %	4,8 %		
	Other buyout funds				
Leverage	82,4 %	64,9 %	59,9 %		
Annual sales growth		16,3 %	16,6 %	11,7 %	10,3 %
Operating CF-to-sales	6,8 %	7,5 %	7,4 %	7,7 %	5,2 %
Pre-tax NI margin	2,7 %	4,9 %	7,1 %	5,8 %	5,4 %
CAPEX ratio	3,6 %	4,1 %	4,6 %		

Table 15 reports the median accounting variables of the RLBOs listed by KKR, Bain Capital and Warburg Pincus LLC (the three most active buyout funds in our sample) and the RLBOs listed by the other buyout funds.

The RLBOs listed by the three most active buyout funds appear to have significantly higher leverage than the other RLBOs. In addition, they also have lower annual sales growth. The operating cash flow to sales and pre-tax net income margin ratios are also higher for these RLBOs. Finally, the capital expenditures ratio appears to be lower for the RLBOs listed by the three most active buyout funds before the IPO and higher after the IPO.

		IPO-1	**IPO**	**IPO+1**	**IPO+2**	**IPO+3**
KKR, Bain, Warburg	Median	15,0 %	15,7 %	18,0 %	18,2 %	18,9 %
Other buyout funds	Median	12,5 %	13,9 %	14,3 %	13,4 %	13,2 %
Excess OP	Median	2,5 %***	1,8 %***	3,7 %****	4,7 %****	5,7 %****

Table 16 reports the median operating performance of the RLBOs listed by KKR, Bain Capital and Warburg Pincus LLC (the three most active buyout funds in our sample) and the RLBOs listed by the other buyout funds.

The RLBOs of the most active buyout funds outperform the other RLBOs in every period, statistically significant at 5% (IPO-1 and IPO) and 1% (IPO+1 – IPO+3). The RLBOs listed by the most active buyout funds do not appear to share the same pattern as for the other RLBOs that the operating performance deteriorates after the first year following the IPO, as the performance increases in every

period. The yearly changes in operating performance are statistically significant from IPO-1 to IPO and IPO+3. The yearly changes in year 1 and 2 are insignificant.

6.1.7 European RLBOs

	European				
	IPO-1	**IPO**	**IPO+1**	**IPO+2**	**IPO+3**
Leverage	80,9 %	62,8 %	61,7 %		
Annual sales growth		11,9 %	8,7 %	4,9 %	5,7 %
Operating CF-to-sales	8,8 %	7,5 %	8,7 %	9,8 %	7,7 %
Pre-tax NI margin	3,2 %	7,2 %	6,5 %	5,8 %	4,6 %
CAPEX ratio	2,9 %	3,2 %	3,4 %		
	American				
Leverage	83,1 %	65,1 %	61,0 %		
Annual sales growth		15,6 %	15,6 %	11,1 %	9,9 %
Operating CF-to-sales	6,5 %	6,8 %	8,2 %	7,8 %	8,2 %
Pre-tax NI margin	2,6 %	7,2 %	6,1 %	5,5 %	4,3 %
CAPEX ratio	3,6 %	4,1 %	4,6 %		

Table 17 reports the median accounting variables of the American and European RLBOs

Table 17 shows the descriptive accounting data for the European and American RLBOs. The public-to-private, divisional and private-to-private RLBOs are analyzed as a group, due to the small sample of European RLBOs. The American RLBOs have slightly higher leverage the year prior to the IPO and in the year of the IPO. The leverage ratios appear to be alike after the IPO. The sales growth is significantly higher for the American than the European companies in every period. The operating CF-to-sales and pre-tax net income margin show similar development, deteriorating after the year after IPO. These two ratios are overall slightly higher for the European RLBOs. The cash flow to sales ratio results indicates that the European RLBOs experience a decrease in performance from IPO+2 to IPO+3. This pattern does not emerge for the American RLBOs. Finally, the CAPEX ratio appears to increase after the IPO for the European and American RLBOs. The CAPEX levels are overall higher for the American RLBOs after the IPO.

		IPO-1	IPO	IPO+1	IPO+2	IPO+3
Europe	Median	13,1 %	14,1 %	12,9 %	12,2 %	10,9 %
USA	Median	13,0 %	14,3 %	14,5 %	13,6 %	13,9 %
Excess OP	Median	0,1 %	-0,2 %	-1,5 %	-1,4 %	-2,9 %

Table 18 reports the median operating performance of the American and European RLBOs and the excess operating performance. *, **, ***, **** indicate significance at a 15%, 10%, 5% and 1% level respectively

European firms appear to perform slightly better than the American RLBOs prior to the public offering. This pattern reverses after the offering, as the American RLBOs outperform the European RLBOs in every year after the IPO. However, the Wilcoxon test shows no evidence of any differences in performance in any of the periods. Testing for yearly changes in performance indicates that the American RLBOs change in operating performance is higher than European change in performance from IPO-1 to IPO, IPO+2 and IPO+3 (significant at 15%, 10%, and 10% levels respectively). The results thus suggest that there is no statistical evidence of American RLBOs outperforming the European RLBOs in any of the periods, but the American RLBOs change in operating performance in the year of the IPO, year 2 and year 3 is significantly better than the European RLBOs improvement in operating performance.

6.2 Stock performance

6.2.1 Public-to-Private

Table 19 shows the estimated raw buy-and-hold returns, industry-adjusted, IPO-adjusted and market-adjusted returns of the public-to-private RLBOs. The public-to-private RLBO sample provides a raw median return of 3,4%, 8,9% and 15,6% after 1 day, 30 days and 6 months. In the long term, they produce a return of 24,9% and 43,4% after 1 and 3 years. Similarly, the classic IPOs[18] provide a median return of 10,3%, 11,9%, 12,9%, 8,9% and -9,4% for the same periods. The excess returns are statistically significant at 1% and 5% level, 1 day, 30 days, 1 year and 3 years following the offering. Thus, the public-to-private RLBOs underperform the IPOs after 1 and 30 days and outperform one- and three-years following the offering.

		1 day	30 days	6 months	1 year	3 years
RLBO Raw Returns	Mean	7,5 %	11,8 %	20,2 %	29,0 %	59,3 %
	Median	3,4 %	8,9 %	15,6 %	24,9 %	43,4 %
Industry-Adjusted Returns	Mean	-7,9 %	-4,8 %	-1,3 %	12,9 %	50,3 %
	Median	-7,2%****	-2,8%*	1,0%	16,0%**	34,2%****
IPO-adjusted Returns	Mean	-14,9 %	-13,9 %	-9,8 %	-1,2 %	36,0 %
	Median	-6,9%****	-2,9 %***	2,7 %	16,0 %***	52,7%****
Market-adjusted Returns	Mean	7,6 %	11,0 %	15,6 %	19,6 %	23,7 %
	Median	3,8%****	7,8%****	9,1%****	20,8%****	3,9 %

Table 19 reports the raw, industry-adjusted, IPO-adjusted and market-adjusted mean and median buy-and-hold returns for the public-to-private RLBOs. *, **, ***, **** indicate significance at a 15%, 10%, 5% and 1% level respectively

In terms of the industry-adjusted returns, the same pattern emerges, although the excess returns have a lower magnitude. The public-to-private RLBOs underperform their industry-matched peers in the short term (significant at 1% and 15% after respectively 1 and 30 days) and outperform them in the long term (significant at 10% and 1% after 1 and 3 years). Adjusted for the markets' performance, the public-to-private RLBOs outperform the risk-adjusted market index after 1 day, 30 days, 6 months and 1 year. The results are statistically significant at a 1% level. The excess return after 3 years is not significant.

[18] See Appendix 17 for the classic IPOs stock performance

6.2.2 Divisional

The divisional RLBOs provide a median raw buy-and-hold return of 3,2%, 6,6% and 12,1% after 1 day, 30 days and 6 months. In the long-term, the divisional RLBOs returns 15,6% and 38,9% after 1 and 3 years after the offering. As for the public-to-private RLBOs, the divisional underperform the classic IPOs 1 and 30 days after the offering (statistically significant at 1% level) and outperform after 1 and 3 years (15% and 1%).

		1 day	30 days	6 months	1 year	3 years
RLBO Raw Returns	Mean	9,5 %	13,4 %	18,1 %	29,0 %	45,8 %
	Median	3,2 %	6,6 %	12,1 %	15,6 %	38,9 %
Industry-Adjusted Returns	Mean	-6,4 %	-2,9 %	-3,4 %	2,5 %	31,8 %
	Median	-4,7 %****	-1,7 %	-1,7 %	0,7 %	24,7 %****
IPO-adjusted Returns	Mean	-12,9 %	-12,3 %	-11,9 %	-1,3 %	22,4 %
	Median	-7,1 %****	-5,3 %****	-0,8 %	6,7 %	48,3 %****
Market-adjusted Returns	Mean	9,4 %	12,8 %	13,1 %	17,3 %	7,4 %
	Median	3,2%****	6,6%****	8,1%****	1,6%****	-5,1%***

Table 20 reports the raw, industry-adjusted, IPO-adjusted and market-adjusted mean and median buy-and-hold returns for the divisional RLBOs. *, **, ***, **** indicate significance at a 15%, 10%, 5% and 1% level respectively

In terms of the industry-adjusted returns, the same pattern emerges as for the IPO-adjusted returns, although the excess returns again are lower. The divisional RLBOs underperform their industry-matched peers in the short term, only significant after 1 day (at 1% level) and outperform them in the long term, only statistically significant at a 1% level after 3 years. Thus, the divisional RLBOs only perform differently from their industry-matched relatives, 1 days and 3 years following the offering. Adjusted for the markets' performance, the divisional RLBOs outperform the risk-adjusted market index after 1 day, 30 days, 6 months and 1 year (statistically significant at 1% and 10%). Three years after the offering, the divisional RLBOs underperform the risk-adjusted market index, statistically significant at a 10% level.

6.2.3 Private-to-Private

The private-to-private RLBOs provide a median raw buy-and-hold return of 8,5%, 13,8% and 20,4% in the short term. In the long term, they return 23,5% and 4,5%. As the public-to-private and divisional RLBOs, they underperform the classic IPOs in the short term and outperform 3 years after the offering. The excess return is statistically significant at a 1% level, 1 day, 1 year and 3 years after the

offering. Thus, there are no differences in the excess return of the private-to-private RLBOs, 30 days and 6 months after the public offering.

		1 day	30 days	6 months	1 year	3 years
RLBO Raw Returns	Mean	17,9 %	21,7 %	32,1 %	36,0 %	36,9 %
	Median	8,5 %	13,8 %	20,4 %	23,5 %	4,5 %
Industry-Adjusted Returns	Mean	-0,9 %	-0,7 %	3,2 %	-0,4 %	15,6 %
	Median	-5,3 %****	-3,7 %****	0,0 %	-2,6 %*	5,4 %
IPO-adjusted Returns	Mean	-4,4 %	-4,1 %	2,1 %	5,7 %	13,6 %
	Median	-1,8 %****	1,9 %	7,5 %	14,6%***	13,9%***
Market-adjusted Returns	Mean	17,9 %	20,8 %	27,2 %	24,8 %	2,4 %
	Median	8,4%****	12,6%****	13,0%****	10,9%****	-24,0%****

Table 21 reports the raw, industry-adjusted, IPO-adjusted and market-adjusted mean and median buy-and-hold returns for the private-to-private RLBOs. *, **, ***, **** indicate significance at a 15%, 10%, 5% and 1% level respectively

The private-to-private RLBOs underperform their industry-matched peers 1 day, 6 months and 1 year after the offering, statistically significant at a 1% and 15% level. The offerings perform as the industry-matched sample after 6 months and slightly better after 3 years, though statistically insignificant. In terms of marked-adjusted excess returns, the private-to-private RLBOs outperform the risk-adjusted market index in the short term and after 1 year. After 3 years, however, the risk-adjusted market index outperform the RLBOs by 24%. The excess returns are statistically significant at a 1% level.

6.2.4 Quick Flips

Given the stated hypothesis, we analyze whether the quick-flips experience positive excess performance compared to the RLBOs held private longer than one year.

	Quick-Flip				
	1 day	**30 days**	**6 months**	**1 year**	**3 years**
Public-to-Private	0,2 %	-0,7 %	3,9 %	-11,0 %	25,5 %
Divisional	0,6 %	12,9 %	26,4 %	-4,2 %	22,9 %
Private-to-Private	8,7 %	9,0 %	15,6 %	11,6 %	-10,2 %
	Non-Quick-Flip				
Public-to-Private	3,8 %	9,6 %	15,7 %	26,1 %	43,8 %
Divisional	3,5 %	5,9 %	10,7 %	16,1 %	38,9 %
Private-to-Private	8,1 %	14,2 %	21,9 %	25,0 %	6,1 %
	Excess return				
Public-to-Private	-3,5 %	-10,3 %	-11,8 %	-37,1 %**	-18,4 %
Divisional	-2,9 %	6,9 %	15,7 %	-20,3 %	-16,0 %
Private-to-Private	0,6 %	-5,1 %	-6,2 %	-13,4 %	-16,3 %

Table 22 reports the median buy-and-hold returns for the RLBOs held private longer and shorter than one year. *, **, ***, **** indicate significance at a 15%, 10%, 5% and 1% level respectively

The results show that the quick-flipped public-to-private RLBOs underperform the RLBOs that are kept private longer than one year significantly in the long-term. The public-to-private quick flips provide negative excess median returns in all periods (although only statistically significant at a 10% level one-year after the IPO). In year 3 the quick-flipped public-to-private firms provide a return of only 25,5% compared to 43,8% for the non-quick-flipped companies. Similarly, the quick flipped divisional RLBOs underperforms the non-quick-flips after 1 and 3 years and provides a negative median return (statistically insignificant). The quick-flipped private-to-private RLBOs underperform the non-quick flips 30 days, 6 months, 1 year and 3 years following the offering (neither statistically significant). The variability and small sample are such that it is difficult to establish statistically significant evidence of outperformance.

	Shorter than median				
	1 day	**30 days**	**6 months**	**1 year**	**3 years**
Public-to-Private	2,8 %	7,7 %	12,4 %	18,7 %	34,0 %
Divisional	2,5 %	9,4 %	8,9 %	13,0 %	40,3 %
Private-to-Private	8,9 %	10,6 %	18,7 %	23,4 %	2,4 %
	Longer than median				
Public-to-Private	5,1 %	10,4 %	22,0 %	27,8 %	48,2 %
Divisional	4,4 %	5,4 %	12,5 %	19,5 %	28,3 %
Private-to-Private	7,2 %	17,8 %	22,5 %	23,5 %	5,4 %
	Excess return				
Public-to-Private	-2,4 %	-2,8 %	-9,6 %	-9,1 %	-14,2 %
Divisional	-1,9 %	4,0 %	-3,6 %	-6,5 %	12,0 %
Private-to-Private	1,8 %	-7,3 %***	-3,8 %	-0,1 %	-3,0 %

Table 23 reports the median buy-and-hold returns for the RLBOs held private longer and shorter than median (4,5 years for the public-to-private, 2,8 years for the divisional and 2,9 years for the private-to-private). *, **, ***, **** indicate significance at a 15%, 10%, 5% and 1% level respectively

The divisional RLBOs that are kept private shorter than median appear to outperform the sample that is kept longer than median, three-years following the offering. The public-to-private RLBOs that are kept private longer performs significantly better than those that are kept private shorter in every period. The private-to-private RLBOs that are held longer than median appears to outperform those held shorter. The difference is only statistically significant 30 days following the public offering. The weak significance is due to the high variability in the sample.

6.2.5 Stock performance in the 1980s, 1990s, and 2000s

To investigate the possible existence of yearly effects, the one- and three-year median buy-and-hold returns are examined over the three decades.

		1980s		1990s		2000s	
		1 year	**3 years**	**1 year**	**3 years**	**1 year**	**3 years**
Public-to-Private	Mean	-5,8 %	3,1 %	32,1 %	66,7 %	32,7 %	63,1 %
	Median	3,4 %	-0,6 %	30,7 %	32,5 %	25,2 %	44,7 %
Divisional	Mean	-6,4 %	41,1 %	38,2 %	56,9 %	22,1 %	29,4 %
	Median	0,3 %	42,6 %	16,3 %	38,3 %	17,1 %	26,9 %
Private-to-Private	Mean	12,6 %	19,5 %	46,0 %	29,4 %	26,8 %	47,4 %
	Median	4,5 %	16,3 %	28,3 %	-4,4 %	23,2 %	23,7 %
Classical IPOs	Mean	13,9 %	14,2 %	39,2 %	16,6 %	20,5 %	24,6 %
	Median	6,3 %	-20,8 %	10,2 %	-1,5 %	9,2 %	0,0 %

Table 24 reports the mean and median buy-and-hold returns for the public-to-private, divisional and private-to-private RLBOs listed in the 1980s, 1990s, and 2000s. *, **, ***, **** indicate significance at a 15%, 10%, 5% and 1% level respectively

The public-to-private RLBOs 3-year median returns are significantly higher in the 2000s. The one-year median return is higher in the 1990s than 80s and 00s. For the divisional RLBOs, the three-year median returns are highest in the 1980s and one-year returns highest in the 2000s. The private-to-private RLBOs seem to perform better in the 2000s. The results also indicate that they underperform divisional and public-to-private RLBOs in all three decades. Overall, there seems to be some variation in the buy-and-hold returns when they are divided into subsamples according to IPO offering decade.

6.2.6 Repetitiveness of the acquiring buyout group

Given the stated hypothesis 4.1, table 25 shows the stock performance of the RLBOs listed by the three most active buyout funds in our sample.

		1 day	30 days	6 months	1 year	3 years
KKR, Bain, Warburg	Average	7,29 %	12,27 %	19,68 %	32,03 %	55,26 %
	Median	3,73 %	13,00 %	21,59 %	26,35 %	50,29 %
Other buyout funds	Average	13,53 %	17,22 %	25,61 %	32,21 %	43,84 %
	Median	5,57 %	10,00 %	15,34 %	20,29 %	20,60 %
Excess return	Average	-6,24 %	-4,96 %	-5,92 %	-0,18 %	11,42 %
	Median	-1,84 %	3,00 %	6,25 %	6,05 %	29,69 %**

Table 25 reports the median buy-and-hold returns for the RLBOs listed by the three most active buyout funds and RLBOs listed by other buyout funds. *, **, ***, **** indicate significance at a 15%, 10%, 5% and 1% level respectively.

The most active buyout funds' stock returns appear to be less underpriced the first day following the IPO, providing a negative excess return of 1,84%. They, however, appear to outperform the other buyout funds 30 days, 6 months, 1 year and 3 years after the IPO. The excess median return is only statistically significant three-years following the IPO (at 10% level).

6.2.7 European RLBOs

The European RLBOs (the broad definition) underperform American RLBOs in all analyzed periods; 1 day, 30 days, 6 months, 1 year and 3 following the offering.

		1 day	30 days	6 months	1 year	3 years
Europe	Mean	5,3 %	6,9 %	8,5 %	6,7 %	14,6 %
	Median	3,4 %	4,4 %	2,6 %	3,2 %	-5,7 %
USA	Mean	13,0 %	16,8 %	25,2 %	32,4 %	45,0 %
	Median	5,3 %	10,4 %	15,8 %	21,7 %	22,9 %
Excess return	Mean	-7,6 %	-9,9 %	-16,7 %	-25,7 %	-30,4 %
	Median	-1,9 %****	-6,0 %***	-13,2 %***	-18,5 %****	-28,6 %**

Table 26 reports the median buy-and-hold returns for the European and American RLBOs. *, **, ***, **** indicate significance at a 15%, 10%, 5% and 1% level respectively

The European RLBOs underperform the American RLBOs by 1,9% and 6% after 1 day and 30 days, statistically significant at a 1% and 5% level. The underperformance after 6 months, 1 year and 3

years is 13,2%, 18,5% and 28,6%, statistically significant at a 5%, 1% and 10% level.

6.3 Performance

6.3.1 Hypothesis 1.1

Hypothesis 1.1: The public-to-private, divisional and private-to-private RLBOs outperform the classic IPOs, their industry-matched relatives, and the risk-adjusted market index.

Overall, the public-to-private, divisional and private-to-private RLBOs outperform the industry-matched sample and the classic IPOs in terms of operating performance. The stock performance results indicate that the RLBOs underperform the industry-matched sample and the classic IPOs in the short term. In the long term, however, the RLBOs outperform the industry-matched sample and the classic IPOs significantly (the private-to-private RLBOs do not outperform the industry-matched sample). The RLBOs also outperform the risk-adjusted S&P index 1 day, 30 days, 6 months and 1 year following the IPO.

The operating performance results suggest that the RLBOs perform better than the IPOs and industry-matched sample in every period. The outperformance is also supported by comparing the RLBOs two other proxies for operating performance – the pre-tax net income ratio and operating cash flow to sales - with the classic IPOs[19], as the three types of RLBOs have higher ratios after the IPO. There could be several reasons for the superior performance. First, following Jensen (1989) the higher leverage and higher concentration of ownership mitigates agency costs as the leverage works as a control function and higher managerial ownership increases the management's incentive to achieve superior performance. As such, the RLBOs perform significantly better than their industry-matched peers also after the IPO. As the ownership and leverage decrease after the IPO, the conflict between the management and shareholders increases and the performance deteriorates. This also appears to be the case for the classic IPOs and the matched sample. Second, the buyout funds could have a correcting effect on the management's behavior, and as such, the RLBOs have lower capital expenditures. This could indicate that the RLBOs in a higher degree invests in positive NPV projects than the classic IPOs. The development in performance after the IPO is not superior for the RLBOs compared to the industry-matched sample, indicating that the mitigated agency costs are reappearing.

[19] See Appendix 16 for the classic IPOs pre-tax NI and CF-to-sales ratios.

In terms of the stock performance, the public-to-private and divisional RLBOs stock returns do not appear to show a deteriorating pattern as seen in the operating performance and the classic IPOs stock performance. The private-to-private RLBOs stock performance appears to decline three years after the offering, showing a similar pattern as the classic IPO. A potential implication for the development in the public-to-private and divisional RLBOs stock performance could be that the market expects deterioration in the operating performance. As the deterioration in the operating performance is smaller for the public-to-private and divisional RLBOs than the classic IPOs, the market is positively surprised, and the RLBOs outperform. The private-to-private's operating performance, however, declines after the IPO year, and thus the stock performance deteriorates after one year. Overall, the excess IPO-adjusted stock return after 1 day, 30 days, one- and three-years are all statistically significant, suggesting that the three types of RLBOs underperform the classic IPOs after 1 and 30 days following the offering. The public-to-private and divisional RLBOs industry-adjusted excess return are significant after 1 and 3 years. The private-to-private three-year performance, on the other hand, is not different to industry-matched peers.

There could be several other reasons for these findings. First, there could be a higher degree of information asymmetry for the classic IPOs, especially as the public-to-private and divisional have previously been listed. Thus, the investors have better knowledge to their prior public track record. Second, following Brav and Gompers (1997), a buyout fund should be more familiar with the private-to-public process and be less tempted to overprice their shares, keeping up an excellent reputation for future offerings. Third, again following Brav and Gompers (1997), the buyout funds can have a strong institutional investor sentiment, which is less likely to overpay for the offered shares. Fourth, following Jensen (1989), the ideal LBO candidates are companies with stable cash flow, low R&D expenses, and low future growth prospects. Ritter (1991) on the other hand explains that the high first day returns and the deterioration in returns in the long-term are driven by relatively young growth companies. As the information technology companies constitute a much higher fraction of the IPO sample than the RLBO sample, this could be a possible reason. Finally, following Mian and Rosenfeld (1993), the excess return could be driven by takeover activity. In their sample, 33 of the 85 firms were taken over within a three-year period. In comparison, 25 out of 176 public-to-private, 41 out of 190 divisional and 40 out of 314 private-to-private RLBOs in our sample were taken over within the three-year period.

	Acquired		Non-Acquired	
	1 year	3 years	1 year	3 years
Public-to-Private	19,2 %	63,6 %	26,3 %	32,6 %
Divisional	20,8 %	54,2 %	15,0 %	25,0 %
Private-to-Private	31,9 %	38,2 %	23,2 %	-1,8 %

Table 27 reports the median buy-and-hold returns for the acquired and the RLBOs that were not acquired within the three years.

Table 27 shows the median return for the acquired and the companies that were not acquired within the three years. The median excess IPO-adjusted returns appear to be twice as high for the acquired companies than the non-acquired for the public-to-private and divisional RLBOs 3 years after the IPO. Judging on the likelihood that the stock market performance of this RLBO sample would be repeated in a future sample of RLBOs, is contingent on whether one believes that the number of acquisitions evident in this sample is likely to be repeated. The non-acquired sample should be the focus if the probability is believed to be low. The non-acquired private-to-private samples median return is negative three-years after offering. The results thus indicate that the private-to-private RLBOs positive raw return is driven by takeover premiums from the acquired RLBOs. The non-acquired public-to-private and divisional RLBOs three-year excess return is still statistically significant positive adjusted for the classic IPOs and their industry-matched relatives[20]. There is no evidence of the non-acquired private-to-private sample outperforming the industry-adjusted and classic IPO sample three-years following the public offering. Finally, even though the private-to-private's excess returns are driven by the acquired firms, it does not dismiss that value was created.

So, takeover activity appears to be the driver of the private-to-private RLBOs excess return, but not the public-to-private and the divisional. There could be several reasons that these RLBOs still outperform the classic IPOs and industry-matched samples. First, the operating performance is superior to the classic and industry-matched sample in every period after the IPO. This indicate that the RLBOs are better-performing companies. Second, the public-to-private and divisional RLBOs are larger in terms of total assets and market capitalization at the IPO date. This could have two implications. Following Wruck (1989), the buyout funds could spend more resources on monitoring and have a more active presence in the board of directors, as the companies are a bigger part of their portfolio. Moreover, Ritter (1991) reports that large IPOs exhibit normal performance, which could

[20] See Appendix 18 for the industry-adjusted and IPO-adjusted excess returns for the non-acquired RLBOs

be the case for these RLBOs. Finally, following Degeorge and Zeckhauser (1993), there could be a selection of listing the better LBOs. This could imply that poor performing LBOs rarely go public and that those LBOs that choose to go public experience better performance. This could especially be the case for the public-to-private and divisional RLBOs, as the investors have more knowledge about their previous track record, management and activities.

The market-adjusted excess returns suggest that the public-to-private firms outperform the market in all periods except three years following the IPO, in which there are no significant differences. In terms of the divisional and private-to-private RLBOs, these companies outperform the risk-adjusted market index 1 day, 30 days, 6 months and 1 year after the offering. The divisional and private-to-private RLBOs market-adjusted excess return is negative three-years after the offering.

Overall, the RLBOs outperform the classic IPOs and their industry-matched relatives both in terms of operating and stock performance. The RLBOs also outperform the market in every period except three-years following the offering. The results overall appear to be consistent with hypothesis 1.1.

The results of higher operating performance after the IPO are consistent with Holthausen and Larcker (1996) and inconsistent with Degeorge and Zeckhauser (1993). The positive excess stock performance is consistent with Mian and Rosenfeld (1993), Degeorge and Zeckhauser (1993), Holthausen and Larcker (1996) and Cao and Lerner (2009). The findings of lower short-term stock performance for RLBOs, in general, are consistent with the previous studies of Degeorge and Zeckhauser (1993), Holthausen and Larcker (1996) and Cao and Lerner (2009).

6.3.2 Hypothesis 1.2

Hypothesis 1.2: No significant differences between the long-term performance of the public-to-private, divisional and private-to-private RLBOs.

In terms of the operating performance, the public-to-private RLBOs appear to have a higher operating income ratio than the divisional and private-to-private RLBOs. The difference between the divisional and public-to-private is statistically insignificant. There is, however, evidence of the private-to-private RLBOs underperforming the public-to-private RLBOs in the year prior to the IPO as well as

two- and three- years following the IPO. The divisional companies outperform the private-to-private RLBOs two-years following the offering.

Similar to the operating performance results, the stock performance indicates that the public-to-private RLBOs experience marginally better returns than the divisional, which perform slightly better than the private-to-private in the long run. Testing for differences in the long-term stock performance, there are no statistically significant differences between the public-to-private and divisional RLBOs. The private-to-private RLBOs appear to underperform the public-to-private and divisional RLBOs after three-years[21] (significant at 1% level).

An appropriate explanation for this finding could be that the public-to-private and divisional are larger and more levered after the IPO. The higher leverage decreases the free cash flow available for the management to grow the company beyond its size by investing in subpar and negative NPV projects. This is confirmed by public-to-private and divisional RLBOs' lower capital expenditures post-IPO. The size explanation is similar as presented in hypothesis 1.1.

Overall, there is no evidence of any differences between the public-to-private and divisional. There is, however, evidence of the private-to-private RLBOs underperforming the public-to-private and divisional RLBOs in terms of operating and stock performance. Hypothesis 1.2 is rejected.

6.3.3 Hypothesis 1.3

Hypothesis 1.3: A higher degree of underpricing reflected in the short-term stock performance after the IPO for the private-to-private compared to the public-to-private and divisional RLBOs

The private-to-private RLBOs appear to outperform the public-to-private RLBOs one-day return following the offering, and outperform the divisional RLBOs after 1 day, 30 days and 6 months following the IPO. There are no significant differences between the median returns of the public-to-private and divisional. As the underpricing is significantly higher, the private-to-private appears to be more similar in terms of characteristics and development in performance to the classic IPOs. A potential explanation for this pattern could be that the public-to-private and divisional RLBOs

[21] See Appendix 19 and 20 for the differences between the three types of RLBOs operating and stock performance

previously have been listed. The investors are thus expected to have better knowledge to these companies' prior public track record. Overall, the results are consistent with hypothesis 1.3.

6.4 Accounting characteristics

6.4.1 Hypothesis 2.1

Hypothesis 2.1: The capital expenditure ratio decreases from the year prior to the LBO to the IPO (public-to-private only), and increases after the IPO.

The public-to-private RLBOs capital expenditure ratio decreases from the year before the LBO to the year prior the IPO. This is consistent with the hypothesis and agency theory as discretionary spending, cross-subsidizing and engagement in subpar NPV projects should be reduced by the entrance of a buyout fund, higher managerial ownership, and leverage.

Also consistent with the hypothesis, the CAPEX ratio increases significantly after the IPO for all three types of RLBOs. This is also in line with the agency theorem, which suggests that the conflict between the principal and agent increases with the dispersion of ownership. Hence, the agent's competing personal goals to grow the company's size and diversification are replacing the principal's invectives of maximization of shareholder values. In addition, as the largest shareholder's ownership declines, the incentive to actively monitor the management decreases, which could be a factor of increased capital expenditures post-IPO. Interestingly, the classic IPOs capital expenditures ratio decreases after the IPO. This could be an indication of the mitigated agency costs reappearing for the RLBOs. Overall, the results are consistent with hypothesis 2.1.

The decrease in CAPEX following the LBO is consistent with the findings of Kaplan (1989), Smith (1990), and Muscarella, and Vetsuypens (1990), which all find that CAPEX levels decrease significantly following an LBO. The increase in capital expenditures following the IPO is consistent with Holthausen and Larcker (1996), and inconsistent with Degeorge and Zeckhauser (1993) that find no evidence of increases in CAPEX following the buyout.

6.4.2 Hypothesis 2.2

Hypothesis 2.2: The public-to-private RLBOs annual sales growth is higher after the IPO than in the private period.

The public-to-private RLBOs annual sales growth is significantly higher after the IPO than in the private period. This is consistent with Jensen (1989), who argues that the management have incentives to grow the company beyond its optimal size and diversify the company's operations for their personal benefit and job security. As the leverage decreases and ownership disperses following the IPO, the principal agency conflict increases, and sales increase.

6.4.3 Hypothesis 2.3

Hypothesis 2.3: The operating performance decreases following the IPO.

The decrease in managerial and the largest shareholder's ownership following the IPO would lead us to anticipate a reversal in the operating performance as the conflict between the principal and agent increases. The IPO-adjusted operating margin decreases first two years after the IPO, suggesting that classic IPOs experience a higher degree of deterioration in performance than the RLBOs after IPO+1. As the RLBO deleverages and ownership concentration decreases, the agency costs are reappearing such that the operating performance deteriorates two years after the IPO. In terms of the industry-adjusted operating performance, the public-to-private excess margins increase in every period, while the divisional RLBOs peaks two-years after the IPO.

As already discussed in hypothesis 1.1, the public-to-private and divisional RLBOs raw median operating performance deteriorate following the year after the IPO. The private-to-private's operating performance, however, deteriorates after the year of the IPO. There could be several reasons for this pattern. First, as the leverage relative to the private-to-private post-IPO, which could serve as a motivating factor. Second, the private-to-private has the largest decrease in ownership at the time of the IPO (but also highest level), could suggest that the management constraints and the management's incentives are more relaxed following the IPO.

Overall, the results indicate that the public-to-private and divisional RLBOs operating performance deteriorates one-year following the public offering, while the private-to-private declines after the IPO

year. The results indicate that the agency costs are reappearing in the year of the IPO and the year after. The private-to-private's results are consistent with hypothesis 2.3, and Holthausen and Larcker (1996).

6.5 Time held private

6.5.1 Hypothesis 3.1

Hypothesis 3.1: Quick-flips underperform the RLBOs that are held private longer than one-year, both in terms of accounting and stock performance

Many observers – as discussed in the introduction of the thesis - have argued that buyout groups push overleveraged companies into the public market too quickly, thereby transferring the expected bankruptcy risk and loss to public investors. In our sample, three out of 95 quick flips delist due to bankruptcy within the three years. In comparison, only 10 out of 690 non-quick-flips go bankrupt within the three years.

In terms of accounting performance, the results indicate that the quick-flipped divisional RLBOs outperform the non-quick-flips in all periods. The public-to-private and private-to-private RLBOs underperform the quick-flips in every period, although the difference is insignificant (except IPO+2 for the public-to-private). The changes in performance relative to IPO-1 is insignificant for all types in all time periods, suggesting that change in performance after IPO is similar for both quick-flips and non-quick-flips.

The results indicate that the quick-flipped divisional RLBOs operating performance deteriorates after the IPO year. Assuming that these RLBOs are listed after the first quarter, and thus present some of the results from the IPO year in the prospectus, this could indicate that the buyout fund takes their investment public under a peak of operating income ratio. This cannot be said for public-to-private and private-to-private RLBOs as both have peak operating margin subsequent to their offerings (IPO+2 and IPO+1 respectively).

In terms of stock performance, the public-to-private and private-to-private quick flips underperform the non-quick-flips in every period. The excess negative returns are statistically significant only 1

year after the IPO for the public-to-private RLBOs. The divisional quick-flips underperform the RLBOs held longer than a year at 1 day, 1 year and 3 years after the IPO.

A potential reason for the public-to-private and private-to-private RLBOs underperformance could be that the buyout funds have not the conducted the necessary restructuring activities. The agency costs have not been mitigated in the private period. As the IPO market conditions are favorable, they sell the immature LBOs to get quick cash returns. This is supported by the quick-flips' higher capital expenditures.

Assuming again that the divisional firms are listed late in the in the IPO year, a possible explanation for the development in the performance of these quick-flips could be that the managers, together with the buyout fund make plans for taking the firm public. At this point, they begin to work even harder to make the company look good to the investors. Their own wealth is at stake, and each additional dollar of earnings count. The year after the IPO, the company performs worse as the previous performance has been tilted and the lower leverage and ownership decreases the management's incentive. As such, these RLBOs experience much worse stock performance. Hence, the results could suggest that the managers of the divisional quick-flips are taking advantage of information asymmetry to enrich themselves.

The public-to-private and private-to-private quick-flips underperform those that are held private longer than one year. The divisional RLBOs results are more ambiguous. The divisional RLBOs clearly have a higher operating performance, but lower stock return after 1 day, 1 year and 3 years. The results for public-to-private and private-to-private, as well as the divisional stock performance results, bring further support to Cao (2011)'s claim that "flipping" LBOs does not provide much value.

Overall, the results are consistent with Cao and Lerner (2009) who also find that the quick-flips underperform the firms that are kept private longer than one year. Although, this pattern is stronger for the public-to-private and private-to-private RLBOs (Cao and Lerner (2009)'s sample is tilted towards private-to-private RLBOs). These RLBOs results are thus consistent with hypothesis 3.1.

6.5.2 Hypothesis 3.2

Hypothesis 3.2: RLBOs held private longer than median years (for the respective RLBOs types) outperform RLBOs held shorter than median.

The operating performance of the public-to-private held shorter than median is higher in every period, while the stock performance appears to be lower in every period (statistically insignificant). In terms of the divisional RLBOs operating performance, the companies held shorter outperform those who are held longer (only statistically significant in IPO+3). The stock performance appears to be higher three-years after the IPO, although statistically insignificant. For the private-to-private, the stock performance is negative in every period (except 1 day following the IPO), while the operating performance is lower two- and three years following the IPO. The same explanation as for hypothesis 3.1 is applied.

Overall, the results appear to be ambiguous. The private-to-private RLBOs are consistent with hypothesis 3.2. The performance of the public-to-private and divisional RLBOs held shorter than median is inconsistent with hypothesis 3.2. The findings are somewhat consistent with Cao and Lerner (2009) who found that companies held private longer than median perform worse.

6.6 Yearly effects

6.6.1 Hypothesis 4.1

Hypothesis 4.1: No significant differences in performance between the RLBOs listed in the 1980s, 1990s, and 2000s.

As previously discussed in the literature review, the buyout market of the 1990s and 2000s is very different from that of the 1980s, both in terms of capital employed and competition. Also, the sample characteristics section shows that the holding period has increased significantly through time. The purpose of this section is to determine whether the RLBO stock performance has changed through time, as the development in performance could be subject to yearly effects. That is, the corporations which were taken public in 1985 could be exposed to a different economic climate than those in the sample which did get listed in 1999. RLBOs have distinct characteristics at the time of the IPO, and it could be expected that these may respond differently to shifts in the economic conditions than

classic IPOs. In addition, the operating performance could have changed through time, even though this may be subject to biases as the industry distribution has changed over time.

The results indicate that the operating performance appears to have increased significantly from the 1980s and 1990s to the 2000s for the three types of RLBOs. This pattern also emerges for the classic IPOs. There could be several reasons for this finding. First, the buyout funds could concentrate their acquisitions on companies in industries with higher operating income. The change in the industry distribution brings support to this explanation. Second, the buyout funds could have improved at monitoring, aligning the interests of the management and improving efficiencies in the restructuring period. This can be a consequence of the increased competition in the buyout industry. The increased holding period could bring support to this explanation.

In terms of the stock performance, the public-to-private's performance has increased significantly from the 1980s to the 1990s and 2000s. The divisional RLBOs however, appears to be performing best in the 1990s. The private-to-private appears to provide higher stock returns in the 2000s.

Overall, hypothesis 4.1 is rejected, as the RLBOs overall listed after the year 2000 appear to outperform.

6.7 Repetitiveness of the buyout funds

6.7.1 Hypothesis 5.1

Hypothesis 5.1: RLBOs acquired and taken public by the three most active buyout funds outperform the other RLBOs.

In terms of operating performance, the RLBOs taken public by the three most active buyout funds outperform the other RLBOs significantly in every period after the IPO. The excess improvement in performance compared to the improvement in performance listed by the other buyout funds is also statistically significant from the year prior to the IPO to three-years following the IPO. There could be several potential explanations for these patterns. First, the RLBOs listed by the three most active buyout funds have significantly higher leverage than the other RLBOs. Following Jensen (1989), leverage has a mitigating effect on agency costs. Second, the three most active buyout funds could potentially have a higher quality of monitoring and are better at aligning the management's interest

with theirs as they are involved in more transactions. This is also confirmed by the lower increase in capital expenditures after the IPO and the lower annual sales growth after the IPO. Third, the RLBOs listed by the three most active buyout funds appear to have higher ownership before and after the IPO[22].

In terms of the stock performance, IPOs listed by the three most active buyout funds are less underpriced the first day following the IPO. This may be due to a stronger institutional investor sentiment, which are less likely to overpay for the newly issued shares. In the long term, the most active buyout funds seem to have a positive excess median return at 30 days, 6 months, 1 year and 3 years after the offering. The median excess return is only statistically significant three-years after the public offering.

Overall, the results are consistent with hypothesis 5.1.

6.8 European RLBOs

6.8.1 Hypothesis 6.1

Hypothesis 6.1: The European RLBOs perform similarly to the American RLBOs.

The European RLBOs have lower operating margins than the American in every period after the IPO. As already indicated, the American RLBOs performance deteriorates after the first year following the IPO, while the European's operating performance decreases in every period after the IPO. This could indicate that the buyout funds in Europe take the companies public during a peak of earnings. In terms of the stock performance, the American RLBOs outperform the European RLBOs in every period after the IPO (statistically significant in every period).

There could be several reasons for this finding. First, firms such as Willis Group Holdings, Nielsen Holdings, and Warner Chilcott Holdings Co in our sample are taken private from a European stock exchange and re-listed on an American stock exchange. A possible explanation for this could be that the buyout fund believes the firm is undervalued on the European stock exchange and hence expect

[22] KKR, Bain Capital and Pincus LLC have median ownership of 65,9% and 51,8% pre- and post-IPO while the other buyout funds have ownership of 58,7% and 39,5%.

a higher value on the American stock exchange. Second, following PWC (2015) the American equity market is more liquid and twice as big as the European equity market. Some buyout funds could have access to a lower interest rate through the US bond market, due to institutional investor sentiment and reputation. The buyout fund thus may want to list the equity in the US, as the corporate bonds are listed in the US. Third, according to Kaplan and Stromberg (2009), the American buyout market is more developed than the European. As such, a possible explanation could be that the American buyout funds are better at monitoring and correcting the management's behavior as they have been involved in more transactions. The European sample is smaller and may not reflect the total population adequately. Nonetheless, the outperformance of RLBOs in the US appears to be an American phenomenon, and thus hypothesis 6.1 is rejected.

7. Cross-sectional regression analysis

7.1 Model development and estimation

The natural next questions have to do with the differences across the RLBO offerings. What role does the buyout funds restructuring period and lock-up period play in the long-run performance? How does the decrease in leverage and management's ownership affect the long-run performance of the three types of RLBOs? Can the change in capital expenditures post-IPO be explained by the change in ownership and leverage? In this section, we seek to answer these questions by relating cross-sectional regressions with proxies for changes in organizational incentives taking place at the time these firms go public. We analyze whether these proxies can explain stock and operating performance following the public offerings of the RLBOs. The variables presented in table 28 are those available for the cross-sectional regression analysis.

Regression variables	Variable	Scale	Period
Dependent variables	Operating margin	%	t1 & t2
	Buy-and-Hold industry-adjusted excess return (BHR)	%	t1 & t3
Explanatory variables	Total percentage change in holdings of the largest shareholde	%	t0
	Total percentage change in holdings of insiders	%	t0
	Change in leverage ratio	%	t-1 to t1
	Change in CAPEX/ total assets	%	t-1 to t1
	Industry operating performance	%	t1 & t2
	Logarithm of days held private	Log days	t0
	Lock-up period	No. of months	t0

Table 28 shows the variables available for the regression analysis.

Given these variables, it should be possible to estimate regressions models for both the operating performance and stock performance for the RLBOs. The variables are measured in percentage or time (log days and number of months). The change in organizational structure variables is measured at the time of the IPO, regardless of whether we examine the change in accounting performance between year 1 and 2 (IPO+1 and IPO+3 for stock performance) following the IPO. Thus, we assume that the changes in incentives that occur in the year of the IPO is related to subsequent changes in performance. Since we do not know how quickly a change in operating performance arising from a change in incentive structures would be reflected in the financial performance, we examine the two alternative intervals. The buy-and-hold return is adjusted for the industry's performance. As for the operating performance, to adjust for the industry's operating performance, it is included as a control explanatory variable.

7.2 Hypotheses cross-sectional regressions

For any association between changes in ownership structure, leverage and lock-up period following the IPO with stock price performance, it must be assumed that the markets are not fully efficient. Holthausen and Larcker (1996) argue that the market anticipates the effects associated with the dispersion of ownership and decrease in leverage and that the IPO price reflects these changes. If this is the case, the changes in the suggested determinants should not be reflected in the development of returns. This argument requires all agents involved in the market to hold fully rational expectations and act accordingly. This is a very strong assumption. Holthausen and Larcker (1996) do not find any significant associations between stock performance and change in management's holdings nor leverage. As such, this assumption is supported. However, using a different and larger sample and at a different point in time may arrive at a different finding.

7.2.1 Ownership

Following Jensen (1989), the variable representing the largest shareholder could be expected to have a positive association with the performance, as a higher presence gives more incentives to monitor the management and should have a positive effect on the mitigation of agency costs. Maury and Pajuste (2005) on the other hand, suggests that there is a positive relationship between contestability and firm value. Hence, ownership concentration could also be expected to have a negative association with the performance. They argue that as the power of the largest shareholder increases so does its incentive and ability to divert funds and extract utility.

The variable representing managements' ownership could be expected to have a positive association with the long-run stock performance. Following Jensen and Meckling (1976), higher managerial ownership could increase as the management has a greater incentive to increase shareholder wealth, as they have a greater stake in any value-increase. On the contrary, Fama and Jensen (1985) argue that higher managerial ownership could decrease financial performance as management could choose lower risk projects with lower NPV, as the management's wealth is less diversified.

Nonetheless, even though there are conflicting theories, agency theory predicts that there would be a reintroduction of inefficiencies and a loss of the previously experienced performance gains once the RLBO returns to public trading and ownership concentration decreases. The principal's incentives for value creation is once again replaced by the competing agent's goals. Hence, we expect a positive coefficient for the change in ownership variables (measured as ownership post-IPO minus pre-IPO). As such, we form the following hypotheses:

Hypothesis 7.1: A positive association between performance and the change in the largest shareholder's ownership

Hypothesis 7.2: A positive association between performance and the change in the managements' equity ownership.

7.2.2 Leverage

Following Jensen (1989), the leverage variable is expected to have a positive association with performance. The increased pressure to meet debt obligations should force the management to focus on revenue generation and cost minimization, which in turn should be reflected by increased performance. With less funds to allocate, the probability of investing in subpar projects should decrease, as should the diversion of funds to extract utility. Alternatively, if sufficient funds cannot be invested in net working capital or capital expenditures activities and necessary capital investments cannot be made, this could have a negative effect on the performance. Following Holthausen and Larcker (1996), leverage might affect project selection by managers due to managerial risk aversion. Again, there are two conflicting theories on whether increased leverage provide positive or negative incentive effects. Following the same explanation as for the ownership hypotheses, agency theory

suggests that leverage has a positive association with performance.

Hypothesis 7.3: A positive association between performance and the change in leverage.

7.2.3 Capital expenditures

Following Kaplan (1989), an increase in CAPEX could indicate that the management is relaxing constraints and increasing discretionary spending, cross-subsidization or engagement in subpar or negative NPV projects associated with the decreased leverage and dispersed ownership following the IPO.

Hypothesis 7.4: A negative association between performance and the capital expenditures/total assets variable.

7.2.4 Time held private

Following Cao (2011), the days private variable is expected to have a positive association with performance, as increased days private is associated with a longer restructuring period and potentially more organizational and efficiency improvements.

Hypothesis 7.5: A positive association between performance and the days held private variable.

7.2.5 Lock-up period

In terms of the lock-up variable, following Leland and Pyle (1977)'s signaling model, a longer-lock period is expected to have a positive association with the stock performance, as it signals that the shareholders are willing to hold the stock longer before being able to sell.

Hypothesis 7.6: A positive association between performance and the lock-up-period.

7.2.6 Differences between the RLBOs

We do not expect any significant differences in the cross-sectional regressions between the public-to-private, divisional and private-to-private.

Hypothesis 7.7: No significant differences between the public-to-private, divisional and private-to-

private cross-sectional regression results.

7.3 Estimation

The reliability of the parameters presented below and their estimated p-value depends on the extent the CLRM assumptions of the regressions are met. The residuals of the estimated regressions models all have zero mean values. Graphically, the residuals also appear to be normally distributed (approximately). However, the normality test rejects the null hypothesis of a normal distribution of the residuals for some of the regressions. This is a violation of CLRM assumption 6. There is no presence of multicollinearity within the regression models.

Results of the Breuch-Pagan test indicate that heteroscedastic variance is present in some of the regressions. In these regressions, heteroscedastic-consistent standard errors are used. The findings from the RESET test suggest that there is evidence of misspecification in some of the regressions. These regressions are still estimated, but we carefully specify that these variables have to be interpreted with cautiousness, as misspecification violates assumption four. Ideally, we would remove the misspecification by including more independent variables, but as this could not be completed, the regressions are still estimated[23]. The heteroscedasticity problems are solved, and aside from the misspecification in a few of the regressions and non-normality of the residuals, the estimated regression models do not appear to violate CLRM (assumption 1-6).

7.4 Stock performance

The base regression for examining whether the stock performance is associated with the suggested explanatory variables is defined as:

$$Industry - adjusted\ return = \beta_0 + \beta_1 \Delta LEVERAGE + \beta_2 \Delta CAPEX + \beta_3 \Delta BS + \beta_4 \Delta MGMT + \beta_5 LOCKUP + \beta_6 PRIVATE$$

[23] The regressions where the misspecified variables are omitted are included in Appendix 23

7.4.1 Public-to-private

Explanatory variables	12-Months Industry-adjusted Buy-and-Hold Return After IPO			36-Months Industry-adjusted Buy-and-Hold Return After IPO		
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Intercept	-0,065 (0,730)	0,050 (0,910)	0,367 (0,935)	-0,222 (1,396)	-0,257 (1692)	0,757 (1,597)
ΔLeverage	-0,493*** (0,212)	-0,442* (0,275)	-0,145 (0,224)	-0,414* (0,262)	-0,245 (0,511)	-0,093 (0,383)
ΔCAPEX ratio	-1,504 (1,551)	-1,667 (2,225)	0,728 (0,581)	-3,879** (2,225)	-4,970 (4,193)	0,395 (0,993)
ΔOwnership largest shareholder	-0,616 (0,786)			-0,439 (1,237)		
ΔOwnership management	2,528** (1,411)			6,208*** (2,598)		
Lock-up period	-0,006 (0,062)			-0,038 (0,122)		
Log(days private)	0,024 0,104	-0,008 (0,123)	-0,052 (0,126)	0,155 (0,203)	0,116 (0,228)	-0,058 (0,216)
R^2	0,117	0,060	0,018	0,104	0,036	0,003
No. of obs.	56	56	135	56	56	135

Table 29 contains the public-to-private RLBOs estimated regression parameters and their corresponding standard errors (in parentheses below parameter estimations). *,**,***,**** indicate significance of 15%, 10%, 5% and 1% level respectively.

Table 29 presents the estimated parameters of the proposed regression models on the industry-adjusted stock performance. It is apparent that the first and fourth regressions have much higher R^2. Thus, ownership, lock-up period and days private explain most of the variance in the public-to-private RLBO stock performance among the variables we include. The model is estimated by applying heteroscedasticity-consistent standard errors. All six regressions suggest a negative relationship between the change in leverage and industry-adjusted stock performance. The coefficients are significant at the 5% and 15% level 12 months and 15% three-years after the offering. This finding implies that a decrease in the change in leverage of 1 percentage point (pp) at the time of the IPO, increases the industry-adjusted stock performance by 0,493pp in the first twelve months and 0,414pp over the first three years. In terms of change in management's equity holdings, the parameters are positive and significant one and three-years following the IPO, at a 10% and 5% level. The results imply that a decrease in the change of management's equity holdings by 1pp decreases performance by 2,5pp one-year and 6,2pp three-years following the offering. The change in the largest shareholder's ownership is insignificant and negative one- and three-years following the offering.

The CAPEX/ total assets coefficient is negative in the regressions with the smaller sample, and positive in the third and sixth regression. The coefficient is statistically significant at a 15% level three-years after the offering. The lock-up period is negative in both regressions but economically and statistically insignificant. The days private variable is positive in the first, fourth and fifth and negative in the other regressions. The coefficients are thus ambiguous and statistically insignificant.

The statistically insignificant results of restructuring period length and lock-up period suggests that these variables have low explanatory power on the variance in long-run stock performance of the public-to-private RLBOs. The intercept is positive in all four regressions. The regression models are also estimated with the inclusion of dummies representing effects over each decade (1980s was excluded due to missing ownership and lock-up period data). The results provided no evidence of any differences in the data between the 1990s and 2000s.

7.4.2 Divisional

	12-Months Industry-adjusted Buy-and-Hold Return After IPO			36-Months Industry-adjusted Buy-and-Hold Return After IPO		
Independent variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Intercept	3,337****	2,851****	2,236****	0,876	0,790	0,752
	(1,243)	(1,015)	(0,860)	(1,547)	(1,301)	(0,874)
ΔLeverage	-0,758**	-0,751**	-0,390*	-0,651	-0,602	-0,234
	(0,424)	(0,415)	(0,253)	(0,528)	(0,533)	(0,382)
ΔCAPEX ratio	-0,013	-0,013	0,028	0,444**	0,458***	0,402**
	(0,182)	(0,178)	(0,102)	(0,226)	(0,229)	(0,207)
ΔOwnership largest shareholder	-0,250			-0,749		
	(0,905)			(1,126)		
ΔOwnership management	0,426			4,477****		
	(1,901)			(2,366)		
Lock-up period	-0,080			-0,011		
	(0,104)			(0,130)		
Log(days private)	0,433****	-0,423****	-0,332****	-0,104	-0,098	-0,073
	(0,155)	(0,151)	(0,128)	0,193	(0,194)	(0,128)
R^2	0,135	0,126	0,052	0,139	0,076	0,019
No. of obs.	68	68	181	68	68	181

Table 30 contains the divisional RLBOs estimated regression parameters and their corresponding standard errors (in parentheses below parameter estimations). *,**,***,**** indicate significance of 15%, 10%, 5% and 1% level respectively.

For the divisional RLBOs stock performance regressions, heteroscedasticity-consistent standard

errors are applied in the third regression. The leverage coefficients are negative one and three-years following the offering. The parameters are statistically significant at 10% and 15% level one-year following the IPO. The change in the coefficient of the largest shareholder is negative and statistically insignificant. The change in the management's ownership parameter is statistically significant at 1% level and positive three-years following the IPO. The CAPEX ratio has a positive association with the three-year stock return and negative with the one-year stock performance (statistically significant at 10% and 5% three-years following the IPO). The result implies that a 1pp increase in CAPEX increases the industry-adjusted three-year stock performance by 0,402pp. The days private variable shows ambiguous results, as the coefficient is positive in the first regression and negative in the second and third regression. The first two regressions are based on the same sample. The results indicate that an increase in days held private of 1pp, decreases the one-year stock performance by 0,332pp. As for the public-to-private RLBOs, the lock-up period is statistically and economically insignificant.

The intercept is positive in all four regressions (significant in the first three regressions). Similar to the public-to-private RLBOs, these regression models are also estimated with the inclusion of dummies representing effects over each decade. The results neither here provided any evidence of differences in the data between the 1990s and 2000s.

7.4.3 Private-to-private

Independent variables	12-Months Industry-adjusted Buy-and-Hold Return After IPO			36-Months Industry-adjusted Buy-and-Hold Return After IPO		
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	2,100****	1,087****	1,086****	1,918**	0,919	1,231**
	(0,658)	(0,412)	(0,351)	(1,047)	(0,664)	(0,679)
ΔLeverage	-0,374**	-0,349*	-0,383***	0,375	0,399*	0,206
	(0,210)	(0,213)	(0,168)	(0,260)	(0,258)	(0,276)
ΔCAPEX ratio	-0,003	0,005	-0,003	-0,012	-0,014	-0,018
	(0,025)	(0,025)	(0,022)	(0,079)	(0,078)	(0,096)
ΔOwnership largest shareholder	0,314			-0,404		
	(0,672)			(0,733)		
ΔOwnership management	1,393			-0,256		
	(1,222)			(1,245)		
Lock-up period	-0,142**			-0,150		
	(0,079)			(0,120)		
Log(days private)	-0,178****	-0,167****	-0,173****	-0,134	-0,101	-0,149*
	(0,062)	(0,060)	(0,051)	(0,101)	(0,097)	(0,098)
R^2	0,055	0,033	0,033	0,037	0,026	0,012
No. of obs.	163	163	277	163	163	277

Table 31 contains the private-to-private RLBOs estimated regression parameters and their corresponding standard errors (in parentheses below parameter estimations). *,**,***,**** indicate significance of 15%, 10%, 5% and 1% level respectively.

The results and coefficients are similar to the previous results of the public-to-private and divisional RLBOs. However, the R^2's are much lower in general for this sample. Heteroskedastic robust standard errors are applied in the first three regressions. The leverage coefficients are negative one year after the offering and positive three-years following the offering. The coefficients are statistically significant at a 15%, 10% and 5% level one-year after the offering and a 15% level three-years after the offering. The results imply that a lower change in leverage at the time of the IPO has a negative impact on the one-year stock performance and positive effect on the three-year stock performance. The ownership coefficients are positive one-year after the offering and negative three years following the offering (statistically insignificant). The CAPEX coefficients are positive and statistically insignificant in regression two, and negative in the other regressions. The parameters are however economically insignificant. The days held private variable is significant both one and three-years after the IPO. The third regression suggests that if the number of days a private-to-private RLBO is held private increases by 1pp, the one-year return decreases by 0,173pp (significant at 1% level) and three-

year return by 0,149pp (significant at 15% level). The lock-up variable has a negative association with stock performance and implies that an increase in lock-up period decreases the one-year stock performance (significant at a 10% level).

The intercept is positive in all four regressions (significant on a 1% and 10% level in all four regressions). Including time dummies, the results neither here provided any evidence of differences in the results between the 1990s and 2000s.

7.5 Operating performance

The base regression for examining whether the change in operating performance is associated with the suggested explanatory variables is defined as:

$$\Delta OP = \beta_0 + \beta_1 \Delta LEVERAGE + \beta_2 \Delta CAPEX + \beta_3 \Delta BS + \beta_4 \Delta MGMT + \beta_5 PRIVATE + \beta_6 IND.ADJUST$$

Different to the stock performance regressions, the lock-up period variable is excluded, and the industry adjustment control variable is included.

7.5.1 Public-to-private

Independent variables	ΔEBITDA/Sales from IPO-1 to IPO+1		ΔEBITDA/Sales from IPO-1 to IPO+2	
	(1)	(2)	(3)	(4)
Intercept	-0,075 (0,112)	-0,057 (0,131)	-0,090 (0,126)	-0,081 (0,147)
ΔLeverage	-0,094 (0,067)	-0,111* (0,073)	-0,083*** (0,032)	-0,101**** (0,034)
ΔCAPEX ratio	-0,207 (0,553)	-0,022 (0,537)	-0,027 (0,329)	-0,380 (0,415)
ΔOwnership largest shareholder	-0,209** (0,111)	-0,279** (0,142)	-0,022*** (0,065)	-0,297**** (0,097)
ΔOwnership management	0,080 (0,102)	0,140 (0,133)	0,159 (0,209)	0,229 (0,217)
Lock-up period	0,007 (0,013)	0,003 (0,016)	0,009 (0,017)	0,007 (0,019)
Log(days private)		0,000 (0,000)		0,002 (0,002)
R^2	0,243	0,330	0,154	0,340
No. of obs.	78	63	71	56

*Table 32 contains the public-to-private RLBOs estimated regression parameters and their corresponding standard errors (in parentheses below parameter estimations). *,**,***,**** indicate significance of 15%, 10%, 5% and 1% level respectively.*

Table 32 shows the estimated cross-sectional regression on the operating performance of the public-to-private RLBOs. The days private and capital expenditures (only in regression 3) variables are misspecified and will hence be interpreted with cautiousness. The leverage variable appears to have a negative association with the operating performance from the year before the IPO to both the year after and two years after the IPO. The coefficient is statistically significant at a 15% level one-year and a 1% and 5% level two-years following the IPO. The results imply that a decrease in the change of leverage of 1pp decreases the one-year operating performance by 0,111pp and the two-year operating performance by 0,101pp. In terms of ownership of the largest shareholder, it appears that there is a negative association between change in the largest shareholder's ownership and operating performance. The change in the management's equity holdings has a positive association with the operating performance (statistically insignificant). The estimated slope coefficients of the CAPEX ratio are also insignificant, but they appear to have a negative association with the operating

performance. The days private variable is positive in the four regressions, but economically and statistically insignificant.

7.5.2 Divisional

Independent variables	ΔEBITDA/Sales from IPO-1 to IPO+1		ΔEBITDA/Sales from IPO-1 to IPO+2	
	(1)	(2)	(3)	(4)
Intercept	-0,097 (0,147)	-0,137 (0,148)	-0,015 (0,153)	-0,144 (0,165)
ΔLeverage	-0,061 (0,056)	-0,017 (0,030)	0,030 (0,035)	0,026 (0,035)
ΔCAPEX ratio	-0,029*** (0,011)	-0,034**** (0,013)	-0,048**** (0,008)	-0,053**** (0,016)
ΔOwnership largest shareholder	0,065 (0,153)	-0,092 (0,082)	-0,062 (0,075)	-0,064 (0,080)
ΔOwnership management	0,027 (0,163)	-0,018 (0,153)	-0,043 (0,174)	-0,048 (0,180)
Lock-up period	0,013 (0,019)	0,016 (0,020)	0,020 (0,020)	0,018 (0,022)
Log(days private)		0,000 (0,001)		0,000 (0,001)
R^2	0,058	0,052	0,110	0,111
No. of obs.	93	84	83	75

Table 33 contains the divisional RLBOs estimated regression parameters and their corresponding standard errors (in parentheses below parameter estimations). *,**,***,**** indicate significance of 15%, 10%, 5% and 1% level respectively.

Table 33 shows the estimated regression model on the operating performance of the divisional RLBOs. There appears to be misspecification in all four models, as the leverage, capital expenditures, ownership of the largest shareholder and management's ownership (only in regression 2) is correlated with the residuals. The results indicate that the CAPEX ratio is statistically significant at a 1% level. The results imply that a 1pp increase in the change in CAPEX at the time of the IPO decreases the operating performance by 0,034pp. Considering the median change in the divisional RLBOs CAPEX level is 0,7%, the result is economically weak. The leverage, ownership of the largest shareholder and management coefficient is positive in the first regression and negative in the second, third and fourth regression. The ambiguous results could be due to the misspecification. The days' private parameters are positive but statistically insignificant in the four regressions.

7.5.3 Private-to-private

Independent variables	ΔEBITDA/Sales from IPO-1 to IPO+1		ΔEBITDA/Sales from IPO-1 to IPO+2	
	(1)	(2)	(3)	(4)
Intercept	0,292 (0,253)	0,300 (0,276)	0,314 (0,345)	0,324 (0,373)
ΔLeverage	0,102 (0,072)	0,104 (0,075)	0,167** (0,095)	0,178** (0,102)
ΔCAPEX ratio	1,067 (1,048)	1,091 (1,086)	1,217 (1,164)	1,239 (1,204)
ΔOwnership largest shareholder	0,001 (0,110)	-0,019 (0,130)	0,066 (0,174)	0,048 (0,199)
ΔOwnership management	0,109 (0,279)	0,087 (0,331)	0,315 (0,450)	0,333 (0,534)
Lock-up period	-0,034 (0,033)	-0,035 (0,037)	-0,032 (0,046)	-0,032 (0,050)
Log(days private)		0,000 (0,000)		0,000 (0,000)
R^2	0,203	0,207	0,173	0,176
No. of obs.	183	160	168	147

Table 34 contains the private-to-private RLBOs estimated regression parameters and their corresponding standard errors (in parentheses below parameter estimations). *,**,***,**** indicate significance of 15%, 10%, 5% and 1% level respectively.

As for the regression model on the divisional RLBOs operating performance, there appears to be misspecification in all four models. Again, the leverage, capital expenditures ratio and ownership of the largest shareholder (only in regression 1) variables have to be interpreted carefully. The change in leverage has a positive effect on the one- and two-year operating performance. The positive effect on the one-year performance is inconsistent with the stock performance regression, which could be due to the misspecification. The parameters are statistically significant two-years after the IPO at a 10% level and imply that an increase in the change in leverage of 1pp at the time of the IPO, increases the operating performance by 0,167pp. In terms of change in ownership, it appears that there is a positive association between the change in the largest shareholder's ownership in regression 1, 3 and 4 and negative in regression 2. The change in the ownership of management is positive but statistically insignificant in all four regressions. The change in CAPEX ratio is statistically insignificant but

positive in all four regressions. The days private variable is statistically insignificant and negative in the four regressions.

7.6 Interpretation

If we assume that the changes in organizational structures are exogenous, then our results are somewhat consistent with the hypotheses and Jensen (1989), who argues that there are positive incentive effects with more concentrated ownership by managers and investor who monitor the management and that these organizational changes are conducive to superior performance. In the context of these cross-sectional regressions, the assumption that the organizational structure is exogenous suggests that the change in leverage and change in the ownership stakes of the management and largest shareholder are important determinants of the RLBOs organizational performance.

		ΔLeverage	ΔLS	ΔMgmt	ΔCAPEX	Days private	Lock-up
Stock performance	Public-to-private	Neg	Neg	Pos	Neg	Amb	Neg
	Divisional	Neg	Neg	Pos	Pos	Neg	Neg
	Private-to-private	Neg	Amb	Amb	Neg	Neg	Neg
Operating performance	Public-to-private	Neg	Neg	Pos	Neg	Pos	
	Divisional	Amb	Neg	Amb	Neg	Pos	
	Private-to-private	Pos	Amb	Pos	Pos	Neg	

Table 35 summarizes the estimated regressions. Neg implies a negative association, pos implies a positive association with the performance and amb implies ambiguous results.

7.6.1 Ownership

Hypothesis 7.1: A positive association between performance and the change in the largest shareholder's ownership.

The negative association between the largest shareholder and performance is inconsistent with hypothesis 7.1. This could have several reasons. First, following Maury and Pajuste (2005), the result could imply that contestability increases as its incentive to and ability to divert funds and extract utility, which is assumed to have a negative association with mitigation of agency costs. Second, the higher change in the buyout funds position could indicate that they have had a bigger position in the firm while held private. Following Wruck (1989), a higher ownership concentration in the private period enables the buyout fund to implement new and more efficient strategies and organizational changes easier. In addition, they have an active presence on the board of directors or the management

team. As a consequence, this could indicate that the firm is more efficient and lean, and as such perform superior after the IPO[24]. The results are however inconsistent with the hypothesis that increased holdings of the largest shareholder increases the incentive to monitor the management actively and have a corrective effect on the management's behavior.

Hypothesis 7.2: A positive association between performance and the change in the managements' equity ownership.

The positive association between the management's ownership and performance is consistent with hypothesis 7.2 and agency theory, as higher managerial ownership decreases the management's opportunistic behavior in terms of deriving pecuniary benefits. A higher management's equity holding increases the incentive to achieve superior performance, as the manager has a greater stake in any value creation.

This finding is consistent with Holthausen and Larcker (1996).

7.6.2 Leverage

Hypothesis 7.3: A positive association between performance and the change in leverage.

Jensen (1989) discusses the favorable incentive effects associated with greater leverage, but we find no evidence of the excess positive performance after the IPO being related to the change in leverage at the time of the IPO. Conversely, we find that a lower change in leverage at the time of the IPO has a positive effect on the performance which is inconsistent with Jensen (1989). Leverage can have a negative influence if it is increased above the level where the costs associated with financial distress exceed the gains associated with the benefits of the interest tax shield and added incentives. This could be the case for these RLBO samples. Another interpretation could be the result of increased leverage in the private period resulting in insufficient available funds for capital expenditures. If the companies cannot conduct necessary investments, then performance after the IPO might be influenced negatively. Overall, we reject hypothesis 7.3.

[24] This is dismissed after testing for the association between the pre-IPO ownership and performance

7.6.3 Capital expenditures

Hypothesis 7.4: A negative association between performance and the capital expenditures/total assets variable.

The capital expenditures ratio has a negative association with the divisional and public-to-private two-year operating performance and a positive association with the divisional RLBOs three-year stock performance. The CAPEX ratio's effect on the divisional RLBOs performance is thus ambiguous. The public-to-private RLBOs results are consistent with hypothesis 7.4, as the results imply that lower ownership concentration post-IPO could indicate that the management is relaxing constraints and invests in subpar or negative NPV projects. The hypothesis is, however, rejected for the divisional and private-to-private RLBOs.

7.6.4 Time held private

Hypothesis 7.5: A positive association between performance and the days held private variable.

In terms of the days held private, the variable does not appear to have any explanatory power on the change in the public-to-private RLBOs performance. The coefficients indicate that increased days held private have a negative effect on the divisional RLBOs stock performance and negative effect on the stock and operating performance of the private-to-private RLBOs. After including time dummies, the results indicate that this pattern was stronger in the 1990s and has diminished in the 2000s. This is inconsistent with Cao (2011), who argues that increased time held private, improves organizational efficiencies and better aligns the management's interest with the shareholder's. Overall, hypothesis 7.5 is rejected for all three types of RLBOs.

7.6.5 Lock-up period

Hypothesis 7.6: A positive association between performance and the lock-up-period.

The results indicate that the lock-up period does not affect the public-to-private and divisional RLBOs stock performance (economically insignificant). The variable, however, has a negative association with the private-to-private RLBOs stock performance. We reject hypothesis 7.6.

7.6.6 Differences between the RLBOs

Hypothesis 7.7: No significant differences between the public-to-private, divisional and private-to-private cross-sectional regression results.

In terms of the differences between the RLBOs, the results suggest that the public-to-private, divisional and private-to-private have similar characteristics with only a few small differences. Overall, the change in leverage and the largest shareholder's ownership appears to have a negative association, and the management's equity seems to have a positive association with the RLBOs. The days held private appears to have a negative association with the divisional and private-to-private RLBOs, but no effect on the performance of the public-to-private's performance. The change in CAPEX ratio has a negative effect on the public-to-private operating performance, but more ambiguous on the performance of the divisional and private-to-private RLBOs. Overall, the results are consistent with hypothesis 7.7, although there are some differences.

7.7 Capital expenditures

The base regression for examining whether the change in capital expenditures is associated with the change in leverage and ownership is defined as.

$$\Delta CAPEX = \beta_0 + \beta_1 \Delta LEVERAGE + \beta_2 \Delta BS + \beta_3 \Delta MGMT + \beta_4 IND.ADJUST$$

7.7.1 Hypotheses

The change in CAPEX/ total assets is expected to have a negative association with the change in leverage and the change in ownership. The decrease in leverage at the time of the IPO increases the free cash flow available to capital expenditure and discretionary investments. Following Jensen (1989), the reduction in leverage could increase the free cash flow and management's incentive to invest in subpar and negative NPV projects for own personal benefit. Similarly, a reduction in the largest shareholder's ownership reduces the incentive to closely monitor the management, which again can lead to management increasing capital expenditures. It should be noted that a difficulty associated with interpreting these capital expenditure regressions is that some firms explicitly are going public to increase capital expenditures. For instance, as the ownership falls, more capital is likely raised. Also, the capital expenditures may affect the change in leverage, and the change in

leverage may affect the increase in capital expenditures. It may hence be significant endogeneity problems in these regressions. Nonetheless, we form the following hypotheses:

Hypothesis 7.8: A negative association between the change in capital expenditures and the change in the largest shareholder and management's equity ownership

Hypothesis 7.9: A negative association between the change in capital expenditures and the change in leverage

7.7.2 Results

Independent variables	Public-to-private RLBO: ΔCAPEX ratio		Divisional RLBO: ΔCAPEX ratio		Private-to-private RLBO: ΔCAPEX ratio	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-0,003 (0,008)	-0,008 (0,009)	0,054 (0,166)	0,053 (0,187)	-0,086 (0,121)	-0,073 (0,134)
ΔLeverage	0,002 (0,017)	0,004 (0,014)	0,067 (0,172)	0,083 (0,206)	-0,659** (0,374)	-0,684** (0,391)
ΔOwnership largest shareholder	-0,038 (0,042)	-0,066** (0,038)	0,024 (0,410)	0,002 (0,449)	0,815 (0,799)	0,982 (0,884)
ΔOwnership management	-0,128 (0,112)	-0,143* (0,066)	0,212* (0,140)	0,197 (0,142)	3,213 (2,578)	3,402 (2,821)
Industry-adjustment		0,001**** (0,000)		0,001 (0,002)		0,000 (0,001)
R^2	0,042	0,159	0,002	0,003	0,027	0,029
No. of obs.	81	63	97	87	208	187

Table 36 contains the three types of RLBOs estimated regression parameters and their corresponding standard errors (in parentheses below parameter estimations). *,**,***,**** indicate significance at 15%, 10%, 5% and 1% level respectively.

The following results show that the independent variables have low explanatory power on the change in capital expenditures following the public offering for the RLBOs. The R^2 is very low for the first four regressions (except for regression 2, due to the control variable). In terms of change in the largest shareholder's ownership, it appears that there is a negative association between changes in percentage holdings of the largest shareholder and the public-to-private RLBOs change in capital expenditures, significant at a 10% level. The change in management's equity holding is significant at a 15% level for the divisional and public-to-private RLBOs. This suggests that an increase of 1pp in the change of management's equity holdings decreases the public-to-private RLBOs change in capital

expenditures by 0,143pp and increases the divisional RLBOs CAPEX by 0,212pp. There is no evidence of any associations between change in leverage and change in CAPEX for the public-to-private and divisional RLBOs. In terms of the private-to-private RLBOs, there appears to be a negative association between the change in capital expenditures and change in leverage. The result implies that a 1pp higher decrease in leverage, increases capital expenditures by 0,698pp (industry-adjusted). The result is statistically significant at a 10% level.

The slope coefficients are all insignificant, which is consistent with the results of the stock and operating performance regressions.

7.8 Interpretation

7.8.1 Ownership

Hypothesis 7.8: A negative association between the change in capital expenditures and the change in the largest shareholder and management's equity ownership

The public-to-private RLBOs capital expenditures have a negative association with the change in the largest shareholder and management's ownership. The change in the divisional RLBOs management's ownership has a positive association with CAPEX. The agency theorem suggests that decreased managerial holdings increase CAPEX, as the principal's incentives of value creation and efficiency are replaced by the competing agent's goal to increase the size of the company. Also, higher ownership of the largest shareholder incentivizes the shareholder to actively monitor and correct the management's behavior to only invest in positive NPV projects. Overall, the public-to-private results are consistent with hypothesis 7.8, and the divisional RLBOs results are inconsistent.

7.8.2 Leverage

Hypothesis 7.9: A negative association between the change in capital expenditures and the change in leverage

For the private-to-private RBLOs, there seems to be a negative association between the change in leverage and change in capital expenditures, consistent with the hypothesis. The private-to-private RLBO results are consistent with hypothesis 7.9.

7.9 Discussion of validity

Finally, the economic interpretation that the change in management's ownership has a positive effect on performance and change in leverage has a negative effect is critically dependent on the assumption that the change in organizational structure is exogenous. It is possible that some exogenous shock (for instance changes in the investment opportunities or higher interest rates) affect both the firm's optimal structure and its performance. Since we have not identified and do not control for these potential shocks, it is possible that the observed relationship between changes in performance and structural changes is due to exogenous shocks, and that performance and organizational structure are not causally related. The limitation of treating organizational incentives as exogenous is also present in the previous studies which have examined the performance during the restructuring (private) period, such as Kaplan (1989), Smith (1990) and Muscarella and Vetsuypens (1990). It is reasonable to conclude that the LBOs achieved superior performance post LBO, but it is more problematic to conclude that the shifts in organizational incentives caused the improved performance.

8. Concluding discussion

8.1 Conclusion

The purpose of this thesis is to contribute to the existing RLBO literature. Based on a sample of 197 public-to-private, 240 divisional and 349 private-to-private (which of 72 are European) RLBOs from 1980-2015, the post-IPO operating and stock performance is examined through change and levels analysis as well as cross-sectional regression analysis. The level and change analysis show that the buyout funds', insiders' and management's equity holdings decrease significantly at the time of the IPO. Further, the leverage decreases and CAPEX increases following the IPO. The RLBOs appear to be hybrid organizations that evolve towards a public corporation but still retains some of the LBO characteristics. The classic IPOs have significantly lower leverage and higher CAPEX after the IPO than the RLBOs. The increase in CAPEX could indicate that the agency costs are reappearing following the IPO as the ownership disperses and leverage decreases. The cross-sectional analysis indicates that the change in capital expenditures has a negative association with the change in management's equity holding (public-to-private) and leverage (private-to-private), consistent with agency theory.

The operating and stock performance analysis indicates that the RLBOs perform significantly better than the classic IPOs and industry-matched peers in every period after the IPO, although the changes in operating performance after the IPO are not statistically different. The private-to-private RLBOs outperformance is driven by takeover activity. The non-acquired public-to-private and divisional RLBOs still outperform the classic IPOs and industry-matched sample. The agency perspective provides an appropriate explanation as these RLBOs have higher leverage and concentrated ownership, and are larger.

There are no significant differences between the public-to-private and divisional RLBOs operating and stock performance. The private-to-private RLBOs, however, appear to underperform the public-to-private and divisional in the long-term. Following the agency theorem, an appropriate explanation could be that they are less levered than the public-to-private and divisional RLBOs. When the operating performance is analyzed through cross-sectional regression analysis, the results indicate there is a negative association between the change in leverage and performance. This suggests that leverage does not have a control function on the management as the agency theorem indicate. Another explanation could be that the public-to-private and divisional RLBOs are larger and thus account for a larger investment in the buyout funds' portfolio. As such, this could indicate that buyout funds' monitor these companies more actively than the private-to-private RLBOs. Finally, there could be a selection of the better LBOs, which implies that the poor-performing LBOs rarely goes public.

The public-to-private and divisional RLBOs operating performance deteriorates after the first year following the IPO, while the private-to-private's performance deteriorates after the year of the IPO. This could imply that the mitigated agency costs are reappearing following the IPO. Similarly, the private-to-private RLBOs stock performance declines after one year following the IPO. In comparison, the public-to-private and divisional RLBOs stock performance does not decline. As such, the private-to-private RLBOs appears to be more similar to the classic IPOs, which also shows a deteriorating pattern.

Moreover, the operating performance results indicate that the public-to-private and private-to-private quick flips underperform those held private longer than a year significantly. The divisional quick-flips outperform in terms of operating performance and underperform in terms of stock performance. The private-to-private RLBOs held private shorter than median years appear to underperform, and

the public-to-private and divisional RLBOs held longer than median appear to outperform, although the results are statistically weak. Inconsistent with the hypothesis, the European RLBOs appear to underperform the American RLBOs significantly in every period both in terms of operating and stock performance. The RLBOs listed by the three most active buyout funds outperform the RLBOs listed by the other buyout funds significantly both in terms of level and change analysis. This result could suggest that the three most active buyout funds are superior at monitoring and improving efficiency in their portfolio companies. Finally, the RLBOs listed after the year 2000 outperform those listed in the 1980s and 1990s.

Overall, the RLBOs outperform the classic IPOs, industry-matched peers and risk-adjusted market index (except three-years after the IPO). The public-to-private and divisional outperform the private-to-private RLBOs in the long-term. Agency theory as an explanatory model has some empirical support, as it appears that the change in management's equity holding has a positive association on the performance of the RLBOs following the IPO. However, inconsistent with agency theory, the change in leverage and the largest shareholder's ownership has a negative association with the performance. Decreases in the holdings of the largest shareholder appear to have a positive association with performance, suggesting that the effects associated with entrenched shareholders dominate the benefits of having a large shareholder with the incentive to monitor and correct the management's behavior.

8.2 Further research

The early LBO studies have often relied solely on analyses of the private period to validate the explanatory power of the agency perspective. However, the broader-based analysis in this thesis, suggests that the agency theory for explaining a complex topic such as RLBO performance post-IPO could be limited. In further RLBO studies, researchers should also investigate competing theories. This especially applies when dividing the RLBOs into public-to-private, divisional and private-to-private, as there could be evidence of information asymmetry differences.

To further explore the associations between the performance and proxies for agency cost presence, the ownership data could be collected for the entire three years after the IPO and not only the change at the time of the IPO. Here, the association between the deterioration in operating performance and

ownership could be further researched. As the information had to be collected manually through screening the prospectuses, this was not possible for us.

The yearly changes are particularly interesting in this thesis, as it includes RLBOs listed from 1980-2015. The literature review indicates that the buyout funds' returns have decreased, while our empirical results show that the performance has increased. Possible further research could be to identify reasons for this finding. For instance, this could be the organizational changes, industry distributions or a case study comparing an LBO today to for instance Baker and Wruck (1989)'s case study.

We have focused exclusively on public offerings. An interesting approach could be to further research alternative exit methods and the types of firms selected for each form of exit. We, however, emphasize that the data availability could be limited due to the secretive nature of the buyout funds.

Finally, the reliability of the estimated stock and operating performance can also be improved by applying alternative models or methods to solve the problem of non-normally distributed residuals and the misspecification. As already indicated, the misspecification could not be solved by finding the non-linear relationship[25]. An alternative method could be by finding other agency proxies or estimating the regression by the instrumental variables method. To solve the non-normality of the residuals, the regression models could be resampled through a non-parametric bootstrap and possibly obtain a normal distribution.

[25] We included squared terms without success.

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Appendices

Appendix 1

	Public-to-Private	Divisonal	Private-to-Private	IPOs	RLBOs to IPOs
1983	0	2	1	5	60,0 %
1984	0	3	1	6	66,7 %
1985	1	5	1	17	41,2 %
1986	5	15	3	27	85,2 %
1987	6	14	7	28	96,4 %
1988	1	2	1	19	21,1 %
1989	2	1	1	22	18,2 %
1990	1	7	4	26	46,2 %
1991	14	16	8	51	74,5 %
1992	24	23	26	92	79,3 %
1993	12	14	20	98	46,9 %
1994	7	7	12	90	28,9 %
1995	5	9	8	79	27,8 %
1996	1	9	24	65	52,3 %
1997	3	14	19	190	18,9 %
1998	0	5	20	133	18,8 %
1999	4	9	24	164	22,6 %
2000	5	9	17	102	30,4 %
2001	7	9	12	44	63,6 %
2002	3	5	15	38	60,5 %
2003	2	4	9	32	46,9 %
2004	7	7	24	69	55,1 %
2005	6	9	23	68	55,9 %
2006	7	7	12	61	42,6 %
2007	2	0	0	36	5,6 %
2008	0	2	0	14	14,3 %
2009	3	2	2	16	43,8 %
2010	4	2	3	29	31,0 %
2011	6	1	6	41	31,7 %
2012	9	2	4	45	33,3 %
2013	12	3	7	59	37,3 %
2014	11	3	6	60	33,3 %

Appendix 1 presents the yearly distribution of public-to-private, divisional and private-to-private RLBOs and classic IPOs.

Appendix 2

Buyout fund	No. of deals
KKR	48
Bain Capital	25
Warburg Pincus LLC	22
Welsh, Carson, Anderson & Stowe	20
Texas Pacific Group	19
Blackstone group	19
GTCR Golder Rauner	17
Thomas H. Lee Partners	16
Morgan Stanley Private Equity	16
Apollo Group	12
Lehman Brothers	11
Kelso & Company	11
Merrill Lynch	10
Goldman Sachs	10
Forstmann Little & Co	10
EQT	10
Carlyle Group	10

Appendix 2 reports the buyout funds in our sample with more than 10 transactions

Appendix 3

	Winsorized 97,5 percentiles				
	1 day	**30 days**	**6 months**	**1 year**	**3 years**
Public-to-Private	7,4%	11,2%	18,8%	24,2%	49,3%
Divisional	8,3%	12,6%	17,8%	27,9%	41,6%
Private-to-Private	12,2%	16,6%	25,1%	30,7%	29,1%
Classic IPOs	19,9%	23,2%	23,7%	23,8%	14,9%
	Winsorized at Third St.Dev				
Public-to-Private	7,1%	11,5%	20,1%	28,8%	54,9%
Divisional	8,6%	12,9%	17,7%	28,0%	43,9%
Private-to-Private	14,9%	18,7%	28,1%	32,8%	33,1%
Classic IPOs	20,3%	23,4%	25,5%	25,7%	15,1%

Appendix 3 reports the winsorized stock returns at third standard deviation and 97,5 percentiles

Appendix 4

Industry Classification	Public-to-Private		Divisional		Private-to-Private		Classic IPOs	
Agriculture, Forestry and Fishing	0	0%	0	0%	0	0%	0	0%
Mining	0	0%	1	2%	2	10%	1	1%
Construction	2	13%	0	0%	0	0%	2	2%
Manufacturing	6	40%	27	64%	10	50%	49	41%
Transportation, Communications,	0	0%	2	5%	0	0%	12	10%
Wholesale Trade	1	7%	2	5%	0	0%	4	3%
Retail Trade	4	27%	3	7%	4	20%	9	8%
Finance, Insurance and Real Esta	0	0%	2	5%	2	10%	10	8%
Services	2	13%	5	12%	2	10%	32	27%
Public Administration	0	0%	0	0%	0	0%	0	0%
Nonclassifiable	0	0%	0	0%	0	0%	0	0%
Total	15		42		20		119	

Appendix 4 shows the industry distribution in the 1980s

Appendix 5

Industry Classification	Public-to-Private		Divisional		Private-to-Private		Classic IPOs	
Agriculture, Forestry and Fishing	0	0%	1	1%	2	1%	16	2%
Mining	0	0%	5	4%	4	2%	17	2%
Construction	2	3%	0	0%	0	0%	8	1%
Manufacturing	37	50%	66	56%	68	40%	298	30%
Transportation, Communications,	5	7%	5	4%	16	9%	59	6%
Wholesale Trade	3	4%	5	4%	10	6%	40	4%
Retail Trade	19	26%	9	8%	21	12%	63	6%
Finance, Insurance and Real Esta	2	3%	9	8%	13	8%	150	15%
Services	6	8%	17	15%	35	20%	328	33%
Public Administration	0	0%	0	0%	1	1%	1	0%
Nonclassifiable	0	0%	0	0%	1	1%	4	0%
Total	74		117		171		984	

Appendix 4 shows the industry distribution in the 1990s

Appendix 6

Industry Classification	Public-to-Private		Divisional		Private-to-Private		Classic IPOs	
Agriculture, Forestry and Fishing	1	1%	0	0%	0	0%	5	1%
Mining	1	1%	3	5%	11	8%	45	6%
Construction	1	1%	3	5%	2	1%	8	1%
Manufacturing	19	22%	28	43%	39	27%	166	23%
Transportation, Communications,	9	11%	6	9%	13	9%	48	7%
Wholesale Trade	2	2%	2	3%	5	3%	23	3%
Retail Trade	16	19%	6	9%	22	15%	27	4%
Finance, Insurance and Real Esta	9	11%	4	6%	18	13%	180	25%
Services	27	32%	13	20%	34	24%	127	18%
Public Administration	0	0%	0	0%	0	0%	0	0%
Nonclassifiable	0	0%	0	0%	0	0%	86	12%
Total	85		65		144		715	

Appendix 4 shows the industry distribution in the 2000s

Appendix 7

		ΔIPO	ΔIPO+1	ΔIPO+2	ΔIPO+3
RLBO raw OP	Median	0,6 %	1,4 %	0,7 %	0,7 %
	Winsorized	0,7 %	0,7 %	0,6 %	0,9 %
Industry-adj. OP	Median	-0,9 %****	1,4 %	2,6 %	2,7 %
IPO-adj. OP	Median	-1,1 %****	0,1 %**	0,4 %	0,1 %

Appendix 7 reports the public-to-private RLBOs median relative changes in operating performance. *,**,***,**** indicates significance at a 15%, 10%, 5% and 1% level.

Appendix 8

		ΔIPO	ΔIPO+1	ΔIPO+2	ΔIPO+3
RLBO raw OP	Median	0,4 %	1,4 %	0,8 %	0,2 %
	Winsorized	1,4 %	0,9 %	1,1 %	0,7 %
Industry-adj. OP	Median	-1,2 %**	0,4 %	4,9 %	1,6 %
IPO-adj. OP	Median	-1,3 %****	0,1 %	0,6 %	-0,4 %

Appendix 8 reports the divisional RLBOs median relative changes in operating performance. *,**,***,**** indicates significance at a 15%, 10%, 5% and 1% level.

Appendix 9

		ΔIPO	ΔIPO+1	ΔIPO+2	ΔIPO+3
RLBO raw OP	Median	1,9 %	1,7 %	0,6 %	1,0 %
	Winsorized	2,6 %	1,5 %	0,6 %	0,8 %
Industry-adj. OP	Median	-0,2 %	0,8 %	0,0 %	0,9 %
IPO-adj. OP	Median	0,1 %****	0,4 %	0,4 %	0,3 %

Appendix 9 reports the private-to-private RLBOs median relative changes in operating performance. *,**,***,**** indicates significance at a 15%, 10%, 5% and 1% level.

Appendix 10

		ΔIPO	ΔIPO+1	ΔIPO+2	ΔIPO+3
Europe	Median	1,0 %	-0,2 %	-1,0 %	-2,2 %
USA	Median	1,3 %	1,4 %	0,6 %	0,8 %
Excess OP	Median	-0,3 %**	-1,7 %	-1,5 %***	-3,0 %**

Appendix 10 reports the European and American RLBOs median relative changes in operating performance. *,**,***,**** indicates significance at a 15%, 10%, 5% and 1% level.

Appendix 11

		ΔIPO	ΔIPO+1	ΔIPO+2	ΔIPO+3
KKR, Bain, Warburg	Median	0,7 %	3,0 %	3,1 %	3,8 %
Other buyout funds	Median	1,4 %	1,8 %	0,9 %	0,7 %
Excess OP	Median	-0,8 %	1,2 %	2,2 %	3,2 %****

Appendix 11 reports the three most active and RLBOs listed by other buyout funds' median relative changes in operating performance. *,**,***,**** indicates significance at a 15%, 10%, 5% and 1% level.

Appendix 12

	Quick-Flip			
	ΔIPO	**ΔIPO+1**	**ΔIPO+2**	**ΔIPO+3**
Public-to-Private	3,6 %	3,1 %	4,8 %	3,3 %
Divisional	0,4 %	-1,2 %	-7,0 %	-6,6 %
Private-to-Private	0,9 %	2,3 %	0,2 %	-0,5 %
	Non-Quick-Flip			
Public-to-Private	0,5 %	1,3 %	0,2 %	0,6 %
Divisional	0,9 %	1,7 %	1,4 %	0,9 %
Private-to-Private	1,6 %	1,4 %	0,5 %	1,1 %
	Excess OP			
Public-to-Private	3,1 %	1,8 %	4,6 %	2,7 %
Divisional	-0,5 %	-2,9 %***	-8,4 %	-7,5 %
Private-to-Private	-0,7 %	0,9 %	-0,3 %	-1,6 %

Appendix 12 reports the quick-flipped and non-quick-flipped RLBOs median relative changes in operating performance. *,**,***,**** indicates significance at a 15%, 10%, 5% and 1% level.

Appendix 13

	Shorter than median			
	ΔIPO	**ΔIPO+1**	**ΔIPO+2**	**ΔIPO+3**
Public-to-Private	1,4 %	2,6 %	1,4 %	1,3 %
Divisional	1,0 %	1,7 %	0,9 %	1,9 %
Private-to-Private	1,6 %	1,4 %	-0,2 %	-0,1 %
	ΔIPO	**ΔIPO+1**	**ΔIPO+2**	**ΔIPO+3**
Public-to-Private	-1,3 %	1,6 %	0,6 %	1,1 %
Divisional	1,0 %	1,8 %	1,7 %	0,1 %
Private-to-Private	1,9 %	1,8 %	1,1 %	1,7 %
	Excess OP			
Public-to-Private	2,7 %	1,1 %	0,8 %	0,2 %
Divisional	0,0 %	-0,1 %	-0,8 %	1,8 %***
Private-to-Private	-0,3 %	-0,4 %	-1,4 %	-1,9 %

Appendix 13 reports the RLBOs held longer and shorter than median's median relative changes in operating performance. *,**,***,**** indicates significance at a 15%, 10%, 5% and 1% level.

Appendix 14

		1980's		1990's		2000's	
		ΔIPO+1	**ΔIPO+3**	**ΔIPO+1**	**ΔIPO+3**	**ΔIPO+1**	**ΔIPO+3**
Public-to-Private	Median	-3,6 %	-1,6 %	2,1 %	-0,6 %	0,9 %	2,6 %
Divisional	Median	1,9 %	0,5 %	2,4 %	1,8 %	0,6 %	-0,9 %
Private-to-Private	Median	-1,7 %	-4,7 %	1,9 %	-0,1 %	1,4 %	1,7 %
Classical IPOs	Median	-1,5 %	-4,8 %	1,0 %	-0,1 %	3,1 %	4,6 %

Appendix 14 reports the median relative changes in operating performance in the 1980s, 1990s and 2000s. *,**,***,**** indicates significance at a 15%, 10%, 5% and 1% level.

Appendix 15

	Shorter than median				
	IPO-1	**IPO**	**IPO+1**	**IPO+2**	**IPO+3**
Leverage	80,3 %	63,2 %	56,7 %		
Annual sales growth		18,3 %	19,6 %	12,7 %	10,9 %
Operating CF-to-sales	6,8 %	7,1 %	8,9 %	7,6 %	8,3 %
Pre-tax NI margin	2,4 %	7,7 %	5,8 %	5,6 %	4,3 %
CAPEX ratio	3,6 %	3,8 %	4,6 %		
	Longer than median				
Leverage	86,5 %	68,2 %	64,1 %		
Annual sales growth		13,4 %	12,0 %	10,0 %	9,0 %
Operating CF-to-sales	6,2 %	6,7 %	7,4 %	7,9 %	8,1 %
Pre-tax NI margin	2,9 %	6,8 %	6,2 %	5,4 %	4,4 %
CAPEX ratio	3,6 %	4,2 %	4,5 %		

Appendix 15 reports the accounting variables for the RLBOs held longer and shorter than median

Appendix 16

	Classic IPOs				
	IPO-1	**IPO**	**IPO+1**	**IPO+2**	**IPO+3**
Leverage	69,1 %	34,8 %	42,6 %		
Annual sales growth		41,6 %	31,1 %	19,7 %	13,9 %
Operating CF-to-sales	3,9 %	4,3 %	4,5 %	5,3 %	6,9 %
Pre-tax NI margin	4,1 %	5,9 %	6,1 %	4,3 %	4,1 %
CAPEX ratio	5,3 %	4,1 %	4,5 %		

Appendix 16 report the classic IPOs accounting variables

Appendix 17

	1 day	**30 days**	**6 months**	**1 year**	**3 years**
Mean	22,39%	25,74%	30,02%	30,23%	23,32%
Median	10,29%	11,88%	12,86%	8,93%	-9,39%
St. deviation	44,49%	58,08%	103,27%	120,19%	153,56%
Min	-78,13%	-68,10%	-100,00%	-98,85%	-100,00%
Max	525,00%	773,08%	1657,81%	2440,00%	2740,58%

Appendix 17 reports the mean, median, standard deviation, min and max stock returns for the classic IPOs.

Appendix 18

	IPO-adjusted		Industry-adjusted	
	1 year	3 years	1 year	3 years
Public-to-Private	17,4%***	42,0%****	16,2%	29,7%****
Divisional	6,1%	34,4%****	2,9%	19,2%****
Private-to-Private	14,3%***	7,5%	0,0%	0,4%

Appendix 18 reports the median IPO-adjusted and industry-adjusted excess returns for the non-acquired RLBOs. *,**,***,**** indicates significance at a 15%, 10%, 5% and 1% level.

Appendix 19

		IPO-1	IPO	IPO+1	IPO+2	IPO+3
Public-to-private - Divisional	Median	1,1 %	1,3 %	1,1 %	1,0 %	1,6 %
Public-to-private - Private-to-private	Median	1,7 %***	0,5 %	1,5 %	1,8 %**	1,5 %**
Divisional - Private-to-private	Median	0,7 %	-0,8 %	0,4 %	0,8 %**	-0,1 %

Appendix 19 reports the median excess operating performance for the public-to-private adjusted for the divisional and private-to-private, and divisional adjusted for the private-to-private. *,**,***,**** indicates significance at a 15%, 10%, 5% and 1% level.

Appendix 20

	1 day	30 days	6 months	1 year	3 years
Public-to-private - divisional	0,3 %	2,4 %	3,5 %	9,3 %	4,5 %
Public-to-private - private-to-private	-5,1%****	-4,8%	-4,8%	1,4%	38,8%****
Divisional - private-to-private	-5,3%****	7,2%***	-8,3%*	-7,9%	34,3%****

Appendix 20 reports the median excess returns for the public-to-private adjusted for the divisional and private-to-private, and divisional adjusted for the private-to-private. *,**,***,**** indicates significance at a 15%, 10%, 5% and 1% level.

Appendix 21

	1980-1995			1996-2002		
	IPO-1	IPO+1	IPO+3	IPO-1	IPO+1	IPO+3
Public-to-Private	12,4 %	13,6 %	11,8 %	14,9 %	17,6 %	15,5 %
Divisional	11,5 %	12,9 %	12,1 %	14,0 %	16,0 %	15,9 %
Private-to-Private	12,5 %	12,8 %	10,4 %	10,9 %	12,3 %	11,9 %
	2003-2007			2008-2015		
Public-to-Private	14,7 %	15,7 %	15,5 %	16,8 %	16,6 %	22,3 %
Divisional	16,1 %	17,8 %	14,8 %	18,4 %	19,1 %	16,1 %
Private-to-Private	14,2 %	15,2 %	15,8 %	16,0 %	18,7 %	20,0 %

Appendix 21 reports the median operating performance in the different LBO waves, alternatively to dividing into decades.

Appendix 22

	1980-1992		1993-2002		2003-2007		2008-2015	
	1 year	**3 years**	**1 year**	**3 years**	**1 year**	**3 years**	**1 year**	**3 years**
Public-to-Private	26,4%	31,2%	16,6%	53,3%	19,5%	21,6%	29,4%	56,7%
Divisional	9,0%	41,5%	13,4%	28,3%	24,5%	3,9%	41,4%	64,0%
Private-to-Private	17,4%	8,6%	21,2%	-7,7%	35,9%	30,6%	24,8%	-1,7%

Appendix 22 reports the median stock performance in the different LBO waves, alternatively to dividing into decades.

Appendix 23

Please see the attached USB-stick for the Wilcoxon tests, cross-sectional regression models and the correctly specified models. See “Guide for Stata output” for the descriptions of the files.