Abstract

This thesis examines the post-issue operating performance of a sample of 82 PE-backed IPOs in emerging markets (mainly China and India) in the period 2008-2012. Based on a comparison with a matched-pair sample, it is concluded that the development in the performance of PE-backed IPOs is superior in the short run to that of non-backed IPOs. This conclusion is based on the finding that the operating performance of both samples declines post-IPO, but the performance of the PE-backed sample declines less than that of the non-backed sample. This finding is only significant in the year of the IPO and the following year. Moreover, the analysis indicates that the non-backed sample performs better in absolute terms during the entire period. Neither of the selected accounting items (revenue, COGS, current ratio, or Capex) aid in explaining this difference. The investigation of the market expectations shows that non-backed IPOs generally trade at higher M/B and P/E ratios, which is to be expected given that the findings indicate that non-backed IPOs perform better than PE-backed IPOs. Finally, this thesis finds evidence in favor of a positive correlation between the holding period of the PE fund and subsequent performance of the IPO. It is concluded that the retained share or changes in leverage do not explain the change in operating performance of PE-backed IPOs.

Operating performance of private equity backed initial public offerings in emerging markets

An empirical analysis of the post-issue operating performance of private equity backed initial public offerings in emerging markets and how private equity characteristics affect their performance

Master's thesis

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1 Introduction

Private equity (PE) has received a lot of attention. PE includes both early stage venture capital and later stage buyouts. Buyouts, the more drastic of the two types of investments (Wood and Wright 2009), will be the focus of this thesis. Buyouts include changes in the corporate governance of portfolio companies, is typically backed by substantial borrowings, and is a type of active investment meaning that it is not uncommon for PE investors to sit on the boards of portfolio companies and impact management behavior (Wood and Wright 2009). In spite of its increasing importance, there is much debate on the effects of PE. Critiques claim that buyouts are merely a form of asset stripping, which transfers wealth to PE investors at the expense of employees and other stakeholders or that PE investors simply buy low and sell high and exploit favorable market conditions. Proponents, on the other hand, assert that PE is a value creating organizational form, which increases productivity and efficiency and, thus, improves investors' returns.

The literature on PE gives no universal answer to the question of whether the effects of PE are positive or negative. Early studies suggest that buyouts improve financial performance. This holds both when measuring financial performance based on share price (Kaplan (1989) and Lehn and Poulsen (1989)) and accounting data (Kaplan (1989) and Smith (1990)). More recent research by Groh and Gottschalg (2006) shows that buyout fund investments outperformed the S&P 500 Index over the period 1984-2004 after taking into account operating risk and leverage risk. However, Phalippou and Gottshalg (2006) applying a different methodology do not find a significantly positive beta. Cumming et al. (2007) conclude that overall, recent evidence on accounting performance shows that buyouts outperform industry benchmarks on a risk adjusted basis. For example, Wright et al. (1996) show that UK management buyouts (MBOs) experienced significantly higher increases in return on assets (ROA) than comparable firms that were not subjects to MBOs.

All of the academic research mentioned in the above paragraphs is done in the US or Europe. This is symptomatic for PE research, which has historically focused on these markets, as they are the most developed. However, in recent years emerging markets have attracted significant attention from global investors and China and India now rank among the 5 regions that receive most PE investments (Fang 2016). PE investments in emerging markets are undertaken by either foreign PE

funds or domestic PE funds, which often replicate the organizational structure of develop market PE funds (Fang 2016). Hence, it seems reasonable to expect that the same mechanisms in terms of value creation will affect the performance in portfolio companies. Therefore, this thesis aims to investigate whether academic findings from PE in developed economics can be transferred to emerging markets.

1.1 Area of Research

The size of the return that PE managers generate is determined by the price they receive in excess of the price paid for portfolio companies at the time of exit. Thus, the exit is a pivotal step in the PE process. Traditional exit routes for PE investments are trade sales, secondary buyouts, and Initial Public Offerings (IPOs). A trade sale involves an acquisition of the portfolio company by a strategic buyer. The acquisition is in the interest of the buyer, and the buyer can also be the portfolio company itself repurchasing its own shares. The trade sale often results in the highest price, because the buyer is willing to pay the value of strategic options embedded in the sales price hoping to increase future operating cash flows (Baker, Filbeck and Kiymaz 2015). The secondary buyout, also sometimes referred to as a sponsor-to-sponsor buyout, refers to a situation in which a PE fund sells a portfolio company to another financial sponsor. One of the biggest advantages of a secondary buyout is the option to exit completely and immediately and the speed of the transaction. Finally, PE firms can exit by offering the portfolio company's shares to the public and listing on an exchange for the first time in an IPO. In bullish times this type of exit has a probability of ensuring the PE fund a high return. The latter, namely exit through IPOs, will be the focus of this thesis.

Investigating IPOs is interesting because it offers an opportunity to examine the transition from private to public and the resulting organizational changes, which relate e.g. to the active investment of PE funds and the degree of leverage. Hence, this area has received a lot of academic attention. The underlying assumption in this type of research is that companies managed by PE funds will have achieved a greater utilization of its resources and, thus, will perform better than benchmark IPOs or industry peers.

There are multiple studies, which examine the "private-to-public"-effects both in terms of financial and accounting (that is, operating) performance. This thesis will focus on operating performance, because improving the operations is at the core of the PE business model, which will be elaborated

on further in the next section. However, it is recognized that the justification for this business model is ultimately higher returns to investors and, therefore, financial performance is also considered to some extent. Cao and Lerner (2006) examine the performance of reverse LBOs (RLBOs). RLBOs are IPOs of companies owned by buyout funds, which were public before being taken over by the fund. Therefore, studies of RLBOs are highly relevant in relation to PE-backed IPOs, as they are essentially just a subset of PE-backed IPOs, which have previously been listed. Cao and Lerner (2006) show that RLBOs consistently outperform other IPOs and the market as a whole over the period 1980-2002 and that this holds both in the short term (1 year) and in the longer term (5 years). Holthausen and Larcker (1996) find that the accounting performance of RLBOs is significantly better than their industry peers at the time of the IPO and for at least the next four years, although they discover some decline in performance. Murray et al. (2006), however, investigating a sample UK IPOs find that operating performance of PE-backed IPOs declines steadily and is not significantly different from the industry average within a 5-year period.

As mentioned in the introduction, this thesis will focus on PE in emerging markets. This focus is chosen because of the growing importance of emerging economies in financial markets, in general, and because of the growth in PE investments, specifically. Years of unprecedented growth in emerging markets combined with the lowering of government intervention has attracted an increasing number of PE investors wanting to take advantage of the new opportunities offered in these markets. Nevertheless, it is possible that emerging markets present challenges such as underdevelopment, regulatory restrictions, and corporate governance weaknesses, which negatively impact the efficiency of the PE business model (Johan and Zhang 2016). Moreover, as a result of the impressive growth rates, too much capital might have chased too few good deals assuming that this growth would persist (Johan og Zhang 2016). Hence, this study aims to test whether PE investments in emerging economies are actually as attractive as they seem. In addition, the analysis will be based on data from 2008 to 2012. Naturally, this period is heavily influenced by turbulence in financial markets. However, it is deemed necessary in order to obtain results based on the most recent data, which captures the recent surge in emerging market PE. Furthermore, this will be taken into account when the group of non-backed benchmark IPOs is chosen, as they will be identified on a matched-pair basis taking into consideration when the IPO was undertaken.

1.1.1 Research Question

Is the operating performance of PE-backed IPOs in emerging markets different from non-backed IPOs and can the difference be attributed to PE characteristics?

As is evident from the above research question, the aim of the thesis is to investigate two interrelated aspects of PE in emerging markets. First of all, it will be tested whether PE-backed IPOs outperform non-backed IPOs in terms of operating performance post-IPO. Second, it will be investigated how PE characteristics aid in explaining the operating performance of the group of PE-backed IPOs. Which characteristics to be examined will be determined based on previous literature on the subject and the available data. Before conducting the analysis, it is necessary to formulate hypotheses and sub questions to the research question. These can be found in section 4.2 Research Sub Question and Hypotheses.

1.2 Delimitation

This thesis does not aim to test:

- Long run financial performance
- Financial institutions
- Venture capital-backed IPOs
- All PE characteristics

This thesis will not conduct a coherent analysis of the effect of PE ownership on long run financial performance from an investor perspective. First and foremost, this choice is justified on the basis of the efficient market hypothesis. Assuming that PE ownership affects the operating performance of companies and, thus, future cash flows, this should theoretically be reflected in the share price. Even though it is acknowledged that markets are not in fact efficient, operating performance is chosen as the primary research objective of this thesis because it is fair to assume that operating performance, to a large extent, drives financial performance. However, because operating and financial performance are so closely connected, it also means that financial performance cannot be completely excluded. However, the point of analyzing investor expectations, as done in sub question 3, which will be formulated later, is to gain a deeper understanding of operating performance, not to perform a separate analysis of financial performance.

Next, financial institutions going public are excluded from the sample. Financial institutions include firms in industries such as finance e.g. banks and investment management, insurance, and real estate. These companies are deselected because the business models as well as accounting statements differ from those of industrial companies. Thus, an analysis of the operating performance of financial companies would require another research design, which is outside the scope of this thesis.

This thesis will focus specifically on the buyout segment of PE meaning that IPOs backed by venture capital (VC) funds are not included. This distinction is made because the types of companies that VC funds and buyout funds invest in are fundamentally different. VC funds typically invest in start-ups and it is not uncommon for the company not to be generating any revenues yet. Buyout funds, on the other hand, typically invest in mature companies. For the remainder of the thesis, the term PE will be used to refer to PE funds that invest in mature companies. This distinction is made to maintain focus, especially when deciding on which organizational PE characteristics to investigate, because these differ significantly depending on the type of companies that PE funds invest in.

Finally, there are limitations worth mentioning relating to the PE characteristics investigated in this study. There are numerous characteristic features of PE investing, which would be worth studying. However, for reasons related to the scope of this thesis and time and space constraints, it is necessary to choose a limited number of features. This selection will be based on which characteristics have provided notable insights in previous literature, but will also to a large extent depend on the availability and credibility of data. Considerations related to the quality of data will be further elaborated on in the methodology section.

1.3 Thesis Structure

Introduction	Area of Research
	Delimitation
	Thesis Structure
Descriptive part	Basics of PE
Theoretical part	Value-creating mechanisms
	Literature review
Methodology	Methodology
Empirical part	Descriptive statistics
	Results I - Comparison of PE-backed and non-backed IPOs Sub question 1 - H_1 and H_2 Sub question 2 Sub question 3 - H_3
	Results II - PE characteristics Sub question 4 - H_4, H_5, and H_6
Concluding part	Conclusion
	Discussion of findings

2 Theory

The theoretical part of this thesis consists of two parts. First, a mainly descriptive part will outline the distinguishing features of PE and the basics of the PE business model. The features highlighted in this section are the ones deemed most relevant in relation to the research question that this thesis

seeks to answer and, thus, serve as the foundation upon which the theoretical review and analysis are based. Second, a theoretical review will explain the mechanisms behind PE value creation.

2.1 Basics of Private Equity

2.1.1 Definition

Although not an exhaustive definition, Leeds and Satyamurthy (2015) describe PE investors as being in the business of "providing a combination of scarce capital and performance-enhancing expertise for the purpose of strengthening competitiveness and profitability of individual companies that meet their rigorous investment criteria" (p. 22). This statement offers several insights into PE investing. First of all, the fact that PE investors provide both capital and expertise to entities, which are not publicly traded, sets them apart from other sources of capital such as borrowing from banks or issuing shares. That is, PE investors act as active investors and typically collaborate closely with company management to spark growth and/or strengthen performance. Naturally, this requires a longer investment horizon than that of a typical business financier. Exit generally happens within 3 to 7 years (Cendrowski and Wadecki 2012).

The term "PE" is used to describe a range of investments ranging from angel and venture capital to growth capital and buyouts. Angel and venture capital is usually provided to start-ups or ideas that may not yet be generating revenues, whereas growth capital and buyouts typically require acquiring a stake in well-established, larger companies. Clearly, these types of investment require different types of analysis. Moreover, mergers and acquisitions is the most popular type of exit for angel investors and venture capitalists (Ramsinghani 2011) and therefore these types of investment are poorly suited for this analysis, which focuses on exit via IPO. Therefore, for the purpose of this thesis, the expression "PE" will primarily be used to describe providers of growth capital and buyouts.

Throughout this thesis a number of studies investigating leveraged buyouts (LBOs), management buyouts (MBOs), and RLBOs will be referred to. Although these types of transaction have their own characteristics, it is important to understand that they are merely subsets of PE transactions. A LBO refers to a situation in which a company is acquired using a substantial amount of debt and the term can be used interchangeably with PE. An MBO means that the management purchases a

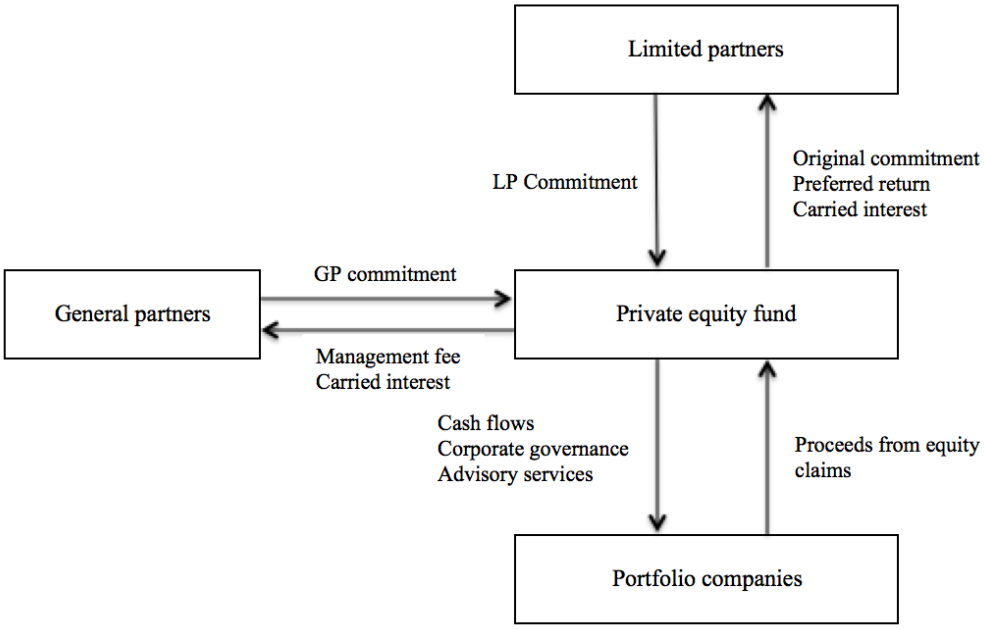
controlling stake in the company it is managing. This is a specific type of PE transaction. As explained in section 1.1 Area of Research, a RLBO is the IPO of a LBO, which was taken private through the buyout. The mechanisms in play in the case of RLBOs are to a large extent the same as in PE-backed IPOs.

In summary, for the purpose of this thesis PE is defined as a medium to long-term equity investment in a mature company that is not publicly traded on an exchange.

2.1.2 Business Model and Structure

Essentially, the PE business model entails acquiring a controlling stake in a suitable company, implementing operational and/or financial value creating initiatives and, eventually, selling the stake in the company at a price that, ideally, ensures a return above the hurdle rate. Moreover, it is customary to operate with a high degree of leverage. This is one of the distinguishing features of PE and will be elaborated on further in the following section. Regarding the final sale of the stake in a portfolio company (referred to as the PE fund's "exit"), the most common methods are taking the company public (as is the focus of this thesis), a trade sale (i.e. selling to a strategic investor), or selling to another financial investor, as previously mentioned.

Figure 2.1 – Private equity limited liability partnership structure



Source: Own creation inspired by Leeds and Satyamurthy (2015)

Figure 2.1 shows the structure of a PE fund. In general, PE funds are structured as limited liability partnerships (LLP). The fund is run by the general partner (GP), who has responsibility for raising capital, the exiting process and everything in between. In contrast to the GP, limited partners (LPs) contribute only capital and, thus, act as passive investors. LPs committing capital to PE funds are typically characterized by having longer investment horizons and a higher tolerance for short-term volatility in order to cope with the inherent illiquidity of PE investments than the average investor. Examples of such investors include large financial intermediaries, e.g. pension funds, banks and insurance companies, university endowments, and foundations.

As shown in figure 2.1, GPs receive two types of compensation; an annual management fee, which is usually between 1% and 2.5% of total capital committed to the fund, and carried interest. Carried interest is the return generated in excess of the hurdle rate, which is the minimum rate of return LPs receive on their investment. It is common practice to split the carried interest 80/20, so that the LPs receive 80 percent and the GP receives 20 percent. The performance-based portion of the remuneration is paid at the end of the life of the investment. Clearly, this is done in order to favor long-term performance over short-term metrics.

The legal organization of funds as LLPs has several implications. First of all, the income generated by the partnership is subject to pass-through taxation, i.e. it is not subject to corporate taxes, but is taxed trough the personal income taxes paid by the partners. Moreover, for a long time, PE funds were virtually unregulated. However, with the passing of Dodd-Franck Act in 2010, funds with more than $150 million in assets under management are required to register with the Securities and Exchange Commission (SEC) (Cendrowski and Wadecki 2012). Finally, the lifetime of the fund is typically finite (about 10 years).

2.1.3 Distinguishing Features of PE

In the following a number of features particular to PE investing are presented. The characteristic features presented in this paragraph are chosen with the aim of building the foundation for understanding how PE firms create value. Furthermore, some of the distinguishing features will be incorporated directly in the quantitative analysis. The features selected are: *active ownership, leverage, and incentive pay*.

2.1.3.1 Active Ownership

As previously mentioned, it is an integral part of the PE business model to acquire a majority, or at least a controlling, stake in its portfolio companies. Furthermore, unlike passive, typically minority, investors, PE firms establish and maintain a close relationship with portfolio companies to gain a deeper knowledge of the company. Based on this knowledge, a number of value enhancing measures are implemented. This is a crucial feature of PE investing for, at least, two reasons. First of all, the relation between PE ownership and improved operating performance is exactly what this thesis aims to test. Second, theoretically speaking, the price that the PE fund pays should reflect all future prospects of the company. That is, there should be no chance of generating excess returns, unless the PE firm has access to superior information regarding the future prospects or can improve the fundamental value of the portfolio company.

According to Graf et al. (2012) operational improvements is one in three ways in which PE firms create value. Operational improvements are facilitated by a specific industrial focus and relationships with industry experts with operating backgrounds and special knowledge. Operating performance is typically improved through sales increases, margin improvements or a variety of other changes. Sales increases are usually realized through investments in sales force or production capacity. Measures to improve margins include cutting costs, optimizing product prizing, and customer retention or selection. Finally, the PE firm can refocus the company's strategy, replace part of or the entire management team, undertake mergers and acquisitions, or divest businesses/business units.

2.1.3.2 Leverage

One of the most notorious traits of PE is the use of leverage. From a theoretical point of view, this can be explained by employing Modigliani and Miller's second proposition, which states that the return on equity increases with increases in the debt-to-equity ratio. Moreover, assuming that the leverage is kept at a level where the value of the tax shield is higher than financial distress costs, a higher debt level will lower the cost of capital, and, thus, increase the value of the portfolio company. However, as is obvious from this justification for applying high leverage, firm value is improved through an optimization of capital structure not through strategic or operational measures,

as is the focus of this thesis. Thus, the next section, which will explain the value creating mechanisms behind the PE characteristics, will emphasize the behavioral effects of high leverage.

2.1.3.3 Incentive pay

As previously mentioned, the compensation package to PE investors is designed promote long-term focus. Moreover, to ensure alignment of the interests of the PE fund and the management team in portfolio companies, it is common practice for the fund to require that the management team acquires a stake of the company in addition to placing fund managers on the board of directors. This way of linking owners' and managers' interests has several advantages. For example, compared to another popular form of performance-based incentive, namely, stock options, carried interest and direct ownership has both upside and downside potential. Stock options, on the other hand, become worthless if not exercised, but can never result in a loss of wealth. Thus, the use of stock options in executive compensation may result in excessive risk taking and moral hazard problems.

2.1.4 Private Equity in Emerging Markets

PE activity has historically mainly taken place in the US and Europe. Even though only 13.8% of global PE investment took place in emerging markets in 2008 with the majority of all other PE investments occurring in the US (approximately 70 percent) (Bliss 2012), PE investments in emerging markets have grown at remarkable rates. From 2002 to 2008 PE investments in emerging markets grew from around $2 billion to $47.8 billion, that is, by a factor of 24 (Bliss 2012). This is equivalent of a compound annual growth rate (CAGR) of 70 percent. In comparison, the CAGR of PE activity in the US was around 30%.

There are a number of reasons why emerging markets offer interesting opportunities for PE funds. First of all, both economies and populations have grown more rapidly in emerging markets than in developed countries. These two factors in combination ensure a rapidly growing middle class, which, in turn, translates into new business opportunities. These new opportunities spur entrepreneurship and high growth for existing companies, which leads to higher levels of investment and offers new opportunities for PE funds. Another important factor is the improvement of the legal system and regulatory environment of emerging markets. According to Bliss (2012), who illustrates this using China and Russia as examples, emerging markets have improved

remarkably on dimensions relating to security of property rights and regulation of credit, labor, and business from 2000 to 2009. In contrast, the performance of developed countries such as the US and the UK on these parameters has declined (Bliss 2012). In general, emerging markets are improving as places to do business and to invest, which benefits PE investors. However, it should not be overlooked that, in absolute terms, developed markets still perform better on these rankings. One way in which it is reflected that emerging market performance on these parameters is still inferior to the performance of developed economies is in protection of intellectual property (IP) rights. Therefore, emerging market investments that derive majority of their value from R&D efforts or brand equity may be less attractive due to the lack of enforcement of IP regulation and low consumer willingness to pay a premium for original branded products.

Finally, there are several reasons why PE funds invest in emerging markets, which relate to developments in the PE market specifically as opposed to fundamental factors in emerging economies. Bliss (2012) shows that emerging market funds have outperformed US VC and PE funds over one-, three-, five-, and ten-year horizons and claims that this finding is caused by a relatively poor performance of US funds, which has resulted in a search for better opportunities abroad. First of all, fund size as measured by the amount of capital under management and the number of fund partners have grown disproportionately with the growth in fund size exceeding the growth in fund partners. Thus, the fixed 2 percent management fee makes up a larger fraction of total compensation possibly reducing the positive incentive effect of carried interest. Second, because many funds were established prior to the financial crisis, investors were willing to settle for less favorable terms to guarantee entry into popular funds. Finally, as mentioned above the amount of capital committed to funds grew rapidly. In fact, demand increased more rapidly than supply, which increased industry valuations and lowered returns.

2.2 Value-Creating Mechanisms

Renneboog and Simons (2005) thoroughly review the motivations for public-to-private transactions, hereunder buyouts by institutional investors such as PE funds. They mention six sources of value creation; tax benefits, agency-costs related motives, transaction costs savings, wealth transfer, takeover defenses, and corporate undervaluation.

The wealth transfer hypothesis states that wealth gains from going private are largely the result of the expropriation of pre-transaction stakeholders. Most often, the stakeholders who are expropriated are pre-transaction bondholders due to an increase in risk of investment projects, an increase in dividend payments or new issues of debt of higher or equal seniority (Renneboog and Simons 2005). However, even though this hypothesis creates value for equity owners it is, as implied by the name, merely a transfer of value between stakeholders. Thus, the wealth transfer hypothesis does not aid in explaining value creation in terms of operating performance, as is the focus of this thesis. Another version of the wealth transfer hypothesis emphasizes wealth transfers from other pre-transaction stakeholders such as employees (Renneboog and Simons 2005). If value is transferred from employees through a reduction in employment and/or wages that would ceteris paribus improve operating performance. Even though wealth transfer theory will not be the focus of this thesis, these types of transfers do create value. The transaction cost hypothesis, which suggests that the wealth gains from going private are the result of the elimination of the costs associated with a listing on the exchange, also is not elaborated on, as this thesis does not investigate the costs associated with listing on a stock exchange. Finally, the takeover defense hypothesis, which views going private as a final defensive measure for a management team protecting its company from a hostile takeover, is not included, as it only creates value in MBOs, which is too narrow a definition for the scope of this thesis.

In the following sub-sections the motivations with the most explanatory power, namely tax benefits, agency-cost theories and the undervaluation hypothesis, are explored in further detail.

2.2.1 Tax Benefits

The tax benefit hypothesis is based on the idea that the wealth gains from going private are largely the result of tax benefits associated with the financial structure underlying the transaction. That is, as a result of the high degree of leverage and the tax deductibility of interest payments, a tax shield is created, which increases pre-transaction value.

Strictly speaking, improvements in performance caused by a financial restructuring do not constitute improvements in operating performance, as the portfolio company could have achieved the same benefits by adopting the same capital structure without implementing any new initiatives related to e.g. strategic direction or operational efficiency (Kaplan 1989). However, empirically tax

benefits have been shown to be one of the most important value drivers in LBOs. Critics of public-to-private transactions even claim that tax benefits are so large that real value creation is superfluous. Kaplan (1989) finds that between 21% and 72% of the premium paid to shareholders to take the company private is attributable to tax benefits in US public-to-private transactions. For a number of the most common performance measures, such as return on assets and cash flow-based measures, tax benefits are included and, thus, impact the assessment of performance. Therefore, it is pivotal to keep in mind the impact of tax benefits when evaluating operating performance in PE transactions.

2.2.2 Agency-Cost Theories

Jensen and Meckling (1976) describe agency costs generated by the corporate form as taking its point of departure in the separation of ownership and control. Agency costs arise when one person, the principal, delegates decision making authority to another person, the agent, in a situation involving cooperative effort. Assuming that both the principal and the agent are self-serving utility maximizers there is a risk that the agent will not act in the best interest of the principal. Agency costs are the sum of monitoring expenditures by the principal, the bonding expenditures by the agent, and the residual loss. Monitoring cost, in the sense that Jensen and Meckling apply the term, refers to all costs related to efforts undertaken to control the behavior of the agent. In practice, this is usually done through establishing appropriate incentives based on parameters such as budget restrictions, compensation policies, and operating rules. Bonding costs are borne by the agent and serve as a guarantee that he will not take certain actions, which would harm the principal, or ensures the reimbursement of the principal, if he does. In spite of undertaking these costs, it is not always possible to align the interests of the principal and the agent perfectly. The dollar equivalent of the divergence between the agent's decisions and those decisions, which would maximize the welfare of the principal, is referred to as the residual loss.

Based on this theoretical strand of thinking, three hypotheses aid in explaining the type of value creation in PE transactions, which would also be reflected in operating performance. The three hypotheses; incentive realignment hypothesis, control hypothesis, and free cash flow hypothesis are elaborated on below.

2.2.2.1 Incentive Realignment

The incentive realignment hypothesis names the reunification of ownership and control as the main source of value creation. When the manager is also the owner of the company, he will bear a larger fraction of the cost of extracting benefits, which, ultimately, decreases his private benefit of this behavior. Thus, PE transactions attack the root of the principal-agent problem by realigning the short-term as well as long-term interests of managers and owners.

2.2.2.2 Control

The control hypothesis is another consequence of the reunification of ownership and control. As previously mentioned, a way for shareholders to impact the behavior of the management team is through monitoring. However, monitoring is subject to free-rider problems, as the activity is commonly undertaken by one or a small group of shareholders but becomes a public good for all shareholders. Thus, there is a tendency to underinvest in monitoring when ownership is dispersed. When a PE fund takes control of a company, the number of equity owners is typically reduced. Moreover, due to the active involvement in the management of the firm, the PE fund has access to information of a higher quality. The combination of increased availability and accuracy of information and an increased willingness to invest in monitoring activities increases the quality of control, which essentially lowers agency costs and increases the value of the company.

2.2.2.3 Free Cash Flow and Leverage

The free cash flow hypothesis is based on the so-called empire building problem. Empire building refers to the tendency of managers to value projects that will grow the firm, its influence and/or is highly prestigious over projects that create value for shareholders. Prioritizing these types of personal benefits over optimal resource allocation can destroy value for the company. However, when firms take on debt, they are obligated to allocate part of their cash flow to debt payments, which restricts their ability to invest in negative net present value (NPV) projects or make other subpar decisions. In a sense, debt forces managers to run the company efficiently to avoid default.

However, it is important to note that leverage can affect managers' behavior in several ways. For instance, another possible consequence of taking on leverage is the so-called asset substitution problem. This problem arises from the fact that investment decisions can impact the value of equity

and the value of debt differently. When firms are worried about financial distress, shareholders can benefit from highly risky decisions, even if they have a negative NPV (Berk and DeMarzo 2014). Hence, increased leverage might also induce excessive risk-taking on the part of managers.

2.2.3 Undervaluation Hypothesis

The undervaluation hypothesis suggests that wealth gains from going private result from developing an alternative higher-valued use for the firm's assets (Renneboog and Simons 2005). This higher-valued use can have many causes. In the case of MBOs, it is possible that management, which is privileged in terms of access to high-quality information, realizes that the market has underestimated the potential of the firm. Therefore, they can buy the firm at a price below its fair value. Another possibility, which also only applies when the PE investor is the incumbent management team, is that management manipulates earnings in order to lower the share price. This phenomenon is explored in the context of post-IPO value creation in the literature review. Finally, outsiders e.g. PE funds may recognize that a company has unrealized value locked up, which they can exploit by initiating a financial, operating, or strategic restructuring.

3 Literature Review

The purpose of the literature review is to provide an overview of existing research that sheds light on the subjects of buyouts, IPOs, operating performance and the interplay between these topics. Using deductive reasoning this literature review will aid in operationalizing the research question by formulating substantiated sub questions. As will be evident from this paragraph, the research on especially buyouts has been focused on the US and, to some extent, Europe.

The paragraph is divided into threes sections. The first section will focus on the relationship between PE buyouts and operating performance to investigate how PE ownership affects operating performance and which factors drive this relationship. The two next sections are related as they both deal with post-IPO performance. First of all, the general performance post-IPO is examined. Subsequently, the focus will turn specifically to the performance of PE-backed companies in the aftermath of an IPO.

3.1 Performance post-buyout

Kaplan (1989), examining the post-buyout data of 48 US MBOs, finds that operating income is unchanged in the first two years following the buyout but is approximately 24% higher in the third year. Moreover, he finds that operating income in relation to both assets and sales increases by roughly 20% more than the respective industry averages. He considers three hypotheses as causes for the operating changes, namely, the wealth transfer hypothesis, the underpricing hypothesis, and agency cost theories, but only finds support for the agency cost theories.

Smith (1990) arrives at somewhat similar results by looking into 58 MBOs between 1977 and 1986. She finds a significant increase in operating returns from the year following the buyout that is sustained in the following years. There is no significant change in operating returns in the years preceding the buyout indicating that the increase is attributable to the MBO. This study also favors incentive effects as the explanation for the improvement in performance and fails to find support for the underpricing hypothesis. Similarly, Lichtenberg and Siegel (1990) show that LBOs experience increases in operating productivity. However, their unit of analysis changes from the entire firm to individual plants. They show that plants purchased by PE funds, which had an average productivity 2% above industry mean in the three years pre-buyout years, experience an increase in productivity to 8.3% above industry average.

Harris et al. (2005) also investigate operating performance on the plant level. Unlike Lichtenberg and Siegel (1990), they find that the plants underperform compared to similar plants pre-transaction. But in line with the other studies mentioned, they also document substantial increases in operating performance post-buyout. They find that more capable management and a decrease in agency costs cause this increase in productivity. A study of the PE buyouts in Sweden conducted by Bergström et al. (2007) also finds that companies experience increases in operating performance post-buyout.

Overall, there is a considerable amount of research that suggests that PE ownership has a positive impact on operating performance. Cumming et al. (2007), conducting a review of literature from 1986 to 2006 on the performance of buyouts, conclude the section on accounting performance by stating that buyout performance is superior to the risk adjusted performance of industry peers. They attribute this to governance mechanisms related to active PE investors and the commitment to

service debt as advocated by the free cash flow hypothesis and positive incentive effects linked to managerial ownership. However, they also note that accounting measures have been shown to be subject to earnings manipulation, which increases the difficulty of measuring operating performance.

Supporting Cumming et al. (2007), Kaplan and Strömberg (2009) also conclude that research on buyouts and operating performance is largely positive. However, studies on US buyouts from around the 1990s and forward find only modest increases in operating and cash flows margins compared to those before 1990 and in Europe. Furthermore, they introduce two arguments why the research should be interpreted cautiously. First of all, some studies, especially those conducted in the US are subject to data restrictions, which may introduce a selection bias. In cases when private companies do not publish accounting reports, studies are based on buyouts which rely on public debt or subsequently go public, which may not be representative for the entire population. Second, one finding from the academic literature is that capital expenditure often declines post-buyout, which may suggest that current cash flows are increased at the expense of future ones. Kaplan and Strömberg (2009) suggest testing this concern by investigating the operating performance of PE-backed companies after an IPO.

These findings from literature on operating performance of buyouts have several implications for this thesis. First of all, a clear connection between increases in operating performance and PE ownership is established across time and geographies (however, only in developed economies), albeit these results are not unambiguous and should be interpreted with caution. Second, there is a general consensus that agency cost theories are meaningful in explaining changes in operating performance, but researchers also find support for other theories. Third, the studies reach different conclusions regarding the timeframe in which operating performance is impacted by PE ownership. Some find that this increase in productivity persists, whereas others claim that it declines with time. This discovery makes the time following an IPO an interesting period from a theoretical point of view.

3.2 Performance post-IPO

Jain and Kini (1994) are among the first to study operating performance rather than post-issue stock price performance of IPOs. They examine a sample of 682 US IPOs between 1976 and 1988 and

find that IPOs exhibit a decline in post-issue operating performance relative to their pre-IPO levels, both before and after taking industry effects into account. By examining the growth in sales and capital expenditures of the firms going public, which exceeds those of other companies within the same industries, it is shown that the decline in operating performance cannot be attributed to the absence of sales growth or a lack of investment. Instead, they provide three possible explanations for the decline in operating performance, namely, increased agency costs, window-dressing, and market timing. These explanations will be explored further in detail later in this section.

Mikkelson et al. (1997) similarly identify a decline in operating returns for 283 US IPOs in the years 1980-1983. They examine a post-IPO period of ten years, but only find a significant decrease in the first year after going public. They do not find a relationship between the changes in operating performance and ownership by management, block holdings or board composition. Rather, they establish a link between operating performance and secondary sales, that is, the situation in which existing shareholders sell their shares in the IPO. Secondary sales are likely to be timed to follow periods of high performance and precede a decline in performance (Mikkelson et al. 1997), the so-called window of opportunity. Moreover, they find that size and age impacts operating performance post-IPO. The explanation for this is that small and young companies typically report relatively low performance measures around the offering, which will then improve once they reach a more mature state. This finding supports the choice of this thesis to draw a distinction between VC and PE buyouts.

The evidence from studies outside the US point in the same direction as the two studies outlined above. Khurshed et al. (2003) investigate a sample of 621 UK IPOs between 1995 and 1999. Their study is designed to investigate IPOs on the Official List and the Alternative Investment Market (AIM) separately. Companies that list on the AIM are characterized by being younger, smaller and less profitable than those the list of the Official List. In line with the argument put forward by Mikkelson et al. (1997), companies that list on the AIM perform better and show no sign of underperformance. For the companies that list on the Official List, though, performance deteriorates after going public.

Cai and Wei (1997) and Kutsuna et al. (2002) both analyze the operating performance of Japanese IPOs. Interestingly, their findings differ widely. Cai and Wei (1997) find a significant post-issue

decline in operating performance relative to industry peers. Furthermore, they conclude that this decline cannot be attributed to changes in managerial ownership. Instead, they find support for the market timing theory. Their study is based on 180 IPOs between 1971 and 1992. Kutsuna et al. (2002) find mixed results regarding operating performance. The 247 IPOs undertaken in 1995-1996 exhibit a decrease in sales, normal profits, and an increase in net profits. Moreover, in sharp contrast with Cai and Wei (1997) they show that changes in managerial ownership (in addition to size and age) is an important factor in explaining the variance in operating performance.

Based on the synthesis of literature and as proposed by Jain and Kini (1994) the most common explanations for the post-IPO decline in performance are summarized below.

3.2.1 Agency Costs

The link between a decline in operating performance and agency costs is relatively clear and follows directly from the description of agency problems as described by Jensen and Meckling (1976). When a firm makes the move from private to public ownership is more dispersed and management owns a smaller fraction. This introduces increased agency costs through the nonalignment of incentives and increased costs of monitoring. For a more detailed explanation, refer to the theory paragraph of this thesis.

3.2.2 Window Dressing

When a firm goes public possible, investors without inside access to information rely heavily on the IPO prospectus and other material published by the firm. This information asymmetry in combination with the aspiration to secure as high an offer price as possible creates an incentive for the firm to follow aggressive accounting policies (Khurshed et al. 2003). There are several ways in which firms can manipulate their accounting disclosures to make them look more favorable. For instance, they can defer expenses (such as R&D) to later periods, capitalize costs rather than expense them, or change depreciation procedures to expense costs over longer periods. This has the effect of overstating pre-IPO performance, which, in turn, will underestimate post-IPO performance.

3.2.3 Market Timing

The market timing, or window of opportunity as it is also called, explanation also relies on the information asymmetry between the firm and its possible investors. When firms take advantage of the window of opportunity it means that they initiate an IPO when conditions are favorable which will lead to optimistic valuations. This might be the case, for example, if the firm is operating in an industry that is booming or if, for any other reason, the firm is currently performing well. Overvaluations are often the results of investors not recognizing that growth trends have a tendency to revert to the mean.

To conclude, there is, to a large extent, a tendency for firms to underperform operationally post-IPO. Some studies favor an explanation based on agency cost theory, while others find support for the market timing hypothesis. Another possible explanation relies on window dressing. However, none of the reviewed articles test this explicitly.

3.3 Performance of PE-backed IPOs

DeGeorge and Zeckhauser (1993) study 63 US RLBOs that went public between 1983 and 1987. They exhibit a radical decline in performance in the first year following the offering. On average, operating income decreases by about three percentage points, which is ten points below the change in their own previous year and four points below comparable firms. Moreover, they find strong evidence to suggest that IPOs coincide with a peak in the performance of RLBOs, as their operating income grew by approximately seven points in the pre-offering year. That is, RLBOs outperform both the industry benchmark and continuing LBOs in the pre-offering year. DeGeorge and Zeckhauser (1993) find that the net effect of the pre-offering increase in performance and post-offering decline is positive meaning that RLBOs outperform the norm. They largely rely on the market timing hypothesis in explaining this pattern, but they also offer explanations based on behavioral and debt overhang effects. Furthermore, they conclude that the market expects this underperformance.

In a similar study, Holthausen and Larcker (1996) examine the accounting and stock price performance of IPOs of 90 US RLBOs between 1983 and 1988. The aim of their research is to determine if a connection between changes in operating performance and changes in organizational incentives following an IPO exists. They identify weak evidence of a decline in performance in the

four years after going public, but that the firms outperform the industry as a whole. An increase in capital expenditures is also identified. The central finding, though, is that operating performance declines with decreases in the concentration of ownership by management and that it is unrelated to changes in leverage.

As mentioned in the previous section, one explanation for the initial decline in operating performance may be window dressing. Chou et al. (2006) investigates the prevalence of earnings management in RLBOs based on a sample of 247 US RLBOs between 1981 and 1999. They find support for the window dressing theory and find a distinct negative relationship between pre-offering earnings management and post-offering stock returns.

Using a sample of 594 US RLBOs between 1981 and 2006, Cao (2011) investigates the timing of RLBOs and how this impacts firm performance post-IPO. He does not find an initial decline in operating performance post-IPO, which contrasts with the findings of earlier studies (e.g. DeGeorge and Zeckhauser (1993) and Holthausen and Larcker (1996)). This divergence is ascribed to the fact that the earlier studies were based on relatively small samples of IPOs from the 1980s. One of the main findings is that PE funds tend to take LBOs public, when they are facing favorable market conditions. This may lead to companies being taken public prematurely, that is, before the restructuring process has been concluded. Therefore, it is shown that a shorter holding period is associated with higher decreases in operating performance. This is especially true for the so-called quick flips (LBOs with a duration of less than one or two years depending on the definition), which exhibit worse operating performance and greater probability of bankruptcy. As the 1980s were, to a greater extent than the rest of the analysis period, characterized by quick flips, the decline in operating performance identified by DeGeorge and Zeckhauser (1993) and Holthausen and Larcker (1996) is to be expected.

Jain and Kini (1995) examine a sample of 136 US VC-backed IPOs in the period 1976-1988 and compare them to a matched sample of non-VC-backed IPOs. Even though the study is based on VC, which has previously been argued to differ widely from the buyout transactions investigated in this thesis, their findings are applicable, because the mechanisms they examine are also prevalent in PE buyouts. They find evidence to support that VC-backed IPOs outperform non-VC-backed IPOs. This finding also holds after controlling for other factors such as IPO offer size, management

ownership retention, changes in discretionary expenditures etc. Thus, the superior performance is to a large extent attributed to monitoring activities of VCs. Moreover, they set out to measure if the market recognizes this potential for improved operating performance. To investigate this, they test the claim put forward by PE funds that they help firms go public at higher price/earnings (P/E) ratios and that this is an indicator of future earnings potential. They find that market-to-book (M/B) and P/E ratios are higher at the time of the offering for VC-backed IPOs, but that this difference diminishes over time. This indicates that investors acknowledge the added value of VC monitoring at the time of the IPO and that as the firm grows and capital market monitoring takes over the significance of this monitoring diminishes.

Based on the above synthesis of existing literature, there is a tendency for PE-backed IPOs to exhibit superior operating performance compared to their industry peers. Moreover, a number of interesting organizational aspects that might impact operating performance are examined. These are among others: the holding period, leverage, and concentration of ownership by management. The holding period, which is found to be negatively correlated with operating performance (Cao 2011) and leverage, which is found not be related to operating performance (Holthausen and Larcker 1996) will be further investigated in the analysis. Furthermore, the examination of market expectations shows that investors take the value-add potential into consideration, when pricing stocks of PE-backed companies.

4 Methodology

The aim of the methodology section is to review the methodological foundation of the thesis. Moreover, the methodological choices and their consequences will be outlined. First of all, a section on the method and philosophy of science, upon which this thesis is built, is presented. Then, a paragraph containing hypotheses and sub questions that give concrete expression to the overall research question follows. Next, a description of how the sample and the benchmark group, respectively, are selected is provided. Subsequently, a description of the data and considerations regarding its validity and reliability follows before methodological reflections concerning the performance measures and statistical models and their assumptions are provided.

4.1 Theory of Science

This study makes use of hypothetic-deduction as its principal scientific method. As implied by the name, hypothetic-deduction is a form a deduction. Deduction is a method, which draws conclusions solely based on logical arguments. The simplest of these logic arguments is *modus ponens*, which can be stated as:

If x, then y
x
Therefore: y (Klausen 2005)

For instance, if the temperature of the water is 100°C, it boils. The water is 100°C. Therefore, it boils. The critical feature of deduction is that, if the precondition (e.g. that water boils at 100°C) is correct, the conclusion (that the water boils) must necessarily hold true. These logical arguments are assumed to be universal and intuitive. The advantage of making these types of inferences is that one can combine an intuitive precondition and an intuitive logical argument to reach a conclusion that is not necessarily obvious. Moreover, this type of argumentation is clear and precise, which has made deductive reasoning somewhat of a scientific ideal. However, in practice, it has turned out that the number of conclusions that can be drawn by applying this type of reasoning, especially outside the field of mathematics, is limited. Hypothetic-deduction circumvents this disadvantage by applying other and less strict arguments. Hypothetic-deduction tests a theory by drawing certain conclusions and outlining the empirical implications that this will have. If these implications are, indeed, observable, this speaks in favor of the theory. If that is not the case, the theory cannot be true. In the next section 4.2 Research Sub Questions and hypotheses, a number of hypotheses will be formulated. These are based on the theories and empirical findings outlined in the literature review. In the remainder of the study, an analysis will be carried out to answer the sub questions. Based on these findings, it will be concluded whether this study finds evidence in favor of or against the theories it aims to test. Thus, this study clearly follows the recipe for a study based on hypothetic-deduction.

As can be read from the above, this type of study is founded on the idea that knowledge should be derived from observable facts. This fundamental approach to science is in line with the ideas of the logical positivists. Logical positivism is a school of thought, which holds that in order for a claim to

be considered meaningful it has to be possible to test it empirically (own translation from Danish) (Klausen 2005). The logical positivists largely agree with the empiricists, who claim that scientific knowledge should stem from ideas implanted in the mind through sense perception (Chalmers 2013). However, rather than focusing on sensuous experiences, the logical positivists take a more linguistic approach, emphasizing the logical form of the relationship between scientific knowledge and facts. Thus, the logical positivists modify the ideas of the empiricists by replacing the psychological aspects with logic and definitions (Johansson et al. 1976). The predominant goal of the movement was to create a *unity science*. That is, a scientific movement that enables the distinction between scientific and unscientific knowledge (Johansson et al. 1976).

Central to the idea of logical positivism, is the ability to determine whether a statement is true or false. This distinction is made feasible by the so-called *principle of verification*. Before diving into the principle of verification, it is necessary to distinguish between analytical and synthetic statements. Analytical statements are common within mathematics and logics. For instance, modus ponens is an analytical statement, which does not need to be verified, because it is collectively accepted as true. Synthetic statements, on the other hand, are subject to the principle of verification. These statements must be verified using pure empirical observations, which are free of theoretical assumptions, using logical statements. Hence, the following only pertains to synthetic statements.

The principle of verification has been expressed in a number of ways. Overall, and without going into detail with the exact wording, there are two versions. The first one states that for a statement to be meaningful and scientific it must be conclusively determined whether it is true (or false). In the second version, it is sufficient to make probable that the statement is true (or false). Both of these versions are associated with significant problems. Proponents of the first version of the principle were faced with the *problem of induction*, which implies that it is impossible to conclusively state whether a statement is true or false based on a finite number of observations (Klausen 2005). This is due to the possible exceptions to the rule, which have not yet been observed. The second, more lenient, version, however, has been found to be too broad. According to this version, all statements based on some kind of empirical foundation are accepted as scientific. It is also in conflict with the desire to create a unity science. That is, suddenly the principle of verification does not determine whether a statement is scientific or not, as was the purpose of the movement, but to what degree it is

scientific. This obstacle, along with other challenges, has meant that no universally agreed-upon version of the verification principle exists.

In spite of the fact that the principle of verification, which is the fundamental principle of the movement, has been disregarded as the defining criterion of whether a statement is meaningful and scientific, it does touch upon a vital aspect of scientific methodology (Klausen 2005). Ceteris paribus, a theory, which is built upon and can be tested using empirical observations, is more scientific than a theory, which cannot. Clearly, this thesis agrees with this (modified) approach to science suggested by the logical positivists, as an empirical analysis will be conducted to tests whether the synthetic statement that PE-backed IPOs perform better than non-backed IPOs is true or false. Moreover, in line with positivistic ideas, the causal explanation for why this is or is not the case will be based on a deductive approach. That is, deductive reasoning will be applied to form hypotheses that when answered will form the basis for confirming or denying the statement.

4.2 Research Sub Questions and Hypotheses

Before defining the specific sub questions to be answered, it is useful to keep in mind the overall research question:

Is operating performance of PE-backed IPOs in emerging markets different from non-backed IPOs and can the difference be attributed to PE characteristics?

The four questions below have been chosen to guide the analysis. The questions will be further elaborated on later in this paragraph.

1. Did PE-backed and non-backed IPOs in emerging markets experience a decline in operating performance as measured by *return on assets*, *profit margin*, and *cash flow-to-assets*? And is the development in operating performance different for the two types of IPOs?
2. Do changes in the following accounting items; *revenues, cost of goods sold (COGS), current ratio, and capital expenditure (Capex)* explain the variance in operating performance for the two types of IPOs?
3. Is there a difference between market expectations for PE-backed and non-backed IPOs as measured by M/B and P/E ratio?

4. Is it possible to explain the variance in operating performance for PE-backed IPOs on the basis of the PE fund's holding period, retained share and the change in leverage?

Sub question 1: The first sub question seeks to answer the first part of the research question, i.e. whether operational performance differs post-IPO between PE-backed and non-backed IPOs. This sub question is based on two hypotheses:

H_1: The operating performances of both samples decline post-IPO
H_2: The operating performance of the PE-backed IPOs declines **less** than that of non-backed IPOs

As accounted for in the literature review, it is often the case that companies experience a decline in operating performance following an IPO. This has been shown by e.g. Jain and Kini (1994) and Mikkelson et al. (1997). There are several possible explanations for this, which are not mutually exclusive. For instance, changes in operating performance may result from changes in the alignment of incentives of owners and managers, the cost of monitoring, or free cash flow, that is, increased agency costs. It might also be the case that the owners are taking advantage of a window of opportunity when deciding to take its portfolio company public. Finally, the decline in operating performance might be the result of pre-offering earnings window dressing.

The second hypothesis is based on the findings from LBOs post-buyout, which indicate, although not unambiguously, that PE ownership has a positive impact on operating performance. If this is the case and companies owned by PE funds operate more effectively and have achieved a higher utilization of resources, it seems fair to assume that these companies will perform better than comparable non-PE-backed companies.

Sub question 2: The second sub question is an extension of sub question 1 as it intends to investigate whether the changes in operating performance can be explained by other accounting items. Jain and Kini (1994 and 1995) apply the same approach. For instance, Jain and Kini (1994) are able to rule out a lack of sales growth and capital expenditure as the reason for the lower performance of IPOs than comparable firms. This, in turn, increases the likelihood that the reason for this difference is related to the organizational changes following an IPO. Moreover, by conducting an OLS regression analysis this thesis seeks to answers how changes in the selected

accounting items affect operating performance, and if the pattern revealed by this analysis is different for PE-backed and non-backed IPOs.

Sub question 3: This question is inspired by the approach taken by Jain and Kini (1995). Although their study is on VC transactions, it is based on the assumption that if the market recognizes the value-add potential of VC monitoring and, thus, have higher expectations of future earnings performance, this will surface in the form of higher M/B and P/E ratios. This assumption also applies to PE buyouts, as it is merely an expression that investors are willing to pay more for these companies as compared to similar companies taking into account their asset base and the earnings generated. If the analysis fails to reject H_2, that is, finds evidence in favor or superior operating performance of PE-backed IPOs relative to non-backed IPO, and the efficient market hypothesis holds, which, admittedly, is a strong, albeit commonly applied, assumption, this thesis expects to observe the following:

H_3: The market expectations are higher for PE-backed IPOs than for non-backed IPOs

Sub question 4: The final question is designed to explicitly answer the second part of the overall research question, as it looks into how different distinguishing features of PE aid in explaining differences in operating performance. This sub question differs from the other questions as it focuses solely on the sample of PE-backed IPOs. From the literature numerous interesting characteristics have been identified. These include ownership share held by PE sponsor, ownership share held by management, leverage, indications of earnings management, and duration of PE involvement among others. When choosing which aspects to investigate the emphasis of this thesis has been placed on relevance from a theoretical point of view but also on feasibility, which has to some extent been restricted by the availability and reliability of data. Based on this selection, three hypotheses have been formulated:

H_4: The operating performance of PE-backed IPOs is positively correlated with the PE sponsor's holding period
H_5: The operating performance of PE-backed IPOs is positively correlated with the post-offering share retained by the PE sponsor
H_6: The operating performance of PE-backed IPOs is positively correlated with changes in leverage

This thesis expects to find a positive relationship between operating performance and the duration of the buyout, that is, the time from the PE fund enters the investment until the company is taken public. This is consistent with Cao (2011), who uses LBO duration as a proxy for restructuring efforts. Cao (2011) confirms that shorter holding periods are associated with decreases in operating performance. This is especially true for quick flips. Cao and Lerner (2006) confirm this for quick flips, however, their findings are not statistically significant.

The assumption that a higher retained share leads to higher operating performance stems from agency cost theory, as explained previously. That is, if PE investors remain invested after the portfolio company goes public, they will be able to impact management behavior favorably. Cao (2011) applies the same argument and states that PE sponsor presence post-IPO is important because it suggests that the sponsor is committed to completing more of the restructuring process, which will lead to improved operational efficiency. Moreover, this presumed relationship could also be explained from a signaling point of view. Hence, if PE sponsors remain invested after the IPO it sends a signal to the market about future prospects that is credible because it would be costly for the PE fund if this representation were not true (Jain and Kini 1994). The relationship between operating performance and retained share will be based on the level of ownership post-IPO. Examining the relationship between performance and the change in ownership by PE investors might also yield interesting results. The data on pre-offering ownership is not available, though. Moreover, Mikkelson et al. (2007) argue that it is sound practice to focus on the level rather the change, as companies could experience similar changes in ownership but quite different levels.

As predicted by the free cash flow hypothesis, leverage is expected to have a disciplinary effect on management behavior, which will limit their ability to invest in unprofitable projects. It is often found that companies use the proceeds from an IPO to bring down the level of debt. Thus, it is expected that operating performance will decline post-IPO due to the decrease in leverage. Holthausen and Larcker (1996) tested this hypothesis on RLBOs but found no relationship between leverage and operating performance.

4.3 Sample

This thesis will focus on IPOs conducted in the period 2008-2012. It has been decided to select the sample from IPOs in the years 2008-2012 to capture the recent increase in IPO activity in emerging markets. A period of analysis of five years is far from uncommon and this approach is used by e.g. Degeorge and Zeckhauser (1993) and Khurshed et al. (2003). The five-year analysis period also allows for a reasonable sample size. 2012 is the last year included the period of analysis. This is done to allow for a three-year post-IPO analysis period. This is consistent with Khurshed et al. (2003), who also define the long run as three years for the purpose of analyzing long-run operating performance of IPOs.

To identify the sample, a data set including all global IPOs from the financial database Dealogic is obtained. Between 2008 and 2012 5,189 IPOs took place. Out of these IPOs roughly half (2,559) took place in emerging markets. The distinction between developed and emerging markets is based on the classification provided by the International Monetary Fund (IMF). This classification splits the world in two overall groups; advanced economies and emerging and developing economies. This dynamic classification is primarily intended as a tool, which enables meaningful analyses, rather than as a statistical exercise based on strict economic criteria (International Monetary Fund 2008). The fact that this classification includes developing as well as emerging markets is not a challenge in practice, as majority of the sample turns out to be made up of Chinese and Indian IPOs. Thus, a discussion of distinguishing features between emerging and developing economies is not necessary. In addition, IPOs of financial companies are removed from the sample as described in section 1.2 Delimitation.

Subsequently, the sample is split into non-backed and PE-backed IPOs. This distinction is already available in the Dealogic dataset. This provides a sample of 129 PE-backed IPOs of industrial companies in the period 2008-2012. A closer look at the sample reveals that data such as the financial sponsor's entry date and the retained share post-IPO is not reported for some of the observations. These observations are removed from the sample. Moreover, the next step of the data gathering process is to identify a matched-pair sample. The criteria for this analysis are discussed in the next section. After the benchmark group has been identified, it becomes clear that it is not possible to find a comparable IPO for some of the PE-backed IPOs. This leaves a final sample of 82 PE-backed IPOs. The search strategy is summarized in table 4.1.

Table 4.1 – Selection process for PE-backed IPOs

Number of IPOs globally from 2008-2012	5,189
- IPOs in developed markets	-2,630
- IPOs of financial companies	-316
Industrial IPOs in emerging and developing markets	2,243
- Non-backed IPOs	-2,114
PE-backed IPOs	129
- Observations deselected due to missing data	-34
- Observations deselected due to a missing benchmark	-13
Final sample	**82**

Source: Own creation

4.4 Benchmark

To focus as clearly as possible on the question of whether PE ownership improves operating performance, a matched-pairs methodology is employed. This approach follows e.g. Megginson and Weiss (1991), who investigate the role of VC in IPOs. In their study the matched sample is selected based on industry and the size of the offering. For this study it has been chosen to focus on the year of the IPO, nationality, and industry. The significance of these criteria is outlined below.

As previously mentioned, the analysis period 2008-2012 is characterized by turbulence in international financial markets. Thus, it is highly relevant to account for this, when identifying the benchmark sample. Ideally, one should find a benchmark IPO that went public as close as possible to the date of the PE-backed observation, however, for practical reasons, this thesis takes the stance that IPOs within +/- one year from the year in which the PE-backed IPO was undertaken is sufficient.

A quick look at other studies within the field of PE and operating performance, as accounted for in the literature review, reveals that majority of the research has been based on a single market or stock exchange. However, the cross-country nature of this study raises the need for a discussion of the relevance of nationality. For this analysis, the country, in which the company offering its stock to the public is based, is considered to be a relevant criterion. This is based on the assessment that performance is impacted by whether the company going public operates in e.g. China or India. That is, markets must to some degree be segmented. One possible way of assessing this is by

investigating the extent to which financial markets are integrated. One of the arguments for investing abroad, e.g. in emerging markets, is that it offers diversification benefits. For this to hold true, it must be that case that e.g. shocks that impact returns in the developed economies do not impact emerging economies. To put it in statistical terms, the correlation between emerging market countries and the rest of the world should be relatively low. Empirically, this is supported by Bekaert and Harvey (1995), who claim that this is one of the distinguishing features of emerging markets. This finding is supported by Harvey (1995), who also discovers low correlation between emerging markets' and developed markets' equity markets. Moreover, he finds that emerging market returns are influenced by local rather than global information variables. In addition, macro environmental factors, in particular changes in the regulatory and economic environment, impact the conditions and the opportunities offered to firms. Therefore, finding a non-backed IPO in the same country as the PE-backed IPO is considered high-priority in establishing a benchmark sample. A possible shortcoming of this approach is that is neglects to take into account the fact that a company might not solely have operations in the country where it is based. Hence, the operating performance might be impacted by market developments and fluctuations in other countries.

Finally, the matched-pair sample is chosen on the basis of industry. As explained by Megginson and Weiss (1991) IPO activity is often clustered within industries. Thus, this is an important condition. The match based on industries is performed on the basis of the industry classification included in the Dealogic dataset. This includes two levels of industry classification; general and specific industry. General industries are e.g. "food & beverage" and "healthcare", whereas specific industries are e.g. "food & beverage – canned foods" and "health care – drugs/pharmaceuticals". The benchmark has, in the first instance, been based on specific industries. If this was not possible, the match has been based on general industries.

If there were several possible matches after applying these criteria, the selection was based on the offering size as measured in EUR. This is done in order to find a match as close as possible to the size of the sample company. Moreover, the size of the offering is used as a proxy for the company's stage in the product life cycle. This is necessary because the PE-backed sample consists of mature companies, but the non-backed sample can consist of companies in all phases of development.

It is recognized that this selection process is to a large extent based on subjective criteria. A possible solution to this would be to follow the approach applied by Holthausen and Larcker (1996). They compare RLBOs to selected industry peers including companies that are not listed. The advantage of this method is that it is not subject to the same subjective selection criteria. On the other hand, it does not take into account the particular phenomena that have been shown to be common when firms make the transition from private to public such as window dressing and window timing. That is, whilst comparing to a broader sample of industry peers would solve certain issues, it would not take into account the pressure involved in an IPO. Hence, it would introduce another bias to the analysis.

4.5 Data

The overarching requirement for data is that of validity. Validity states the degree of certainty with which the collected data describes the matter it is intended to treat (own translation from Danish) (Jacobsen et al. 1999). There are two types of validity; logical and empirical. Logical validity is in place, when the data enables an analysis, which answers the overall research question. Empirical validity means that the results obtained via one data collection method are in line with those that would be obtained through another.

A lack of logical validity is usually the result of one of the following three incidents 1) the collected data only covers part of the research question, 2) the collected data covers more than the research question i.e. a part of the data is not relevant for the research question and/or 3) the collected data covers something else than the research question (own translation from Danish) (Jacobsen et al. 1999). The most critical possibility for this thesis is the first one, as the access to high-quality data is somewhat restricted. This affects mainly the second part of the research question, which aims to test which distinguishing features of PE impact operating performance the most. Due to limitations on available data, certain aspects, such as the ownership stake held by management, are not explored. It should be noted, though, that the list of PE features that could be taken into consideration is extensive and examining all of these characteristics is, under all circumstances, outside the scope of this thesis. That is, the risk of only covering part of the research question is inherent given the high-level formulation of the research question and the difficulty in gaining access to data. The risk of collecting data that compromises the logical validity by covering more than what the research question intends to answer or by gathering data that is not relevant for the

field of study is eliminated by explicitly stating the delimitations of the research question and by basing all hypotheses and, thus, data collection on theoretically or empirically established connections.

Testing the same phenomenon using a variety of data sources can ensure empirically valid results. For example, when answering sub question 1, this type of empirical validation is performed by applying three different performance measures rather than just one. However, collecting multiple sources of data to illustrate the same thing is not always feasible. In those cases, this thesis will rely on existing literature to confirm that the results are in line with the patterns observed by others to the extent that it is possible.

Reliability is a necessary, but not sufficient, condition for validity. Reliability describes the degree to which the collected data measures what it is intended to measure (own translation from Danish) (Jacobsen et al. 1999). It should be noted that this definition differs from the definition of validity, as it does not touch upon whether the data is relevant for the research question but merely that it is not impacted by coincidences or random sources of error. The data used for this thesis is mainly collected from the Orbis and Dealogic databases. This increases the reliability of the data, as there is very little manual manipulation of the data. However, there is still a risk that the data was mistyped, when it was entered into the database, or is in some other way subject to error. One way of controlling whether this is the case is by triangulating the data, i.e. extracting the same data from other sources and comparing the two. For instance, this could be done by comparing data from IPO prospectuses or searching for newspaper articles on the IPOs. As will be explained later, it has not been possible to perform this comparison, because the prospectuses are not all available in English. Moreover, a random sample of newspaper articles of the IPOs has been drawn from the Factiva database. Although, this confirmed the basics of the transaction such as the name of the company, country, and time of the IPO, the data was not detailed enough, i.e. most of the articles did not mention anything on PE fund ownership, holding period etc. In conclusion, the analysis is based on data, which is assumed to be reliable, however, a thorough check of the reliability of the data is not viable and, therefore, has not been carried out.

Jacobsen et al. (1999) establish three rules for gathering quantitative data; 1) the quantified object must have a commonly agreed upon and clearly defined characteristic, 2) the quantified

characteristic must be significant by itself and does not require being put into a larger context to establish its meaning, and 3) the gathered data must be relevant (own translation from Danish).

The first rule is fulfilled as the accounting numbers and ratios analyzed are defined by the International Financial Reporting Standards (IFRS). That is, the definition of the data applied in this study is not only shared and clear, it is also formalized. Moreover, in the case that a term can have more than one meaning, it will be specified. All the countries included in the sample have accepted the IFRS or converged their national accounting standards to IFRS conventions (IFRS 2017). A deeper investigation of how national accounting standards diverge from IFRS is outside the scope of this thesis. Furthermore, the expected impact from such an investigation is assumed to be minor. Another factor, which might impact the quality of the accounting numbers applied, is that of exchange rates. All accounting numbers are extracted from the databases in EUR. That means that a conversion from the local currency has been performed. Thus, currency fluctuations might impact the measures such as revenue growth. It is recognized that this might harm the quality of the data, but is not treated in depth in this thesis.

The second rule applies to concepts that have different meanings depending on which situation it refers to (Jacobsen et al. 1999). In spite of the objectivity and clear-cut definition of the concepts, this rule is relevant for the analysis conducted in this thesis. That is, even though there is no doubt about what e.g. ROA measures that does not mean that the interpretation of the data is straightforward. For instance, economic cycles, i.e. the time when a certain ROA was achieved, or the industry can greatly impact ROA. When this is the case, it is important to account for the context in which the data was collected (Jacobsen et al. 1999). This is done in the sections 4.3 Sample and 4.4 Benchmark of this paragraph.

The requirement of relevance is based on the idea that the collected data should form the basis for understanding or explaining a certain matter or should serve as a foundation upon which to act. That is, a strictly mathematical relation between two variables is irrelevant, if it is not the consequence of a causal relation. However, a study, which only analyzes what is already thoroughly researched and leaves no room for an element of surprise, will not contribute to the creation of new knowledge. Thus, the criterion of relevance entails striking the right balance between gathering data that will clarify important, theoretically based connections and leaving room for discovering unanticipated

new quantitative connections, which might lead to the uncovering of new causal relationships (Jacobsen et al. 1999). This thesis adheres to this requirement by forming a solid theoretical foundation based on existing literature from developed economies on the subject of IPOs in general and value creation post-buyout and post-IPO of PE transactions, but tests whether these relationships also exist in emerging economies. By reviewing literature on the subject, a causal relationship between the variables is established, but applying this to emerging markets allows for the creation of new knowledge.

4.6 Methodology

This paragraph presents insights on two key aspects of the research design. The first section discusses the performance measures, how they differ and the advantages of using several performance measures. Next, considerations regarding how to measure changes in performance etc. are presented. The second section deals with concerns relating to the timeline and other aspects regarding timing. Finally, a section on the data on PE characteristics, which is necessary for the fourth sub question, concludes the methodology paragraph.

4.6.1 Performance Measures and Measurement

As mentioned in sub question 1, the analysis of operating performance will rely on three different performance measures, namely, ROA, profit margin, and cash flow to assets (henceforth, also referred to as CF-ROA). Below these measures and their advantages and disadvantages are elaborated on.

ROA is calculated as net income divided by assets and is a measure of how efficiently a firm utilizes its assets, i.e. its ability to generate profits relative to its asset base. This ratio is commonly applied in the literature as seen in e.g. Cao (2011) and Mikkelson et al. (2007). In spite of this, there are a few caveats, which should be noted when applying ROA as a measure of operating performance. First of all, ROA is calculated based on total assets. However, total assets include both financial and operating assets, which is slightly misleading because only the operating assets are the foundation for generating profits. The performance measure return on invested capital (ROIC) takes this into account and is a more stringent measure of actual operating performance. Calculating ROIC requires calculating net operating profits after tax and invested capital, though, which is based on an entirely restated income statement and balance sheet. Thus, for practical

reasons and because it is common practice in existing research on the subject to apply ROA, ROIC will not be computed in this thesis. Furthermore, net income is an accrual-based accounting measure, which implies that it is sensitive to manipulation, as management has some discretionary power over the accounting practices which determine what is and is not included as income.

Profit margin is calculated as earnings before interest and taxes divided by revenue. Thus, it is an expression of how big a fraction of sales is converted to profit and indicates the level of profitability of the operations. Unlike ROA, the profit margin does reveal how efficiently the company utilizes its resources and, thus, the distinction between total assets and invested capital is superfluous.

The final ratio included in the analysis is the CF-ROA. This measure is equivalent to ROA in its interpretation, but is based on cash flow instead of net profit. This measure is chosen to complement the two other measures because, in comparison with ROA and profit margin, it is less vulnerable to earnings management. It has previously been documented that earnings management is relatively widespread in the period before going public. Hence, management's possible attempts to window dress the income statement will be reflected when applying ROA and will distort the assessment of operating performance. Therefore, it is important to compare these findings with those based on CF-ROA to control for the impact of earnings management.

Barber and Lyon (1996) test the empirical power of ROA, profit margin, CF-ROA and two additional performance measures. They find that CF-ROA is less powerful than the other measures. However, they also discovered that employing several performance measures result in more robust findings than only using one. That is in line with the above discussion of the advantages and disadvantages of the respective performance measures, which is intended to demonstrate how they complement each other in different ways.

When analyzing operating performance, this thesis will primarily focus on the change rather than the level. However, both will be reported. This emphasis is in line with e.g. Jain and Kini (1994) and DeGeorge and Zeckhauser (1993), who argue that change is more relevant than the level, when attempting to measure the improvement in the firm's operating performance in the first years post-IPO and that investors are typically interested in the change as well as the level (Jain and Kini 1994). When reporting both level and change in operating performance for groups of IPOs it will be

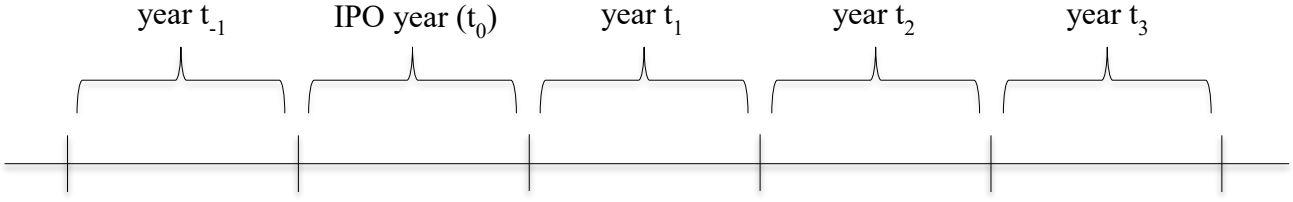
measured using the median, which is more robust than the average, when the sample contains extreme values.

The change in operating performance for each observation will be measured in percentage points. Another possible way of measuring the change is in percentage. This is avoided due to two reasons pointed out by Barber and Lyon (1996). First of all, if the performance measure is negative in one of the two years over which the percentage is being calculated, the result cannot be interpreted. This can be dealt with by leaving out the observations that experience losses. If this is the case, a bias is introduced to the study. Second, by calculating percentages rather than percentage point, it is implicitly assumed that the change in operating performance in proportional to the pre-IPO level of performance. The example given in Barber and Lyon (1996) clearly illustrates why this is problematic. Assuming that firms A and B both have pre-IPO assets of $1 million and operating income of $150,000 (ROA = 15%) and $40,000 (ROA = 4%), respectively. If operating performance improves by $0.01/$1 of assets post-IPO, that is equivalent to a $10,000 increase for both firms. Firm A now has an ROA of 16% and firm B has an ROA of 5%. If the change in operating performance is measured in percentage point both firms have experienced an increase of 1 point, however, in percentages performance has increase by 6.7% and 25%, respectively. Since both firms have generated the same increase in income on the basis of the same amount assets, this thesis takes the stance that reporting changes in operating performance in percentage points when the pairs are matched on size provides a more fair picture and a better basis for drawing inferences.

4.6.2 Timing and Time Horizon

Performance will be measured over a period of four years. The timeline in figure 4.1 illustrates the timing of this and shows that in order to conduct this analysis, data for the year before the IPO, the IPO year and three year post-IPO is needed.

Figure 4.1 – Timeline



Source: Own creation

The last full year before the year when the IPO took place, represented as year t_{-1} in figure 4.1, will serve as the reference for pre-IPO operating performance. The IPO year is named as year t_0, t_1 is the first full year following the IPO year etc. For all observations t_{-1} to t_3 will cover a five-year period between 2007 and 2015, depending on when in the period 2008-2012 the IPO was undertaken. By conducting this regrouping of the data, it is possible to compare observations even though they did not go public in the same year, i.e. it eliminates the time factor. The analysis will not take into account the accounting periods of the individual companies, that is, no calendarization will be performed.

The analysis will primarily focus on the change from year -1 to 1 and -1 to 3, however, the changes from year -1 to 0 and 2, respectively, will also be reported. The advantage of investigating both the short term and long term change is that PE ownership typically declines over time. Usually, the PE fund does not fully exit the portfolio company when the IPO is undertaken due to so-called lock-up provisions (Cao 2011). Thus, it is expected that if a relationship between PE ownership and operating performance is shown, the effect of this relationship will be amplified in the long run, as the PE fund, presumably, sells off more of its shares in the company.

4.6.3 Measures of PE Characteristics

For H_3, which hypothesizes a positive relationship between retained share and operating performance, it is necessary to gather data on the share that the PE fund preserves post-IPO. Fortunately, this is given in the Dealogic dataset. Usually this information would be collected from or at least crosschecked with the information regarding ownership given in the IPO prospectus. This approach is followed by e.g. Cao (2011) and Mikkelson et al. (2007). However, the Chinese prospectuses, which are available through the Thomson One Banker database, are only available in the original language. As the Chinese IPOs make up majority of the sample and ownership data is not available, this thesis will rely solely on the data from Dealogic to ensure consistency of the data for the entire sample.

Likewise, the holding period is given from the Dealogic database. That is, the date when the PE sponsor entered the portfolio company is provided. The holding period is then calculated as the number of days from the investment was made to the first trading day. This information could

ideally have been verified e.g. by searching for newspaper articles on when the fund acquired the company. However, as previously mentioned, it has not been possible to gather this type of detailed information on the funds' acquisitions.

The data on leverage suffers from the same problem as the ownership data, i.e. that the Chinese prospectuses are only available in Chinese. Ideally, the pre- and post-IPO information on leverage would be collected from the pro forma statement from the prospectus. Instead, this thesis will collect data on leverage from the balance sheets in the Orbis database. Naturally, that introduces the concern that the change in leverage is affected by other factors than the IPO. However, for the analysis it is assumed that the additional alterations in capital structure over the course of a year, when an IPO is undertaken, are minor.

4.7 Model and Statistic Tests

This thesis relies on two primary statistical frameworks. When comparing two samples, the assessment of whether they are significantly different will be based on the non-parametric Wilcoxon signed-rank test. In order to explain causal relationships between variables, the ordinary least squares (OLS) regression analysis will be applied. Below, the reasons for choosing these methods are given together with an outline of their main assumptions. On a practical note, it should be mentioned that data is collected and processed in Microsoft Excel and the statistical tests are performed in R Studio.

4.7.1 Wilcoxon Signed-Rank Test

The Wilcoxon signed-rank test (henceforth, Wilcoxon test) is a non-parametric test designed to compare matched samples. That is, it makes no assumption regarding the distribution from which the samples are drawn. The most widely applied statistical tests are t-tests, which assume a normal distribution. When the actual distribution is not known, it is, in principle, not possible to draw inferences from these tests. However, in practice, t-tests are quite robust to the assumption of normal distribution (Bendsen 2009). Still, this thesis relies on the Wilcoxon test, since it is designed specifically for non-parametric data and, thus, is considered more appropriate for the analysis than the t-tests.

The Wilcoxon test is based on a number of assumptions. First of all, since the test is intended to compare matched samples, the two samples have to be the same size and they have to be paired in way, which facilitates comparison. The test assumes that the paired values are independently drawn, or stated differently, that the differences of the pairs are independent and identically distributed (Taeger and Kuhnt 2014). The requirement that the selection of one observation does not impact whether another observation is included in the sample is central to concept of independence. In this case, observation refers to one pair, as the matched pairs are clearly dependent. That is, as the selection of pairs for the sample was not based on whether another pair was included, the sample is considered to be independent. The test also assumes that the distribution of the differences is continuous and symmetric around the median. As the accounting numbers and ratios analyzed are continuous, its differences will also take on continuous values. The assumption of a symmetric distribution is not investigated, but is assumed to be approximately true. Finally, the data has to be measured on an interval or ratio scale. This requirement is imposed to ensure that it is meaningful to speak of "greater than", "less than", and "equal to". Naturally, this assumption is also fulfilled, as the aim of performing the test is to compare the sizes of the variables.

4.7.2 Ordinary Least Squares Regression Analysis

To investigate causal relationships between variables, for instance to answer sub question 4, which seeks to determine how a number of PE characteristics affect operating performance post-IPO, regression analysis will be applied. This method is widely applied in academia in general and is applied in research on the operating performance of PE-backed IPOs by e.g. Cao (2011). The below multivariate regression model will be the point of departure in explaining the underlying assumption of the OLS regression:

$$Y = \hat{\alpha} + \hat{\beta}_1 X_1 + \hat{\beta}_2 X_2 + \epsilon$$

With Y being the dependent variable, X_1 and X_2 are the independent variables, ε is the residual, and $\hat{\alpha}$, $\hat{\beta}_1$, and $\hat{\beta}_2$ are the estimated coefficients of, respectively, the intercept and the slopes of the two independent variables. Of course, this is a generic two-factor model, which is only included to facilitate a clear description of the assumptions.

The nine most crucial assumptions can be divided in two categories; the assumptions, which prevent the introduction of biases to the model, and those, which ensure that p-values are calculated correctly and, thus, that inferences can be correctly drawn from the model. The first category of assumptions includes 1) relevant independent variables, 2) absence of endogeneity, 3) linearity, and 4) absence of influential observations. The second category entails 1) absence of severe multicollinearity, 2) absence of autocorrelation, 3) normal distribution of error terms, 4) homoscedasticity, and 5) the character of the dataset. Violations of both of these types of assumptions impair the validity of the model, but in different ways. Below the assumptions are outlined and emphasis will be placed on the assumptions that are considered most relevant for the analysis. By describing the assumptions, this thesis seeks to enable an identification of breaches of these and to enhance the ability to assess how these breaches impact the validity of the regression. That is, the aim is not to create a perfect model, as this is rare in regression analysis (Stubager and Sønderskov 2011). However, understanding how breaches of the underlying assumptions of the model affect the analysis is essential in interpreting the results in a meaningful way.

One of the big advantages of regression analysis is that it is possible to investigate whether two variables are correlated, while controlling for another variable, by including more than one independent variable. However, this introduces the risk that a variable, which aids in explaining a certain connection, is not included in the model. This is known as the omitted variable bias and can potentially undermine the validity of the size of or even the sign of the coefficient. For example, it might turn out that a certain correlation is spurious, that is, it is shown to be insignificant, when the relevant variable is included. Alternatively, it might be the case that a significant correlation is not discovered, because the relevant variable(s) was not introduced in the model. Unfortunately, there is no simple test that can be performed to identify omitted variables. The explanation for this is in part that identifying omitted variables is not merely a question of testing all variables and their explanatory power against the dependent variable. Rather, the identification of omitted variables should be based on theoretical discussion to account for their relevance. The analysis carried out in this study might be biased by omitted variables. This has already been touched upon, and is related to the availability of data. Hence, a number of interesting PE characteristics have been identified, but are not included in the analysis due to limited data. Therefore, findings from the regression analysis should be interpreted with caution.

The absence of endogeneity means that the independent variables (X_1 and X_2) in the given regression model must influence the dependent variable (Y) and not the other way around. The consequences of endogeneity and the way to deal with a breach of this assumption is to a large extent the same as for omitted variable bias. That is, endogeneity negatively impacts the validity of the model and means that the coefficient estimates are not reliable. Furthermore, the identification of endogeneity between independent and dependent variables should be based on theoretical discussion.

Next, OLS regression models assume a linear relationship between the dependent and independent variables. This study assumes, in line with previous studies that this linear relation exists and does not investigate this further.

The presence of influential observations in the model can bias the coefficient estimates. The coefficients are considered to be affected by influential observations, when they are highly affected by a small number of observations rather than the general tendency in the data. Often, influential observations are present, when the sample is small (Stubager and Sønderskov 2011), as is the case in this study. Influential observations are characterized by both high leverage and a large residual. An observation has high leverage, when it deviates significantly from the average on one or more independent variables. The size of the residual is measured as the difference between the value of the independent variable and the value predicted by the model, $Y - \hat{Y}$. Plotting the studentized deleted residuals can aid in identifying influential observations (refer to appendix D for an example). Roughly speaking, this is a measure which takes into account that the impact of influential observations on the model, when calculating the residual. As a rule of thumb, studentized residuals with a numeric value above 3 are considered problematic (Stubager and Sønderskov 2011). However, the problematic observations cannot just be removed from the sample. Instead, the model could be refit to check the impact on the conclusions exerted by the influential observation. If the conclusions still hold, this increases the validity of the model.

Multicollinearity refers to a situation in which two or more independent variables are strongly correlated. The consequence of the presence of multicollinearity is increased difficulty in distinguishing between the effects of the correlated variables, which means that significant variables might be represented as insignificant in the model. Multicollinearity can be identified by testing

whether the coefficient estimates change drastically, when variables are added to/removed from the model.

Autocorrelation occurs when the error terms of the observations are correlated. Autocorrelation can arise due to connections between the observations across time, serial autocorrelation, or across space, spatial autocorrelation. Serial autocorrelation appears in time series analysis, and therefore is not a concern in this thesis. Spatial autocorrelation often, however, occurs when the research is based on a number of different countries. This thesis assumes, as suggested by Stubager and Sønderskov (2011) that no spatial autocorrelation affects the regression analysis.

As suggested when arguing for the choice of the non-parametric Wilcoxon test for comparison of the samples, normal distribution is not a given. Still, normal distribution of the error terms is one of the assumptions of regression analysis. A violation of this assumption will not impact the size or sign of the coefficients, but will negatively affect the calculation of p-values and, thus, the ability to make inferences. The tests are quite robust to this assumption (Bendsen 2009), but still a histogram of standardized residuals (example in appendix D) and QQ plots could be created to check that the model fulfills this assumption, at least to some extent.

The model is said to be homoscedastic, if the variance of the error terms is the same for all values of the independent variable. If the model, on the other hand, is heteroscedastic, there is uncertainty regarding the calculation of p-values and, thus, assessing the significance of the coefficients is challenging. The models can be tested for homoscedasticity by plotting the residuals against the predicted value of the dependent variable. If this plot shows an even distribution around 0, the assumption of homoscedasticity is satisfied.

Finally, when drawing inferences the character of the dataset should always be kept in mind. There is no formal requirement regarding the size of the sample. It can be hard to obtain significant results, when the sample size is small, though. Another aspect relates directly to the way the results are interpreted. For example, the sample applied in this analysis, although selected to represent emerging economies, consist mainly of Chinese and Indian IPOs (see paragraph 5.1 Descriptive Statistics). Therefore, it would be inappropriate to claim that the findings of this thesis apply to all

emerging markets, when, in fact, it will mainly reflect the features of Chinese and Indian PE-backed IPOs.

5 Analysis

The analysis consists of three main components, namely, a comparison of the two samples and two sections on results. The first, seeks to answer the first part of the research question by investigating whether a difference between the operating performance of PE-backed and non-backed IPOs exist. The second paragraph focuses on the second part of the research question and aims to identify which factors impact operating performance of PE-backed IPOs. Both of the paragraphs will be concluded with sub conclusions.

5.1 Descriptive Statistics

Below, the sample of PE-backed and non-backed IPOs are described and compared. First, they are described in terms of some of the dimension based on which they were selected. This is used to assess the degree to which they are representative. Next, the two samples are explained in terms of selected accounting terms and ratios to gain a deeper understanding of if the two groups differ and, if that is the case, along which dimensions they diverge.

5.1.1 IPO Year, Country, and Industry

Table 5.1 below shows the distribution of the PE-backed sample and non-backed sample of IPOs, respectively, in the years between 2008 and 2012. As is evident from the table, 49 corresponding to roughly 60% of the PE-backed IPOs took place in 2010. The number of IPOs in the remaining four years is relatively stable with between 4 and 13 IPOs per year. The distribution of non-backed IPOs follows the same pattern. The reason that the numbers diverge slightly for the two samples, is that one of the search criteria for the benchmark group was that it occurred maximum one year before or after the PE-backed IPO.

Table 5.1 – Sample IPOs by year

Year	PE-backed IPOs	Non-backed IPOs
2008	7	5
	(8.5%)	*(6.1%)*
2009	13	15
	(15.9%)	*(18.3%)*
2010	49	48
	(59.8%)	*(58.5%)*
2011	9	11
	(11.0%)	*(13.4%)*
2012	4	3
	(4.9%)	*(3.7%)*
Total	82	82
	(100.0%)	*(100.0%)*

Source: Own creation based on data from Dealogic database

Table 5.2 shows the distribution of all industrial IPOs in emerging markets. This shows that the number of IPOs peaked in 2010 and 2011. However, the fraction of IPOs backed by PE was considerably larger in 2010 than in 2011, which explains the dominance of 2010 IPOs in the sample as shown in table 5.1. The number of PE-backed IPOs in table 5.1 and 5.2 differ, as some of the PE-backed IPOs in table 5.2 were removed because of missing data or a missing match in the non-backed group.

Table 5.2 – All industrial IPOs in **emerging economies** by year

Year	All	PE-backed IPOs	PE-backed IPOs, % of all IPOs	Non-backed IPOs	Non-backed IPOs, % of all IPOs
2008	307	16	5.21%	291	94.79%
	(13.7%)	*(12.4%)*		*(13.8%)*	
2009	265	14	5.28%	251	94.72%
	(11.8%)	*(10.9%)*		*(11.9%)*	
2010	716	61	8.52%	655	91.48%
	(31.9%)	*(47.3%)*		*(31.0%)*	
2011	609	23	3.78%	586	96.22%
	(27.2%)	*(17.8%)*		*(27.7%)*	
2012	346	15	4.34%	331	95.66%
	(15.4%)	*(11.6%)*		*(15.7%)*	
Total	2243	129	5.75%	2114	94.25%
	(100.0%)	*(100.0%)*		*(100.0%)*	

Source: Own creation based on data from Dealogic database

Comparing table 5.2 with table 5.3, which provides the same information only for emerging and developed economies, respectively, shows, as expected, that PE is more prevalent in developed

markets. Even though the total number of IPOs is lower in developed markets in 2008-2012, the number of PE-backed IPOs is more than twice that of emerging markets. As in emerging markets, the total number of IPOs peaks in 2010 and follows approximately the same pattern. The biggest difference is that the fraction of IPOs backed by PE funds is 9.15% in 2008 and grows throughout the analysis period in developed markets, whereas it starts at a lower level and remains relatively stable throughout the period for emerging markets. On average, 5.75% of the IPOs in emerging economies are backed by PE, whereas the corresponding number is 15.36% for developed economies.

Table 5.3 - All industrial IPOs in **developed economies** by year

Year	All	PE-backed IPOs	PE-backed IPOs, % of all IPOs	Non-backed IPOs	Non-backed IPOs, % of all IPOs
2008	317	29	9.15%	288	90.85%
	(16.5%)	*(9.8%)*		*(17.7%)*	
2009	235	33	14.04%	202	85.96%
	(12.2%)	*(11.1%)*		*(12.4%)*	
2010	508	74	14.57%	434	85.43%
	(26.4%)	*(25.0%)*		*(26.6%)*	
2011	497	81	16.30%	416	83.70%
	(25.8%)	*(27.4%)*		*(25.5%)*	
2012	370	79	21.35%	291	78.65%
	(19.2%)	*(26.7%)*		*(17.8%)*	
Total	1927	296	15.36%	1631	84.64%
	(100.0%)	*(100.0%)*		*(100.0%)*	

Source: Own creation based on data from Dealogic database

Table 5.4 shows the split between nationalities of the sample. Since matching nationalities was one of the criteria when identifying the benchmark group, the distribution is the same for the two samples. The first thing that is revealed is the dominance of China and India. These two countries combined make up more than 90% of the sample. This is, naturally, due to the size of the markets and the number of transactions. For instance, before the benchmark group was identified, the sample included PE-backed IPOs from e.g. Czech Republic, Russia, Peru, and Argentina, but because of a lack of comparable non-backed IPOs, these transactions were removed from the sample. Furthermore, public listings of Chinese companies make up roughly three fourths of the sample. The (lack of) geographic dispersion of the IPOs has implications for the interpretation of the results. That is, it will be difficult to conclude that the results of this analysis are applicable to all emerging markets.

Table 5.4 – Sample IPOs by country

Country	Sample (PE- and non-backed)
China	60 *(73.2%)*
India	16 *(19.5%)*
Poland	3 *(3.7%)*
Thailand	1 *(1.2%)*
Brazil	1 *(1.2%)*
Malaysia	1 *(1.2%)*
Total	82 *(100.0%)*

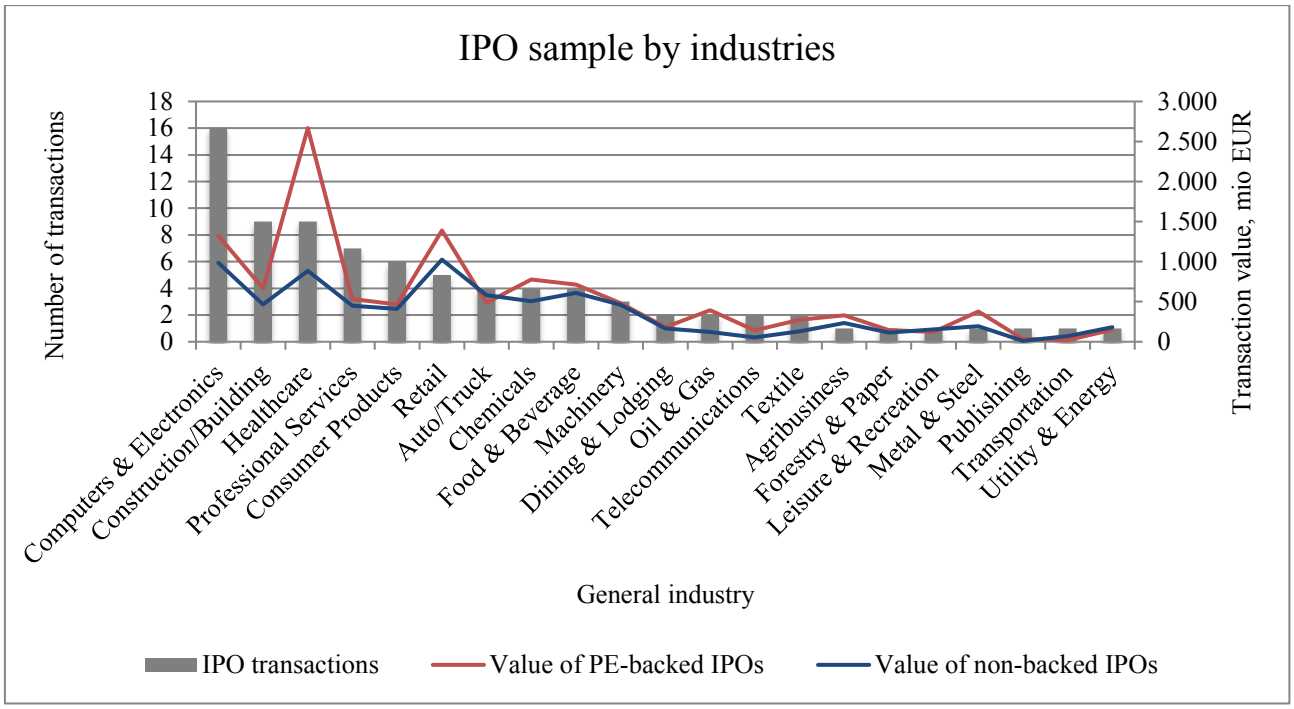
Source: Own creation based on data from Dealogic database

Figure 5.1 shows the distribution of the IPO sample between different industries. 59 of the 82 pairs are within the same specific industry and the remaining 23 pairs operate within the same general industry. The figure shows that the transactions occurred within 21 different industries with computers & electronics, construction/building and healthcare being the most frequent general industries. When measured by deal value rather than the number of IPOs, the picture is somewhat altered, though. Measured by the capital raised, computers & electronics, healthcare and retail were the biggest industries for both groups. In addition, the figure indicates that the amount of capital raised from PE-backed IPOs was, in general, larger than for non-backed IPOs.

To assess whether the sample is representative, this finding is compared to other studies. Cao (2011), using a different classification, finds that IPOs are primarily undertaken within manufacturing and personal/business service. According to his study, retail is the third most frequent industry representing 11.7% and 5.5% of RLBOs and other IPOs, respectively. Only a minor fraction of the IPOs in his study is within healthcare. Computers & electronics is not specified in his classification, therefore, it is unclear how widespread these types of IPOs are. Mikkelson et al. (1997) finds that IPOs are primarily in the computer, electronics, and medical-related products industries. However, it should be kept in mind that this finding is narrowly based on a sample of US IPOs undertaken in 1983. They also find that IPOs in 1980 clustered within computer, electronics and oil, gas, and mining. Existing literature on IPOs and PE-backed IPOs

seem to suggest that retail, electronics and healthcare is highly prevalent. However, it is important to keep in mind that these studies are based on US transactions and, thus, the findings are only indicative, as other industries might be more dominant in emerging markets, especially China and India.

Figure 5.1 – Sample IPOs by industry



Source: Own creation based on data from Dealogic database

5.1.2 Key Accounting Ratios and Items

Table 5.5 below shows a selection of figures for the sample of PE-backed and non-backed IPOs, respectively. More specifically the age, capital raised, revenue, and total assets are chosen to compare the two groups in terms of age and size. ROA, profit margin, and CF-ROA are intended to give an idea of the pre-IPO performance of the two groups. Age and capital raised show the age in years and capital raised in thousand EUR at the time of the IPO. All other measures are shown at year -1. Revenue and total assets are measured in thousand EUR.

Table 5.5 shows that the group of PE-backed IPOs is larger as measured by the capital raised at the IPO, revenue, and the size of the asset than the non-backed IPOs. All of these findings are significant at the 99% level. The table also shows that the group of non-backed IPOs is, on average,

older than its PE-backed counterpart. As shown in the table, the age of the PE-backed and non-backed IPO companies are significantly different (at the 99% confidence level).

It might seem puzzling that the PE-backed and non-backed groups of IPOs differ significantly on size, especially on capital raised given that this was one of the criteria applied in finding the benchmark group. It is worth noting though that the two groups are a lot more similar as measured by capital raised than the other two size measures, which were not part of the matching process. Since the benchmark was, first of all, selected based on country and industry, the divergence is an expression of the limited number of IPOs. Secondly, the benchmark group was matched based on the smallest relative difference in capital raised. Thus, this is an expression that non-backed transactions are on average smaller than PE-backed ones. However, this comparison of size shows that the matching of the size was not very successful.

Second, taking capital raised as an example shows the advantage of using the median over the average due to its robustness to extreme values. If the analysis had been based on average figures, it would have looked like the PE-backed IPOs raised almost 50% more capital than non-backed IPOs (142,386 vs. 95,174 thousand EUR). When looking at the median this figures declines to roughly 15% (82,378 vs. 71,030 thousand EUR). Investigating the sample of PE-backed IPOs more closely reveals that the average capital raised is heavily affected by one observation, namely, an IPO that raised 1,725,766 thousand EUR, which is almost three times as much as the second largest amount of capital raised. Removing the largest observation from both the PE-backed and non-backed samples, the difference between the average capital raised declines to 38% (122,838 vs. 88,977 thousand EUR), while the difference between the medians remain at the same level at approximately 16% (81,785 vs. 70,322 thousand EUR).

The finding that PE-backed IPOs are, in general, larger than non-backed IPOs in line with Levis (2011), who examines a sample of 1,595 IPOs listed on the London Stock Exchange between 1992 and 2005. He finds that PE-backed IPOs are larger as measured by number of employees, total assets, and revenues than both non-backed and VC-backed IPOs. He also investigates the operating performance of the IPOs and finds indication that PE-backed IPO perform better than the two other types of IPOs, as measured by asset turnover and operating margin. Although the assessments of operating performance are based on different measures (this thesis uses ROA and CF-ROA), it is

surprising that the two samples differ so fundamentally. However, it is important to note that Levis' comparison of, respectively, VC-, PE- and non-backed IPOs, in addition to being based on U.K. IPOs, is conducted in the fiscal year of the IPO, that is, year 0 in the terminology of this thesis. Therefore, this examination is not directly comparable to the compared in table 5.5.

These findings on size and age might indicate that PE-backed companies grow at a faster rate and are taken public at an earlier stage than their non-backed counterparts. However, table 5.5 also reveals that the sample of PE-backed IPOs is less profitable than non-backed IPOs as measured by ROA and CF-ROA. The table shows that the levels are significantly different at the 99% level. This finding is confirmed by running the one-sided tests (not reported), which show that the PE-backed sample underperforms the non-backed sample pre-IPO. The investigation of profit margin also suggests that non-backed IPOs perform better than non-backed ones, however, this is not significant.

Table 5.5 – Key figures

	PE-backed IPOs	Non-backed IPOs	p-value
Age (years)	6	8	0.0055***
	(6.9)	(9.3)	
	82	*82*	
Capital raised (th EUR)	82,378	71,030	0.0003***
	(142,386)	(95,174)	
	82	*82*	
Revenue (th EUR)	94,087	49,240	0.0001***
	(237,311)	(98,193)	
	72	*74*	
Total assets (th EUR)	126,142	46,463	>0.0001***
	(277,323)	(114,013)	
	72	*74*	
ROA	9.65%	14.94%	0.0009***
	(8.91%)	(15.04%)	
	72	*73*	
Profit margin	15.84%	19.33%	0.1049
	(16.46%)	(22.61%)	
	71	*73*	
Cash flow-to-assets	11.73%	17.61%	0.0008***
	(11.88%)	(19.37%)	
	72	*73*	

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of a two-sided Wilcoxon signed rank test. The table shows the median, average (in parentheses), and number of observations (in italics). Age and capital raised are shown for the year of the IPO. Accounting figures and ratios are reported for year -1.

5.2 Results I – Comparison of Operating Performance of PE- and Non-Backed IPOs

This section of the empirical analysis is designed to answer the first part of the research question by investigating, if there is any evidence that PE-backed IPOs experience superior performance compared to non-backed IPOs. First, this question is addressed by analyzing measures of operating performance, as described in the paragraph 4.6.1 Performance Measures and Measurement. Then, the analysis dives deeper into this by exploring whether changes in selected accounting measures explain the change in operating performance of the two types of IPOs. Finally, it is looked into whether the observed impact of PE ownership on operating performance is recognized by investors by analyzing whether it translates into higher M/B and P/E ratios. The paragraph is concluded with a sub-conclusion, before proceeding to the second part of the analysis, which focuses solely on the PE-backed IPOs.

5.2.1 Operating Performance

The following comparison of operating performance for PE- and non-backed IPOs expects to find that both samples experience a decline in operating performance post-IPO (H_1), that the performance of the PE-backed IPOs will decline less than that of non-backed IPOs (H_2), and that the performance of the PE-backed IPOs will decline further in the long term due to the gradual exit of the PE fund. Thus, table 5.6, which shows the change in operating performance, will be the focus of the analysis, but table 5.7, which shows the level, is included to gain a deeper understanding of the performance of the two samples.

Table 5.6 - Post-IPO operating performance – **median change**

	ROA (pp)			Profit margin (pp)			CF-ROA (pp)		
Time horizon	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value
Year -1 to 0	-1.43**	-6.75***	0.0004***	-0.20	-1.07***	0.1368	-2.04***	-7.62***	0.0003***
Observations	*71*	*73*		*70*	*73*		*71*	*73*	
Year -1 to 1	-2.84***	-8.47***	0.0122**	-0.99**	-3.05***	0.1872	-3.2***	-9.27***	0.0032***
Observations	*69*	*71*		*67*	*68*		*69*	*71*	
Year -1 to 2	-3.90***	-8.42***	0.4746	-2.88***	-6.02***	0.8768	-4.75***	-9.18***	0.2455
Observations	*65*	*71*		*63*	*69*		*65*	*71*	
Year -1 to 3	-5.60***	-10.06***	0.2197	-6.01***	-5.94***	0.9746	-5.68***	-11.07***	0.1823
Observations	*64*	*70*		*62*	*67*		*64*	*71*	

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of a two-sided Wilcoxon signed rank test.

Table 5.7 - Post-IPO operating performance – **median level**

	ROA (%)			Profit margin (%)			CF-ROA (%)		
Time horizon	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value
Year -1	9.65	14.94	0.0009***	15.84	19.33	0.1049	11.73	17.61	0.0008***
Observations	*72*	*73*		*71*	*73*		*72*	*73*	
Year 0	5.84	6.46	0.5814	15.79	16.00	0.4148	7.73	8.39	0.9566
Observations	*80*	*77*		*80*	*77*		*80*	*77*	
Year 1	5.48	6.47	0.5379	12.4	13.95	0.6107	8.00	7.83	0.9794
Observations	*79*	*74*		*78*	*71*		*79*	*74*	
Year 2	3.47	5.07	0.0636*	8.20	10.74	0.1050	5.76	7.21	0.0853*
Observations	*75*	*77*		*74*	*75*		*75*	*77*	
Year 3	3.04	4.51	0.1330	8.18	9.99	0.0515*	5.60	6.54	0.2252
Observations	*73*	*76*		*72*	*74*		*73*	*77*	

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of a two-sided Wilcoxon signed rank test

Table 5.6 displays evidence to support H_1 across all three performance measures and time horizons, which is significant at the 1% or 5% confidence level, except for the -0.2 percentage point decline in profit margin for PE-backed IPOs from the year before to the year of the IPO. Thus, the data in table 5.6 is in line with findings from the majority of existing literature, which finds that companies experience a decline in operating performance after going public.

In relation to H_2, table 5.6 indicates that PE-backed IPOs perform better than non-backed IPOs post-IPO. This is due to the fact that the decline in operating performance is smaller for the PE-backed sample (except for the change in profit margin from year -1 to 3, which is -6.01 and -5.94 percentage points for PE-backed and non-backed, respectively). However, when the two-sided statistical tests are conducted, it is revealed that the results are only significant in the short term, i.e. year -1 to 0 and year -1 to 1, and only when measured by ROA and CF-ROA. It is worth noting that the p-values for the change in profit margin for the two shortest time horizons are relatively close to the chosen level of significance at 0.1368 and 0.1872, respectively. When a one-side test is performed, it is confirmed that the decreases in profit margin are, in fact, smaller for the PE-backed IPOs than for the non-backed ones at the 10% confidence level (see Appendix A). Therefore, even though the table suggests that PE-backed IPOs perform better than non-backed ones, this pattern can only be shown to be significant until one year after the year of the IPO, but is showed to hold for all performance measures.

As mentioned in section 4.6.1 Performance Measures and Measurement, the change is measured in percentage points. First of all, measuring the change in percentage points rather than as a percentage was chosen, because measuring the change in percentage is not feasible when the performance measure takes on negative values, which is the case in the dataset. The second reasons for choosing percentage points, which was illustrated with an example, assumes that the paired observations have roughly the same assets bases. Since it has been showed that this is not the case for the PE-backed and non-backed samples, even though it was one of the aims when the samples were paired, the validity of this argument has decreased. Therefore, an analysis similar to the one in table 5.6 but based on the percentage difference has been carried out (see appendix B). The overall interpretation of this analysis is similar to the one presented above. It shows that both samples decline significantly post-IPO and suggest that the PE-backed sample declines less than the non-backed sample. However, this is only significant for ROA from year -1 to 0 and for CF-ROA from year -1

to year 0 and 1. Even though the evidence is slightly less conclusive than the findings presented above, it supports the conclusion that PE-backed IPOs perform relatively better in the first years post-IPO and increases its empirical validity.

As discussed above, table 5.6, at least partially, supports H_2, which states that PE-backed firms perform better post-IPO than non-backed firms. As described in the reviews of relevant theory and literature, this hypothesis is based on the assumption that PE ownership is value creating due to improved incentives structures, positive behavioral effects from increased leverage, and the management abilities of PE investors among other things. Therefore, it is surprising that the performance of PE portfolio companies is inferior to that of comparable firms pre-IPO, as was discovered when comparing descriptive statistics and shown in table 5.7. Furthermore, table 5.7 shows that, even in spite of the relative superior performance of PE-backed IPOs in table 5.6, the level of all three measures for the non-backed sample exceeds that of the PE-backed sample in the entire analysis period. The measures are not significantly different, though, except when looking at ROA in year 2, profit margin in year 3, and CF-ROA in year 2. Therefore, even though table 5.6 finds evidence to support H_2, a closer look at table 5.7 shows that the assumption upon which the hypothesis is based, namely that PE-backed companies outperform their non-backed counterparts in absolute terms, is somewhat flawed. Furthermore, table 5.7 shows that this holds pre-IPO, immediately after going public, and in the long run, although it is only sufficiently significant pre-IPO.

Next, it is interesting to take a closer look at how the change in operating performance develops over time, especially for the PE-backed IPOs. As expected, the decline in operating performance for PE-backed IPOs is increasing with time independently of which performance measure is applied. This could indicate that as the PE fund exits its investment, performance is negatively impacted, which would support the theoretical arguments, which hold that PE is value creating. To further investigate this, it would be interesting to see if operating performance and the fraction of the company held by PE investors are significantly correlated over time. However, due to a lack of detailed data on ownership, it has not been possible to carry out this analysis.

Another important finding in this regard is obtained by examining the development of non-backed IPOs, which shows that non-backed IPOs exhibit a similar pattern, i.e. that the decline in

performance is increasing with time. An analysis similar to the one in table 5.6 is conducted (see Appendix C) to examine this development further. That is, rather than examining the development compared to year -1, as is the case in table 5.6, which seeks to illustrate the post-IPO performance and, therefore, compares post-IPO years to the year before going public, appendix C shows the change from year -1 to 0, 0 to 1, and so forth. This breakdown reveals that the change from year 0 to 1 and 1 to 2 is negative and significant (at either the 1% or 5% significance level) across all performance measures for the PE-backed IPOs. This could be interpreted as evidence that performance declines gradually over the first two years, as the PE fund exits its investment, and then stabilizes in year 3, when the fund is no longer involved. However, this explanation would neglect to take into account the fact that the decrease in operating performance is also increasing for the non-backed IPOs. Appendix C shows that performance declines in all years and that this finding is consistent across all performance measures. Statistically, this finding is less conclusive for the non-backed IPOs than it was for the PE-backed ones, as it is only significant for ROA (except for the change from year 0 to 1) and profit margin.

This decline in operating performance and the fact that it declines more in the long run than right after the IPO is in line with Jain and Kini (1994), who discover a similar pattern, when examining US IPOs. They do not explicitly examine or attempt to explain the pattern of this decline. They do, however, provide three possible explanations for their findings, namely, as mentioned in the literature review, agency costs, market timing, and window-dressing. Therefore, even though the decline seems to be more distinct for the PE-backed IPOs, it cannot be ruled out that this pattern is merely an expression of the typical changes that most companies experience after going public.

5.2.2 Key Accounting Figures

This part of the analysis seeks to answer sub question 2. First, an analysis similar to the one in paragraph 5.2.1 Operating Performance is carried out to investigate whether the changes in performance are driven by different factors for PE-backed and non-backed IPOs, respectively. The analysis will focus on changes in revenue, COGS as a percentage of sales, NWC measured by the current ratio and CAPEX. Then, a regression analysis will be performed to examine how changes in these figures are correlated with changes in operating performance for the two samples. The aim of this analysis is to identify differences in the extent to which these figures explain changes in operating performance.

Table 5.8 - Post-IPO changes in key accounting figures – **median change**

	Revenue (%)			COGS (pp)			Current ratio			Capex (%)		
Time horizon	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value
Year -1 to 0	47.0%***	33.3%***	0.0967*	0.3	-0.2	0.7738	1.0***	2.9***	0.0002***	67.3%***	63.2%***	0.6038
Observations	*71*	*74*		*71*	*69*		*71*	*74*		*69*	*69*	
Year -1 to 1	86.5%***	67.8%***	0.4041	0.8	0.0	0.5727	0.4***	2.2***	0.0131**	162.9%***	132.6%***	0.0452**
Observations	*69*	*72*		*68*	*66*		*69*	*73*		*64*	*70*	
Year -1 to 2	97.2%***	84.5%***	0.337	1.9**	1.0**	0.5181	0.1**	1.1***	0.0233**	194.4%***	175.3%***	0.171
Observations	*65*	*72*		*64*	*66*		*65*	*73*		*61*	*69*	
Year -1 to 3	111.5%***	114.9%***	0.4217	4.2***	1.3*	0.7323	0.1	0.6***	0.0466**	128%***	110.6%***	0.1349
Observations	*64*	*71*		*63*	*65*		*64*	*71*		*59*	*69*	

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of a two-sided Wilcoxon signed rank test

Table 5.9 - Post-IPO accounting figures – **median level**

	Revenue (th EUR)			COGS (% of revenue)			Current ratio			Capex (th EUR)		
Time horizon	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value
Year -1	94,087	49,240	>0.0001***	64.0%	59.3%	0.1805	1.5	1.6	0.2691	6,204	4,471	0.3695
Observations	*72*	*74*		*71*	*69*		*72*	*74*		*70*	*71*	
Year 0	140,530	68,000	>0.0001***	62.2%	58.1%	0.2962	2.6	4.8	>0.0001***	10,533	6,006	0.0186**
Observations	*80*	*77*		*80*	*74*		*80*	*77*		*78*	*75*	
Year 1	195,418	78,031	>0.0001***	61.6%	62.0%	0.5847	2.4	3.9	0.0023***	20,350	10,529	>0.0001***
Observations	*79*	*74*		*78*	*70*		*79*	*75*		*75*	*74*	
Year 2	215,470	87,115	0.0003***	65.3%	63.5%	0.2129	1.7	3.0	0.0008***	21,291	7,403	0.0089**
Observations	*75*	*77*		*74*	*74*		*75*	*78*		*73*	*75*	
Year 3	251,648	96,355	0.0012***	66.5%	61.3%	0.0863*	1.5	2.5	0.011**	19,211	7,648	0.018**
Observations	*73*	*77*		*72*	*74*		*73*	*76*		*69*	*75*	

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of two-sided Wilcoxon signed rank test

Table 5.8 shows that revenue increases significantly for both PE-backed and non-backed IPOs across all time horizons. It is indicated that revenue increases more for the PE-backed sample than for the non-backed one except between year -1 and 3. However, the changes are only significantly different in year -1 to 0. Therefore, it does not indicate that the relative superior performance of PE-backed IPOs is caused by difference in revenue growth. Table 5.9 confirms the finding that the PE-backed IPOs are larger than the non-backed companies. Moreover, the increase in revenue is increasing with time for both samples. This pattern is puzzling when considered in connection with the decline in operating performance. Usually, revenue growth is considered a good sign and, all else equal, would be expected to improve operating performance. Thus, this will be further commented above when the regression analysis is conducted, as it is necessary to control for other variables before drawing conclusions about the correlation between changes in operating performance and revenue.

The development in COGS (as a percentage of sales) is insignificant in the first two years following the IPO. From year -1 to year 2 and 3 it increases significantly for both samples. This is in line with the long-term decline in operating performance, but it does not aid in explaining the short-term decline in performance. More importantly, neither the change in COGS or the level (except for year -1 to 3) is significantly different for the two groups of IPOs, and, thus, the variable costs of production do not seem to explain why the development in performance is different for the two groups in the short run.

The current ratio, which is the ratio of current assets to current liabilities, is a measure of the extent to which short-term assets cover short-term liabilities. It can be used in an analysis of liquidity, in which case it should, as a rule of thumb exceed 2 (Petersen and Plenborg 2012). However, there is a trade off between risk and return, as tying up money in working capital (reducing risk) means that less cash is available for investment in profitable projects (reducing profits). PE funds often improve operations by optimizing working capital, that is, lower NWC, which would appear in table 5.8 and 5.9 as a lower current ratio. Holthausen and Larcker (1996) also show that RLBOs have lower levels of NWC than other IPOs. As can be seen from table 5.9 that is also the case in this study. However, it is surprising that the current ratio is significantly lower for PE-backed IPOs in all years except for the year prior to going public. If the relatively low current ratio were the result of PE involvement, one would expect it to be at its lowest level in year -1 and then gradually

increase as PE involvement is diminished. However, actually, the current ratio increases in year 0 and then gradually decreases and reaches approximately the year -1 level in year 3. One can only speculate what causes this increase in year 0. It may be the case that the influx of capital (assuming new shares are issued in the IPO) leads to an increase in cash holdings, which would increase the current ratio. Whatever the cause of this development, it can be concluded that the PE-backed companies have lower levels current ratios and that the current ratios increase less than for non-backed IPOs following the IPO. This might be part of the explanation why PE-backed IPOs perform better in the short term.

Table 5.9 also reveals that PE-backed IPOs invest significantly more than non-backed IPOs. This, however, is not surprising given the difference in size between the two types of IPOs, which has already been established. Instead, attention is directed to table 5.8, which suggests that CAPEX grows more for PE-backed companies in the years following the IPO compared to non-backed ones. However, this is only significant in year -1 to 1. In general, it is difficult to draw any conclusions from the development in CAPEX. First of all, investment in capital will tend to impact performance negatively in the short run, but (hopefully) improve performance in the long run. Furthermore, a high level of investments might be a response to a large number of profitable investment opportunities, or it could be a sign of poor performance and overinvestment (Holthausen and Larcker 1996).

Next, attention is turned to the multivariate regression in table 5.10. For the sake of interpretation, it is important to make clear that since the objective of the analysis is to shed light on whether *changes* in the selected accounting items explain the *variance* in operating performance for the two samples (see sub question 2), the regression expresses how the changes in the independent variables affect the change in the dependent variable. For example, the first line of table 5.10, which is based on the PE-backed sample and the change from year -1 to 1, shows that the change in revenue does not impact ROA. The change in COGS is negatively correlated with the change in ROA, that is, a 1 percentage point increase in COGS (as a percentage of revenue) leads to a 0.07 percentage point decrease in ROA. Likewise, a 1 percentage point increase in the current ratio results in a -0.99 change in ROA. CAPEX has no impact on ROA, at least when rounded to two decimals.

Before commencing the analysis, it is important take a look at the last column, which shows the adjusted R^2 of the regressions. R^2 is a measured of how much of the variance in the dependent variable is explained by the independent variables. The adjusted R^2 takes into account whether adding several variables actually increases the explanatory power of the regression, and, therefore, is deemed relevant, when evaluating multivariate regressions. The adjusted R^2 of the regressions are remarkably low, and for the regressions against CF-ROA in year -1 to 3 it is even negative, implying that the model is a poorer fit for the data than merely drawing a horizontal line. Therefore, no conclusive inferences will be made from the regressions in table 5.10 alone. Instead, the outcome of the regression analysis will be reviewed to identify patterns, which are in line or in conflict with the previous findings of the analysis.

Table 5.10 – Multivariate regression analysis

				Independent variables				
PE/NB	Time horizon	Dependent variable	Intercept	Revenue	COGS	Current ratio	CAPEX	Adjusted R^2
PE	-1 to 1	ROA	-2.45	0.00	-0.07	-0.99***	0.00	0.0874
NB	-1 to 1	ROA	-10.94***	-0.02**	0.10	-0.13	0.00	0.0537
PE	-1 to 3	ROA	-6.31***	0.02***	-0.77***	1.23**	0.00**	0.6706
NB	-1 to 3	ROA	-16.99***	0.00	0.25	1.12**	0.00	0.0436
PE	-1 to 1	Prof. marg.	-2.84	0.01	-0.19*	-0.65	0.00	0.0546
NB	-1 to 1	Prof. marg.	-7.33***	0.02***	-0.36***	0.06	0.00	0.2407
PE	-1 to 3	Prof. marg.	-8.90***	0.02***	-0.71***	-0.35	0.00	0.2907
NB	-1 to 3	Prof. marg.	-6.50***	0.00	-0.55***	-0.73*	0.00	0.3484
PE	-1 to 1	CF-ROA	-2.59	0.00	-0.08	-1.03***	0.00	0.1060
NB	-1 to 1	CF-ROA	-6.27***	0.02***	-0.77***	-1.36**	0.00**	0.6904
PE	-1 to 3	CF-ROA	-13.64***	0.02	-0.01	-0.24	0.00	-0.0175
NB	-1 to 3	CF-ROA	-18.80***	0.01	0.24	0.89	0.00	-0.0123

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of two-sided t-test

The first thing that is revealed by table 5.10 is the negative intercept, which is large in numeric terms and positive on the 1% significantly level in 9 out of 12 regressions. This would suggest that, controlling for the other variables included in the analysis, there is a negative impact on operating performance from going public. This increases the validity of the finding in paragraph 5.2.1 Operating Performance, which concluded that H_1 was true, as operating performance declines for both the PE-backed and non-backed sample post-IPO. Table 5.10 is designed to show the regression for the same time horizon and the same performance measure for PE-backed and non-backed IPOs, respectively, in consecutive rows. That means e.g. that row 1 and 2 can be compared to investigate

how the two groups differ. In five of the six pairs of regressions the intercept is smaller for the PE-backed IPOs, which indicates that non-backed IPOs experience a greater decrease in performance after going public. This also holds in both the short and long term.

The estimated coefficient for revenue growth is small and, for the most part, insignificant. As mentioned previously, table 5.8 revealed that revenue has grown significantly for both groups of IPOs, while performance has declined, which might be perceived as a negative relationship between the change in revenue and the change in performance. Fortunately, the regression analysis demonstrates that this superficial assessment is mistaken, as the coefficient is positive in 11 of 12 cases, which reinforces the traditional idea that an increase in revenue, all else equal, improves operating performance. The differences between the pairs of regressions are too small and insignificant to draw any conclusions about how the performance of the two groups differs in the response to changes in revenue.

The estimated coefficient for COGS varies quite widely from -0.77 to 0.25. It is noteworthy that one fourth of the estimated coefficients are positive. Intuitively, one would expect a lower level of costs in manufacturing to improve performance, i.e. a negative correlation. The fact that the estimate of the sign and size of the coefficient is so volatile casts serious doubt on the validity of the estimates. It is worth noting, though, that COGS is better suited to explaining changes in profit margin than in the other performance measures, since all coefficients for COGS are negative and significant when the independent variables are regressed against profit margin. This makes sense, since the link between profit margin and COGS is relatively straightforward, as opposed to the link between ROA or CF-ROA and COGS, which is subtler.

Majority of the coefficient estimates for the current ratio are negative (8 out of 12), which would suggest, as predicted, that lowering working capital increases operating performance. However, as was the case with the estimates of COGS, the size and the sign of the coefficient varies widely and only half of them are significant. In addition, there is no significant pattern for PE-backed and non-backed IPOs, respectively, which means that no conclusions regarding the differences between the two groups can be drawn.

Finally, the CAPEX coefficients are both too small and insignificant to describe either of the samples. This was expected cf. the explanation above. Most likely, the correlation between investment and operating performance is not visible, because the effects of CAPEX are long-term. Lagging the investment, e.g. regressing the performance measure in year 3 against the CAPEX in year 1, could circumvent this problem. However, this requires making assumptions regarding how much time is needed for the investment to materialize. Thus, this type of analysis is outside the scope of this thesis.

As is evident from the above discussion of the findings of the regression analysis, neither of the selected accounting figures aided significantly in explaining the observed difference between the performance of PE-backed and non-backed companies. However, it did confirm the finding that all IPOs exhibit a decline in performance following the IPO. In paragraph 5.2.1 Operating Performance, the same decline was observed. Moreover, it was shown that the performance of PE-backed IPOs declines less than that of non-backed IPOs in the short term. To test whether the same pattern can be identified using regression technique, multivariate regressions like the ones in table 5.10 are run. However, instead of conducting separate regression analyses for the two types of IPOs, a PE dummy is included in the model. If the estimated coefficient of this dummy variable is positive, this is in line with the observed superiority of PE-backed IPOs. Again, with reference to the low R^2 values of the regressions, no conclusions are drawn solely from table 5.11.

Table 5.11 – Multivariate regression with PE dummy

			Independent variables					
Time horizon	Dependent variable	Intercept	PE dummy	Revenue	COGS	Current ratio	CAPEX	Adjusted R^2
-1 to 1	ROA	-10.07***	5.33***	0.01**	-0.02	-0.23*	0.00	0.1442
-1 to 3	ROA	-14.49***	6.09**	0.01***	-0.43***	0.29	0.00	0.1582
-1 to 1	Prof. marg.	-6.93***	1.64	0.02***	-0.27***	0.00	0.00	0.1500
-1 to 3	Prof. marg.	-7.05***	-1.28	0.01***	-0.61***	-0.6*	0.00	0.3063
-1 to 1	CF-ROA	-12.67***	7.07***	0.01	-0.07	-0.31	0.00	0.0922
-1 to 3	CF-ROA	-16.13***	7.64**	0.01**	-0.43***	0.08	0.00	0.1199

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of two-sided t-test

In line with the tendency from table 5.10, the intercepts in the regression models in table 5.11 are all negative and highly significant. The intercepts would suggests that, all else equal, companies that go public experience a decrease in performance of between 6.93 and 16.13 percentage points.

Moreover, when measured by ROA and CF-ROA, there is shown to be a positive correlation between PE ownership prior to the IPO and operating performance. This, however, does not hold and is insignificant, when measured by profit margin. These findings of a negative intercept and, at least partially, positive PE dummy coefficient support H_1 and H_2.

5.2.3 Market Expectations

Table 5.12 and 5.13 below show the development in, respectively, the level and change in the M/B and P/E ratios. Unlike the previous analyses, which measured differences with reference to year -1, table 5.12 measures the change in the respective years compared to year 0. Naturally, this is because no stock price ratios exist for the year prior to the IPO. This thesis expects, as predicted by the efficient market hypothesis, that the markets expectations will reflect the differences in operating performance observed in the two previous paragraphs. Table 5.6 indicated that PE-backed IPOs perform better than non-backed IPOs in the short term, as the performance of PE-backed IPOs declined significantly less than that of non-backed IPOs. This was supported by the positive and significant PE dummy coefficients in table 5.11.

In addition to reflecting the findings of this thesis, the tendency for PE-backed IPOs to trade at higher price multiples than non-backed IPOs in supported theoretically by Chemmanur and Loutskina (2006), who identify three explanations why VC-backed IPOs are less underpriced than non-backed IPOs. Even though, their study is based on VC-backed IPOs, which are typically characterized by being less mature than PE-backed ones, the following outline of the explanations will make clear that the hypotheses are transferable to PE-backed IPOs. First of all, the fact that VC funds (as well as PE funds) are repeat players in the IPO market means that they are careful about preserving their reputation. As other market participants are aware of this and know that significantly overpricing would be costly for the fund in the long run, VC funds can charge a price that is closer to the intrinsic value of the company. This explanation is based on the effects of VC certification. Second, the difference in underpricing is attributed to the screening and monitoring of VC funds. That is, it is assumed that being selected for VC-backing and subsequently being monitored by the fund implies that the company is of high quality. This explanation has a lot of similarities with the theoretical arguments that have formed the basis of the research questions of this thesis. Finally, due to their repeat involvement in the IPO market, VC funds develop long-term relationships with market participants such as analysts, underwriters etc., which enable them to

obtain a higher price, when they exit their investments by taking them public. This is known as the market power hypothesis.

Table 5.12 – Post-IPO change in stock price ratios – **median change**

	M/B			P/E		
Time horizon	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value
Year 0 to 1	-0.23***	-0.06	0.0125**	-1.83	-0.11	0.2472
Observations	*45*	*48*		*41*	*42*	
Year 0 to 2	-0.31***	-0.22**	0.0650*	-1.07	0.51	0.0421**
Observations	*44*	*49*		*38*	*39*	
Year 0 to 3	-0.34***	0.02	0.0606*	2.86	4.80**	0.3755
Observations	*44*	*46*		*34*	*37*	

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of two-sided Wilcoxon signed rank test

Table 5.13 – Post-IPO level in stock price ratios – **median level**

	M/B			P/E		
Time horizon	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value
Year 0	0.92	1.04	0.6117	13.08	14.29	0.3387
Observations	*45*	*50*		*46*	*47*	
Year 1	0.67	0.85	0.8576	11.98	11.88	0.8601
Observations	*51*	*57*		*47*	*51*	
Year 2	0.57	0.69	0.5450	13.00	14.43	0.9731
Observations	*54*	*62*		*45*	*51*	
Year 3	0.58	0.96	0.0299**	16.71	18.68	0.6379
Observations	*58*	*66*		*47*	*54*	

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of two-sided Wilcoxon signed rank test

Table 5.13 indicates that non-backed companies are generally traded at higher multiples than PE-backed companies. The ratios are not significantly different, though, except for the M/B ratio in year 3. Nonetheless, this finding is surprising, since the M/B and P/E ratios of PE-backed companies were expected to exceed those of non-backed companies, at least in the short run. However, this is not necessarily in conflict with previous findings, as it was also indicated that, as shown in table 5.7, non-backed IPOs had a higher, although not significantly so, level of operating performance. Thus, the fact that PE-backed IPOs experience a smaller decline in performance than

non-backed IPOs in the years after going public does not mean that they operate more efficiently in the long run.

Alternatively, the seemingly lower M/B and P/E ratios of PE-backed IPOs might be attributable to the fact that PE-backed IPOs is a newer and less prevalent phenomenon in emerging economies than in developed ones. That is, the explanations of certification and market power put forward by Chemmanur and Loutskina (2006), which are both based on repeat interaction in the IPO market, may not effectively explain the pricing of PE-backed IPOs in emerging markets, because PE-backed IPOs have not yet been established as recurrent participants. However, to determine whether this is, in fact, part of the explanation, would require additional analysis.

Table 5.13, which shows the change in M/B and P/E ratios, does not provide a clear pattern. First of all, it is worth noting that especially the calculations of the change in P/E in year 2 and 3 are based on a low number of observations, which means that it might be impacted by a few outliers. Second, It is acknowledged that the stock price and, thus, the ratios in table 5.12 and 5.13, is affected by a variety of factors in addition to operating performance such as the economy as a whole, industry developments, investor behavior and maybe even rumors.

5.2.4 Sub Conclusion I

The aim of the first part of the analysis was to answer the first part of the research question, which asks whether the operating performance of PE-backed and non-backed IPOs is different (sub question 1-3). The analysis concluded that the performance of PE-backed IPOs declined less than that of non-backed IPOs in the short run. Both samples experienced a decline in performance post-IPO. The finding that PE-backed IPOs perform better post-IPO was confirmed by positive PE dummy coefficients in multivariate regressions. This confirms H_1 and H_2.

The analysis of sub question 1 also revealed that, in spite of the relatively superior performance of PE-backed IPOs in the short-run, non-backed IPOs seem to perform better than PE-backed IPOs both before the IPO, and in the short and long run after going public. The expectation that the performance of PE-backed IPOs would decline less than the performance of non-backed IPOs was based on the theoretical assumption that PE involvement pre-IPO would have improved performance. Therefore, it is remarkable that the PE-backed sample performs worse than the non-

backed sample pre-IPO. Post-IPO the gap between the performances of the two groups is diminished to the extent that it is no longer significantly different.

Next, sub question 2, which attempted to explain the difference in performance based on a selection of accounting figures to shed more light on the findings from sub question 1, was investigated. The only figure, which differed significantly between the two groups, was the current ratio, which increased significantly less for the PE-backed IPOs post-IPO. However, when multivariate regressions were run, it turned out that the changes in the proposed accounting figures only explained a very small fraction of the change in operating performance. In the next section it will be investigated whether PE characteristics explain the change in the operating performance of the PE-backed IPOs.

Finally, sub question 3, which looked into the market expectations of the performance of the two groups of IPOs, was investigated. It is concluded that the non-backed IPOs, generally trade at higher M/B and P/E ratios, although they are not significantly different from those of the PE-backed IPOs. Hence, no evidence in favor of H_3 was found, but the conclusion is in line with the findings regarding the level of operating performance, which indicated that non-backed IPOs perform better.

5.3 Results II – Private Equity Characteristics

It was shown in the previous paragraph that PE-backed IPOs exhibit a smaller decline in operating performance in the first years after going public. The next section attempts to answer the second part of the research question by investigating whether this difference is attributable to the PE ownership. Hence, it is now investigated how some of the distinguishing features of PE ownership affect performance. Below findings relating to the holding period of the PE fund, the ownership share the fund retains post-IPO and the degree of leverage are presented. Then a multivariate regression is run to investigate whether these variables in combination explain the change in operating performance post-IPO. Finally, a conclusion is presented to sum up the findings of this part of the analysis.

5.3.1 Holding Period

This thesis expects to find a positive correlation between the holding period and the change in operating performance, because the duration of PE involvement is considered, in line with Cao

(2011) and Cao and Lerner (2006), a proxy for restructuring efforts. The holding period is measured as the number of months from the PE fund entered into the investment to the day of the IPO.

The average holding period of the sample is 36.6 months (median: 35.7), that is, roughly three years. Furthermore, the holding period varies quite a lot, as it has a standard deviation of 20.6 months. The longest holding period is 91 months. On the other end of the scale, 10 of the 82 observations were owned by the PE fund for less than a year before being taken public. These would be considered quick flips in the terminology of Cao (2011) and are, based on empirical evidence, expected to underperform in comparison to PE-backed IPOs that had more time to implement value-creating initiatives.

Table 5.14 – Univariate regression analysis – holding period

Time horizon	Dependent variable	Intercept	Holding period	R^2
-1 to 1	ROA	-11.31***	0.20**	0.07
-1 to 3	ROA	-19.02***	0.29***	0.12
-1 to 1	Prof. marg.	-2.33	0.00	0.00
-1 to 3	Prof. marg.	-12.61***	0.11	0.02
-1 to 1	CF-ROA	-12.02***	0.20**	0.08
-1 to 3	CF-ROA	-18.87***	0.29***	0.12

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of two-sided t-test

Table 5.14 does indeed show a positive relation between holding period and the change in operating performance, however, only as measured by ROA and CF-ROA. Furthermore, this effect is significant in both the short and long term. The coefficient estimates are even larger in the long term, although the difference is relatively negligible. In appendix E it is shown that the model (at least for change in ROA from year -1 to 1) is robust to the assumption of absence of influential observations and normal distribution of error terms. R^2 is relatively low. This was to be expected, though, given that the length of the holding period is clearly not the only factor, which has an impact on operating performance.

This finding that the duration of the holding period is positively correlated with operating performance in combination with the knowledge that roughly one in eight of the PE-backed companies went public within one year from when the PE fund entered the company, would suggest

that the decision to undertake an IPO is to some degree motivated by favorable market condition. As suggested by Cao (2011), table 5.14 indicates that companies that go public as a consequence of favorable IPO conditions or high industry valuations experience a deterioration of performance post-IPO.

5.3.2 Retained Share

The retained share is the ownership share, which the PE funds preserves post-IPO. This thesis expects to observe a positive relationship between the retained share and operating performance. There are a number of reasons for this assumed positive relationship. First of all, if PE ownership was the cause of the improved performance of the PE-backed sample as compared to the non-backed sample through incentive realignment and improved monitoring, as hypothesized, then, all else equal, a higher retained share post-IPO should continue to ensure high performance. However, it was shown that the performance of PE-backed IPOs was inferior to that of non-backed IPOs in absolute terms, which casts some doubt on whether the PE ownership can be shown to improve performance. Second, as was argued regarding the relationship between holding period and performance, the retained share is expected to impact the implementation of restructuring initiatives. Hence, the greater the retained share, the greater the impact on the improvement of the operations of the business. Finally, the retained share is expected to send a positive signal to the market regarding the future prospects of the company.

The retained share of the PE funds post-IPO varies between 0 and 55.9%. 4 funds exit their portfolio companies completely, when taking them public, while the remaining 78 funds preserve some share. The average retained share is 16.5% (median: 13.5%). Below, the results of univariate regressions are presented.

Table 5.15 – Univariate regression analysis – retained share

Time horizon	Dependent variable	Intercept	Retained share	R^2
-1 to 1	ROA	-4.76*	0.03	0.00
-1 to 3	ROA	-11.72***	0.22	0.02
-1 to 1	Prof. marg.	-1.05	-0.09	0.01
-1 to 3	Prof. marg.	-11.06***	0.17	0.02
-1 to 1	CF-ROA	-5.51**	0.05	0.00
-1 to 3	CF-ROA	-11.85***	0.22	0.02

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of two-sided t-test

Table 5.15, once again, confirms that operating performance declines post-IPO, as the intercepts are strictly negative and, for the most part, significant. However, it is not possible to document a positive correlation between the retained share and performance. The estimated coefficients do suggest a positive relationship, but are not statistically significant. Moreover, the R^2 does not exceed 0.02 meaning that, at best, the retained share accounts for 2% of the variance in performance. Hence, it is established that the retained share does not seem to be a good predictor of performance.

This finding is in line with Mikkelson et al. (1997), who also do not find any systematic relationship between the ownership stakes of various stakeholders and operating performance. They speculate that the change in ownership does not impact performance, because directors and officers hold substantial ownership stakes in the first years of public trading or possibly due to new compensation packages linked to stock price, which ensures incentive alignment and act as substitutes for the private ownership. It would have been interesting to investigate further, how the ownership share held by management developed post-IPO or to look into the design of the compensation package to shed light on this assumption. However, it has not been possible to gather data on these topics.

5.3.3 Leverage

The free cash flow hypothesis states that management, which primarily serves its own interests, will have a tendency to overinvest in unprofitable projects, when the free cash flow is large. Therefore, a high degree of leverage will lead to better investment decisions, by bringing down the free cash flow through interest and debt payments. Hence, the change in operating profit is expected to be

positively correlated with leverage. Below the development in leverage for the PE-backed IPOs is shown.

	Year -1	Year 0	Year 1	Year 2	Year 3
Leverage	55.18	16.86	17.79	21.82	33.58

	Year -1 to 0	Year -1 to 1	Year -1 to 2	Year -1 to 3
Change in leverage (%)	-55.68***	-53.86***	-25.09***	-11.42

Leverage is found in the Orbis database as the gearing percentage, which is defined as non-current liabilities and loans divided by shareholders funds. As shown below, the degree of leverage dropped significantly from the year before the IPO to the year of the IPO from 55.18% to 16.86%. This is consistent with the assumption that a lot of companies use the proceeds from the offering to bring down debt levels. After year 0 the debt level increases gradually, but remains statistically significantly different from the debt level from year -1 until year 2.

Table 5.16 – Univariate regression analysis – leverage

Time horizon	Dependent variable	Intercept	Leverage	R^2
-1 to 1	ROA	-22.02*	-0.01	0.00
-1 to 3	ROA	-23.44	-0.01	0.00
-1 to 1	Prof. marg.	-17.01**	0.00	0.00
-1 to 3	Prof. marg.	-57.19***	0.01	0.01
-1 to 1	CF-ROA	-31.5***	0.00	0.00
-1 to 3	CF-ROA	12.77	-0.01	0.00

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of two-sided t-test

Table 5.16 does not confirm the hypothesis that performance and leverage are positively correlated. The estimated coefficients are very small and vary around 0 with changing signs. In addition, none of them are statistically significant. Therefore, no relationship between leverage and performance is documented. Furthermore, the R^2 is very lower and the regression models have even less explanatory power than the regression on retained share shown in table 5.15.

This is consistent with the study by Holthausen and Larcker (1996), who also do not find any relation between leverage and performance. They point out that the prerequisite for the free cash

flow hypothesis to hold true is that the company has a considerable free cash flow, which can be invested easily. If that is not the case, there is no reason to expect that the degree of leverage will restrict unprofitable investment. The size of the cash flow is not investigated separately in this thesis. However, it was previously indicated that the CF-ROA is lower for the PE-backed IPOs than for their industry- and country-matched benchmarks. Hence, it is not unlikely that the free cash flow hypothesis does not apply, because the PE-backed companies are restricted by relatively low cash flows.

5.3.4 Multivariate Regression Analysis

Below the three variables analyzed in the previous paragraphs are included as the independent variables in multivariate regression analysis to investigate whether these three factors in combination aid in explaining the changes in operating performance post-IPO of PE-backed IPOs.

Table 5.17 – Multivariate regression analysis – PE characteristics

			Independent variables			
Time horizon	Dependent variable	Intercept	Holding period	Retained share	Leverage	Adjusted R^2
-1 to 1	ROA	-29.65	0.22	-0.01	-0.01	-0.05
-1 to 3	ROA	-66.56	2.25	-2.54	-0.02	0.00
-1 to 1	Prof. marg.	-15.08	0.08	-0.31	0.00	-0.05
-1 to 3	Prof. marg.	-80.77***	0.47	0.48	0.01	-0.02
-1 to 1	CF-ROA	-55.01***	0.41	0.58	0.00	-0.02
-1 to 3	CF-ROA	-45.53	4.06	-5.92	-0.02	-0.01

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of two-sided t-test

Table 5.17 shows that none of the independent variables aid significantly in explaining the changes in operating performance. This was largely to be expected given that only holding period had some explanatory power, when the univariate analyses were run. The fact that holding period is no longer significant, when the two other variables are included could indicate that the correlation discovered in the univariate analysis was spurious and that those regressions suffered from omitted variable bias. However, since it has been found that neither retained share nor the change in leverage was significantly correlated with operating performance and that these findings are in line with previous studies, this thesis takes the stance that they are not relevant variables. Thus, the lack of significance

of the holding period variable in the multivariate regression is not because the previously discovered correlation was spurious, but due to the inclusion of irrelevant variables.

Moreover, the adjusted R^2 is small and, in most cases, negative, which also makes clear that the duration of the holding period, the size of the retained share, or the change in leverage do not explain the changes in operating performance.

5.3.5 Sub Conclusion II

This part of the analysis aimed to test whether the changes in operating performance of the PE-backed IPOs are attributable to PE characteristics (sub question 4). Three selected PE characteristics were analyzed, namely, the duration of the holding period, the retained share, and the change in leverage. All three variables were expected to be positively correlated with operating performance. In conclusion, the analysis found evidence a positive correlation between operating performance and the length of the holding period (H_4), but did not confirm H_5 and H_6. Thus, the two latter hypotheses are rejected.

Based on univariate regressions of the variables against the different performance measures, it was revealed that only holding period was significantly correlated with performance. As anticipated, this correlation was positive, implying that the longer the duration, the greater (or, in this case, less negative) the change in performance. This relationship, which is in line with e.g. Cao (2011), is theoretically based on the assumption that the length of the holding period is a proxy for the restructuring effort by the PE fund. The lack of correlation between the retained share and operating performance is assumed to be due to other incentive realigning mechanisms, which substitute for PE ownership post-IPO. Furthermore, the correlation between leverage and performance is assumed to be absent, because the PE-backed IPOs are cash flow restricted, meaning that the free cash flow hypothesis is not an adequate explanation for the effects of leverage.

6 Implications for Future Research

In the light of the findings of existing literature of the post-IPO performance of PE-backed IPOs, which generally concludes that they outperform their industry peers (see e.g. DeGeorge and Zeckhauser (1993) and Holthausen and Larcker (1996)), it is slightly disappointing that this study

finds evidence to suggest that non-backed IPOs outperform PE-backed ones in the long run, even though PE-backed IPOs performed better than non-backed ones in the first years after going public. In order to gain a broader perspective on what this means for PE activity in emerging markets, the Chinese PE market is looked into. Focus is placed on China because Chinese IPOs make up the vast majority of the sample.

The first wave of PE capital was driven by foreign funds investing in China and took place around the turn of the century (Alexander and Casey 2012). In the second wave, the Chinese government, discontent that this economic activity primarily benefited foreigners, undertook several initiatives to encourage the establishment of a domestic PE market. In 2006-2007 this was taken even further, when certain institutional investors were given permission to invest in local funds (Alexander and Casey 2012). This is the third wave of PE development in China. This brief explanation of the development of PE in China gives two key insights. First and foremost, it is important to keep in mind that PE is a new phenomenon in China. Second, the role of the government as a catalyst for the development of an institutionalized domestic PE market is unique globally (Leeds and Satyamurthy 2015).

To investigate whether the post-IPO operating performance of Chinese IPOs diverges from what was concluded for the entire sample, an analysis of only the Chinese IPOs is performed in appendix E. The general pattern is the same, however, it is even more significant for the Chinese sample. The decline in performance in year 0 and 1 is significantly lower for the PE-backed part of the sample. Moreover, the performance as measured by ROA and CF-ROA is significantly lower for the PE-backed IPOs in the year before the IPO and, again, in year 2 and 3. Thus, the PE-backed IPOs perform better in the short run, but in the long run their performance is still inferior to that of the non-backed IPOs.

The government effort described above has resulted in overwhelming growth in fundraising by China-focused funds from $3.9 billion in 2007 to approximately $16.6 billion in 2011 (Alexander and Casey 2012). It is worth noting that this period of strong growth coincides with the analysis period of this thesis. Given that the investments are typically held by the funds between a few years to a decade, the PE-backed IPOs analyzed in this thesis are most likely the results of buyouts that were carried out in the first or second wave of PE development. Therefore, the fund managers

probably have limited experience with navigating the Chinese business environment and Chinese IPOs. Murray et al. (2006) find that younger PE firms with less experience tend to take their portfolio companies public more quickly and that this results in lower post-IPO operating performance. Their findings also reveal that the reputations of the funds impact the performance. They do this by showing that IPOs backed by prestigious (defined as funds with at least 3% of the total UK market share in terms of number of buyout transactions backed) funds outperform non-prestigious funds. Hence, it will be interesting to see if the patterns discovered in this thesis hold, if the same tests are performed on more updated data, when the industry has had time to develop and learn from the experiences of past IPOs and the funds have established reputations.

Furthermore, this thesis did not investigate the characteristics of the individual PE funds involved in the IPOs. The recent developments in the legal environment and the levels of growth have resulted in confusion regarding the concept of PE and the Chinese PE market now consists of a wide variety of PE funds (Alexander and Casey 2012). Foreign funds are typically well established and have demonstrated good results. The domestic funds, on the other hand, range from professional PE firms with an established track record to entrepreneur-backed funds that act as investment vehicles for high-net-worth individuals, who require liquid, short-term investments (Alexander and Casey 2012). The latter type of funds rarely take an active management role and also do not necessarily have any competences within back office functions and therefore do not fit the definition of PE applied in this thesis. In addition, unlike typical PE funds in most other countries, it is not uncommon that the government is directly involved in running the fund (Alexander and Casey 2012).

This thesis speculates that the fact that the nature of PE in China differs from the traditional definition of PE might also mean that the type of portfolio companies in which they invest is different. This was suggested by the finding that PE-backed IPOs perform worse than non-backed IPOs, which is inconsistent with previous findings. Moreover, as shown in appendix F, the standard deviation of the three different performance measures is higher for the PE-backed sample than for the non-backed sample in most years and especially in the year before the IPO. This is interpreted, as confirmation that the portfolio companies are relatively different in nature. Thus, future research on PE in emerging markets should take the character of the PE funds and the type of companies they invest in into account when evaluating the performance of PE-backed IPOs.

On a final and more high-level note, it is interesting to reflect upon the impact on the development of the PE market from government involvement. As described by Leeds and Satyamurthy (2015) the role of the Chinese government is paradoxial in the sense that it has both promoted increased private sector participation but, at the same time, has sought to control every aspect of PE activity. This has created a PE market, which both local and foreign practitioners acknowledge is far from a level playing field (Leeds and Satyamurthy 2015). Hence, this thesis postulates that the fact that the Chinese government excerts a high degree of control over the development of the market and seeks to promote its policies, will prevent some efficient funds from entering the Chinese PE market. Furthermore, it is also possible that the ability of funds to restructure their portfolio companies is limited by the involvement of the government.

7 Conclusion

This thesis investigates the operating performance of PE-backed IPOs in emerging markets. The phenomenon has been thoroughly investigated for developed markets, in which PE investment has reached a state of maturity. PE is a relatively new but increasingly important factor in financial markets in emerging economies. Thus, it is tested whether findings from existing literature are applicable to the context of emerging markets. The following two-component research question was formulated: *Is operational performance of PE-backed IPOs in emerging markets different from non-backed IPOs and can the difference be attributed to PE characteristics?*

In order to investigate the research question, a sample of 82 IPOs from 2008 to 2012 from emerging markets was identified. As a consequence of the number of IPOs undertaken in China and India, these two markets make up the vast majority of the sample (approximately 75% and 20%, respectively). Hence, the findings from this study are relevant for these two markets, rather than emerging markets in general.

To investigate the first part of the research question, a benchmark group of non-backed IPOs was identified following the matched pairs methodology. The benchmark group was matched on industry, country and the year of the IPOs (within ± 1 year). If more matches were available, the non-backed IPO, which was most similar in terms of capital raised in the IPO, was chosen. The

operating performances of the PE-backed and non-backed sample were compared using a Wilcoxon signed-rank test, which revealed that the operating performance of the PE-backed sample declined less than that of the non-backed sample in the year of the IPO and the following year. However, it also indicated that non-backed IPOs performed better than the PE-backed IPOs in absolute terms, although this was not consistently significant. The examination of selected accounting figures was largely inconclusive, although it did suggest that working capital is managed more efficiently in PE-backed companies. Finally, it was analyzed whether investors' expectations differed between the two groups. Both the M/B and P/E ratio was higher, but not significantly so, for the non-backed IPOs. This is in line with the finding that non-backed IPOs seem to outperform PE-backed IPOs.

In relation to the second part of the research question, it was investigated whether the duration of the holding period, the retained share and change in leverage affected the change in operating performance for the PE-backed sample of IPOs. The holding period was found to be positively correlated with operating performance. The explanation for this has been given by Cao (2011), who claims that the length of the holding period affects the PE fund's ability to implement strategic, operational, and financial improvement initiatives. Moreover, the finding that a substantial number of PE-backed companies were taken public within a year of the PE fund's entry is evidence in favor or the market timing hypothesis. The retained share and change in leverage were deemed to be irrelevant variables based on univariate and multivariate regression analyses as well as findings from previous studies on developed markets.

In conclusion, this study finds that 1) the operating performance of PE-backed IPOs differs from that of non-backed IPOs post-IPO, as PE-backed IPOs experience a smaller decline in performance and 2) PE characteristics can *in part* explain the difference in performance.

8 References

Alexander, Sarah E., and Michael Casey. "The Evolution and Future of Private Equity in China." In *Private Equity in Emerging Markets*, by Darek Klonowski. Palgrave Macmillan, 2012.

Baker, Kent H., Greg Filbeck, and Halil Kiymaz. "13: Exit Strategies in Private Equity." In *Private Equity: Opportunities and Risks*, by Kent H. Baker, Greg Filbeck and Halil Kiymaz. 2015.

Barber, Brad M., and John D. Lyon. "Detecting abnormal operating performance: The empirical power and specification of test statistics." *Journal of Financial Economics*, 1996: 359-399.

Bekaert, Geert, and Campbell R. Harvey. "Emerging Equity Market Volatility." *NBER Working Paper*, 1995.

Bendsen, Thomas. "Noter i statistik." *Ikke-parametriske hypotesetest.* 2009. http://statnoter.dk/index.php?pageID=85.

Bergström, Clas, Mikael Grubb, and Sara Jonsson. "The Operating Impact of Buyouts in Sweden: A study of value creation." *The Journal of Private Equity*, 2007.

Berk, Jonathan, and Peter DeMarzo. "Chapter 16: Financial Distress, Managerial Incentives, and Information." In *Corporate Finance*, by Jonathan Berk and Jonathan DeMarzo. Pearson, 2014.

Bliss, Richard T. "Private Equity: The Differences Between Developed and Emerging Markets." In *Private Equity in Emerging Markets*, by Darek Klonowski. Palgrave Macmillan, 2012.

Cai, Jun, and K.C. John Wei. "The investment and operating performance of Japanese initial public offerings." *Pacific-Basin Finance Journal*, 1997.

Cao, Jerry X. "IPO Timing, Buyout Sponsors' Exit Strategies, and Firm Performance of RLBOs." *The Journal of Financial and Quantitative Analysis*, 2011: 1001-1024.

Cao, Jerry, and Josh Lerner. "The performance of reverse leveraged buyouts." *Working paper*, 2006.

Cendrowski, Harry, and Adam A. Wadecki. "1. Introduction to Private Equity." In *Private Equity: History, Governance, and Operations*, by Harry Cendrowski, Louis W. Petro, James P. Martin and Adam A. Wadecki. John Wiley and Sons, Inc., 2012.

Chalmers, Alan. *What is this things called science?* 2013.

Chemmanur, Thomas J., and Elena Loutskina. "The Role of Venture Capital Backing in Intial Public Offerings: Certification, Screening, or Market Power?" *Working Paper*, 2006.

Chou, De-Wai, Michael Gombola, and Feng-Ying Liu. "Earnings Mangement and Stock Performance of Reverse Leveraged Buyouts." *The Journal of Financial and Quantitative Analysis*, 2006: 407-438.

Cumming, Douglas, Donald S. Siegel, and Mike Wright. "Private equity, leveraged buyouts and governance." *Journal of Corporate Finance*, 2007: 439-460.

Degeorge, Francois, and Richard Zeckhauser. "The Reverse LBO Decision and Firm Performance: Theory and Evidence." *The Journal of Finance*, 1993: 1323-1348.

Fang, Dawei. "Dry powder and short fuses: Private equity funds in emerging markets." *Journal of Corporate Finance*, 2016.

Graf, Christian, Christoph Kaserer, and Daniel M. Schmidt. "Private Equity: Value Creation and Performance." *The Oxford Handbook of Private Equity*, 2012.

Groh, A., and O. Gottschalg. "The risk-adjusted performance of US buyouts." *Working Paper*, 2006.

Harries, Richard, Donald S. Siegel, and Mike Wright. "Assessing the Impact of Management Buyouts on Economic Efficiency: Plant-Level Evidence from the United Kingdom." *The Review of Economics and Statistics*, 2005: 148-153.

Harvey, Campbell R. "Predictable Risk and Returns in Emerging Markets." *The Review of Financial Studies*, 1995: 773-816.

Holthausen, Robert W., and David F. Larcker. "The financial performance of reverse leveraged buyouts." *Journal of Financial Economics*, 1996: 293-332.

IFRS. *IFRS use around the world.* March 30, 2017. http://www.ifrs.org/Use-around-the-world/Pages/Jurisdiction-profiles.aspx (accessed April 16, 2017).

International Monetary Fund. "Statistical Appendix." In *World Economic Outlook: Financial Stress, Downturns, and Recoveries*, by International Monetary Fund. 2008.

Jacobsen, Bo, Karsten Schnack, Bjarne Wahlgren, and Mikkel Bo Madsen. "8. Empiri og data." In *Videnskabsteori*, by Bo Jacobsen, Karsten Schnack, Bjarne Wahlgren and Mikkel Bo Madsen. Gyldendahl, 1999.

Jain, Bharat A., and Omesh Kini. "Venture Capitalist Participation and the Post-Issue Operating Performance of IPO Firms." *Managerial and Decision Economics*, 1995: 593-606.

—. "The Post-Issue Operating Performance of IPO Firms." *The Journal of Finance*, 1994: 1699-1726.

Jensen, Michael C., and William H. Meckling. "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." *Journal of Financial Economics*, 1976.

Johan, Sofia, and Minjie Zhang. "Private equity exits in emerging markets." *Emerging Markets Review*, 2016: 133-153.

Johansson, Ingvar, Ragnvald Kalleberg, and Sven-Eric Liedman. *Positivisme, Marxisme, Kritisk teori - Retninger inden for moderne videnskabsfilosofi.* 1976.

Kaplan, Steven. "The effects of management buyouts on operating performance and value." *Journal of Financial Economics*, 1989: 217-254.

—. "Management Buyouts: Evidence on Taxes as a Source of Value." *The Journal of Finance*, 1989.

Kaplan, Steven, and Per Strömberg. "Leveraged Buyouts and Private Equity." *The Journal of Economic Perspectives*, 2009: 121-146.

Khurshed, Arif, Stefano Paleari, and Silvio Vismara. "The Operating Performance of Initial Public Offerings: The UK Experience." *Working Paper*, 2003.

Klausen, Søren Harnow. *Hvad er videnskabsteori.* Akademisk Forlag, 2005.

Kutsuna, Kenji, Hideo Okamura, and Marc Cowling. "Ownership structure pre- and post-IPOs and the operating performance of JASDAQ companies." *Pacific-Basin Finance Journal*, 2002.

Leeds, Roger, and Nadiya Satyamurthy. *Private Equity Investing in Emerging Markets.* Palgrave Macmillan, 2015.

Lehn, K., and A. Poulsen. "Free cash flow and stockoholder gains in going private transactions." *Journal of Finance*, 1989: 771-787.

Levis, Mario. "The Performance of Private Equity-Backed IPOs." *Financial Management*, 2011: 253-277.

Lichtenberg, Frank R., and Donald Siegel. "The effects of leveraged buyouts on productivity and related aspects of firm behavior." *Journal of Financial Economics*, 1990: 165-194.

Megginson, William L., and Kathleen A. Weiss. "Venture Capitalist Certification in Intitial Public Offerings." *The Journal of Finance*, 1991: 879-903.

Mikkelson, Wayne H., Megan Partch, and Kshitij Shah. "Ownership and operating performance of companies that go public." *Journal of Financial Economics*, 1997: 281-307.

Murray, Gordon, Dongmei Niu, and Richard D. F. Harris. "The operating performance of buyout IPOs in the UK and the Influence of private equity financing." *University of Exeter Centre for Finance and Investment*, 2006.

Petersen, Christian V., and Thomas Plenborg. *Financial Statement Analysis - Valuation, Credit Analysis, Executive Compensation.* 2012.

Phalippou, L., and O. Gottschalg. "Performance of private equity funds: another puzzle?" 2006.

Ramsinghani, Mahendra. "12. Exit Strategies." In *The Business of Venture Capital*. John Wiley & Sons, Inc., 2011.

Renneboog, Luc, and Tomas Simons. "Public-to-Private Transactions: LBOs, MBOs, MBIs and IBOs." 2005, Finance Working Paper ed.

Smith, A. "Capital ownership structure and performance: the case of management buyouts." *Journal of Financial Economics*, 1990: 143-165.

Stubager, Rune, and Kim Mannemar Sønderskov. "Forudsætninger for Linær Regression og Variansanalyse efter Mindste Kvadraters Metode." 2011.

Taeger, Dirk, and Sonja Kuhnt. "Tests on Location." In *Statistical Hypothesis Testing with SAS and R*, by Dirk Taeger and Sonja Kuhnt. 2014.

Wood, Geoffrey, and Mike Wright. "Private equity: A review and synthesis." *International Journal of Management Reviews*, 2009: 361-380.

Wright, M., N. Wilson, and K. Robbie. "The longer term effects of management-led buyouts." *Journal of Entrepreneurial and Small Business Finance*, 1996: 213-234.

9 Appendix A – Post-IPO operating performance, one-sided tests

Post-IPO operating performance, two- and one-sided tests – **median change**

	ROA (pp)					Profit margin (pp)				
Time horizon	PE-backed IPOs	Non-backed IPOs	p-value (PE ≠NB)	p-value (PE > NB)	p-value (PE < NB)	PE-backed IPOs	Non-backed IPOs	p-value (PE ≠NB)	p-value (PE > NB)	p-value (PE < NB)
Year -1 to 0	-1.43**	-6.75***	0.0004***	0.0002***	0.9998	-0.2	-1.07***	0.1368	0.0684*	0.9325
Observations	*71*	*73*				*70*	*73*			
Year -1 to 1	-0.97**	-0.39	0.0122**	0.0061***	0.994	-1.39***	-1.895***	0.5003	0.0936*	0.9077
Observations	*69*	*71*				*67*	*68*			
Year -1 to 2	-1.55***	-0.8***	0.4746	0.2373	0.7652	-3.165***	-2.195***	0.1716	0.565	0.4384
Observations	*65*	*71*				*63*	*69*			
Year -1 to 3	0	-0.5**	0.2197	0.1098	0.8917	-0.145	-0.64*	0.6956	0.4873	0.5163
Observations	*64*	*70*				*62*	*67*			

	CF-ROA (pp)				
Time horizon	PE-backed IPOs	Non-backed IPOs	p-value (PE ≠NB)	p-value (PE > NB)	p-value (PE < NB)
Year -1 to 0	-2.04***	-7.62***	0.0003***	0.0002***	0.9998
Observations	*71*	*73*			
Year -1 to 1	-0.49***	-0.12	0.2169	0.0016***	0.9984
Observations	*69*	*71*			
Year -1 to 2	-1.23***	-0.52	0.0137***	0.1227	0.8788
Observations	*65*	*71*			
Year -1 to 3	0.01	-0.28	0.3746	0.0912*	0.9102
Observations	*64*	*71*			

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of Wilcoxon signed rank test

Post-IPO operating performance, two- and one-sided tests – **median level**

	ROA (%)					Profit margin (%)				
Time horizon	PE-backed IPOs	Non-backed IPOs	p-value (PE ≠NB)	p-value (PE > NB)	p-value (PE < NB)	PE-backed IPOs	Non-backed IPOs	p-value (PE ≠NB)	p-value (PE > NB)	p-value (PE < NB)
Year -1	9.65	14.94	0.0009***	0.9996	0.0004***	15.84	19.33	0.1049	0.9483	0.0524*
Observations	*72*	*73*				*71*	*73*			
Year 0	5.84	6.46	0.5814	0.7111	0.2907	15.79	16.00	0.4148	0.7941	0.2074
Observations	*80*	*77*				*80*	*77*			
Year 1	5.48	6.47	0.5379	0.7329	0.269	12.4	13.95	0.6107	0.6968	0.3053
Observations	*79*	*74*				*78*	*71*			
Year 2	3.47	5.07	0.0636*	0.9686	0.0318**	8.20	10.74	0.105	0.9482	0.0525*
Observations	*75*	*77*				*74*	*75*			
Year 3	3.04	4.51	0.133	0.9343	0.0665*	8.18	9.99	0.0515*	0.9746	0.0257**
Observations	*73*	*76*				*72*	*74*			

	CF-ROA (%)				
Time horizon	PE-backed IPOs	Non-backed IPOs	p-value (PE ≠NB)	p-value (PE > NB)	p-value (PE < NB)
Year -1	11.73	17.61	0.0008***	0.9996	0.0004***
Observations	*72*	*73*			
Year 0	7.73	8.39	0.9566	0.5237	0.4783
Observations	*80*	*77*			
Year 1	8.00	7.83	0.9794	0.4897	0.5126
Observations	*79*	*74*			
Year 2	5.76	7.21	0.0853*	0.9579	0.0427**
Observations	*75*	*77*			
Year 3	5.60	6.54	0.2252	0.8886	0.1126
Observations	*73*	*77*			

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of Wilcoxon signed rank test

10 Appendix B - Post-IPO operating performance, change in percentage

Post-IPO operating performance – **change measure in percentage**

	ROA (%)			Profit margin (%)			CF-ROA (%)		
Time horizon	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value
Year -1 to 0	-27.1%**	-52.4%***	0.019**	-2.1%	-6.8%***	0.3678	-25.8%***	-49.6%***	0.0273**
Observations	*63*	*68*		*65*	*69*		*65*	*68*	
Year -1 to 1	-31.5%***	-51.7%***	0.1634	-7.7%**	-16.5%***	0.4353	-29.1%***	-49.9%***	0.046**
Observations	*58*	*64*		*62*	*65*		*61*	*65*	
Year -1 to 2	-42.7%***	-57.6%***	0.5479	-20.9%***	-26.9%***	0.5296	-31.7%***	-53.4%***	0.1379
Observations	*51*	*61*		*50*	*62*		*52*	*64*	
Year -1 to 3	-40.4%***	-63.6%***	0.2854	-29.8%***	-24.4%***	0.7896	-43.4%***	-54.6%***	0.4294
Observations	*46*	*60*		*48*	*58*		*49*	*63*	

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of two-sided Wilcoxon signed rank test

11 Appendix C – Post-IPO operating performance, year-on-year change

Post-IPO operating performance – **year-on-year change**

	ROA (pp)			Profit margin (pp)			CF-ROA (pp)		
Time horizon	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value
Year -1 to 0	-1.43**	-6.75***	0.0004***	-0.2	-1.07***	0.1368	-2.04***	-7.62***	0.0003***
Observations	*71*	*73*		*70*	*73*		*71*	*73*	
Year 0 to 1	-0.97**	-0.39	0.3431	-1.39***	-1.895***	0.5003	-0.49***	-0.12	0.2169
Observations	*77*	*73*		*76*	*70*		*77*	*73*	
Year 1 to 2	-1.55***	-0.8***	0.0204**	-3.165***	-2.195***	0.1716	-1.23***	-0.52	0.0137***
Observations	*75*	*73*		*74*	*70*		*75*	*73*	
Year 2 to 3	0	-0.5**	0.6733	-0.145	-0.64*	0.6956	0.01	-0.28	0.3746
Observations	*73*	*75*		*72*	*73*		*73*	*75*	

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of two-sided Wilcoxon signed rank test

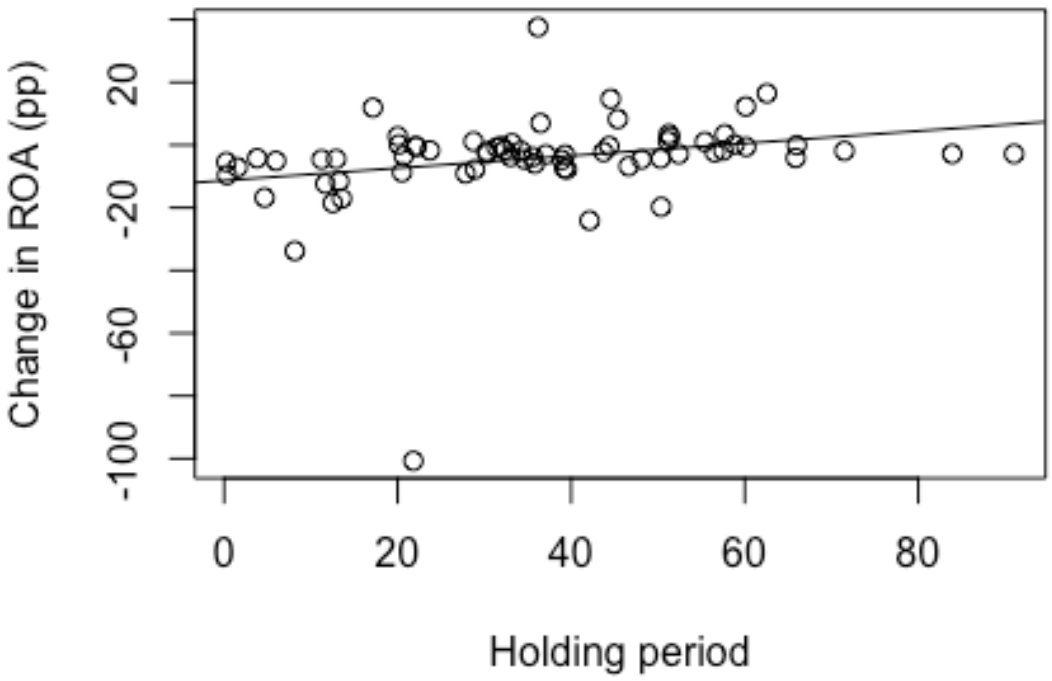
12 Appendix D – Check for selected OLS assumptions

The model

The regression is run in R Studio and gives the following estimates (the coefficients and the multiple R^2 are the values reported in table 5.14):

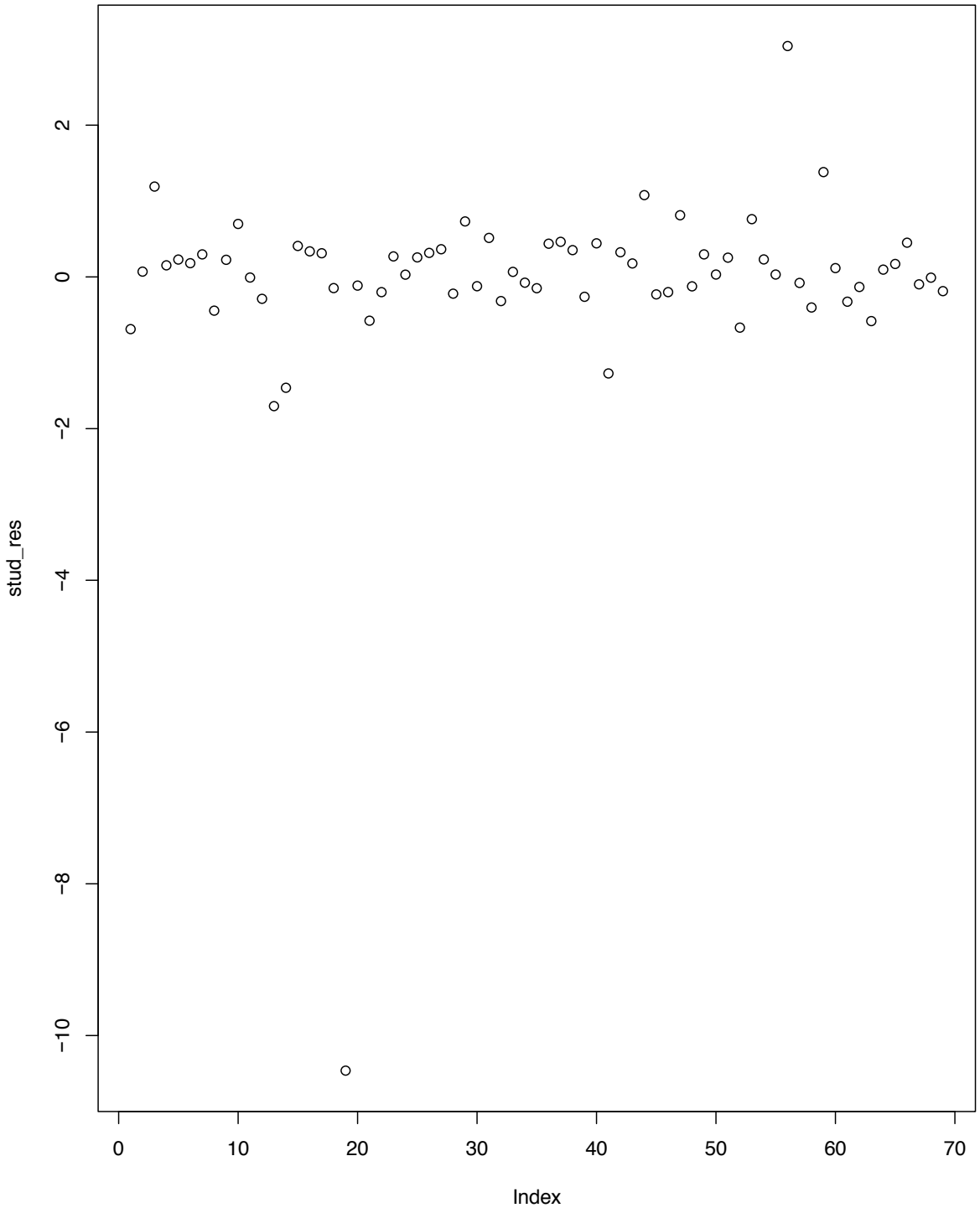
```
Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) -11.31078    3.61690  -3.127  0.00261 **
vHold         0.19721    0.08814   2.237  0.02859 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 14.65 on 67 degrees of freedom
  (13 observations deleted due to missingness)
Multiple R-squared:  0.06952,   Adjusted R-squared:  0.05564
F-statistic: 5.006 on 1 and 67 DF,  p-value: 0.02859
```

To illustrate this graphically, the change in ROA from year -1 to 1 is plotted against the holding period and the fitted model is added to the figure:



Influential observations

As described in section 4.7.2 the studentized residuals are plotted:



This figures (and inspection of the studentized residuals) reveals that two points have residuals above the numerical value of 3. One is around -10 and the other is right above 3. In line with the

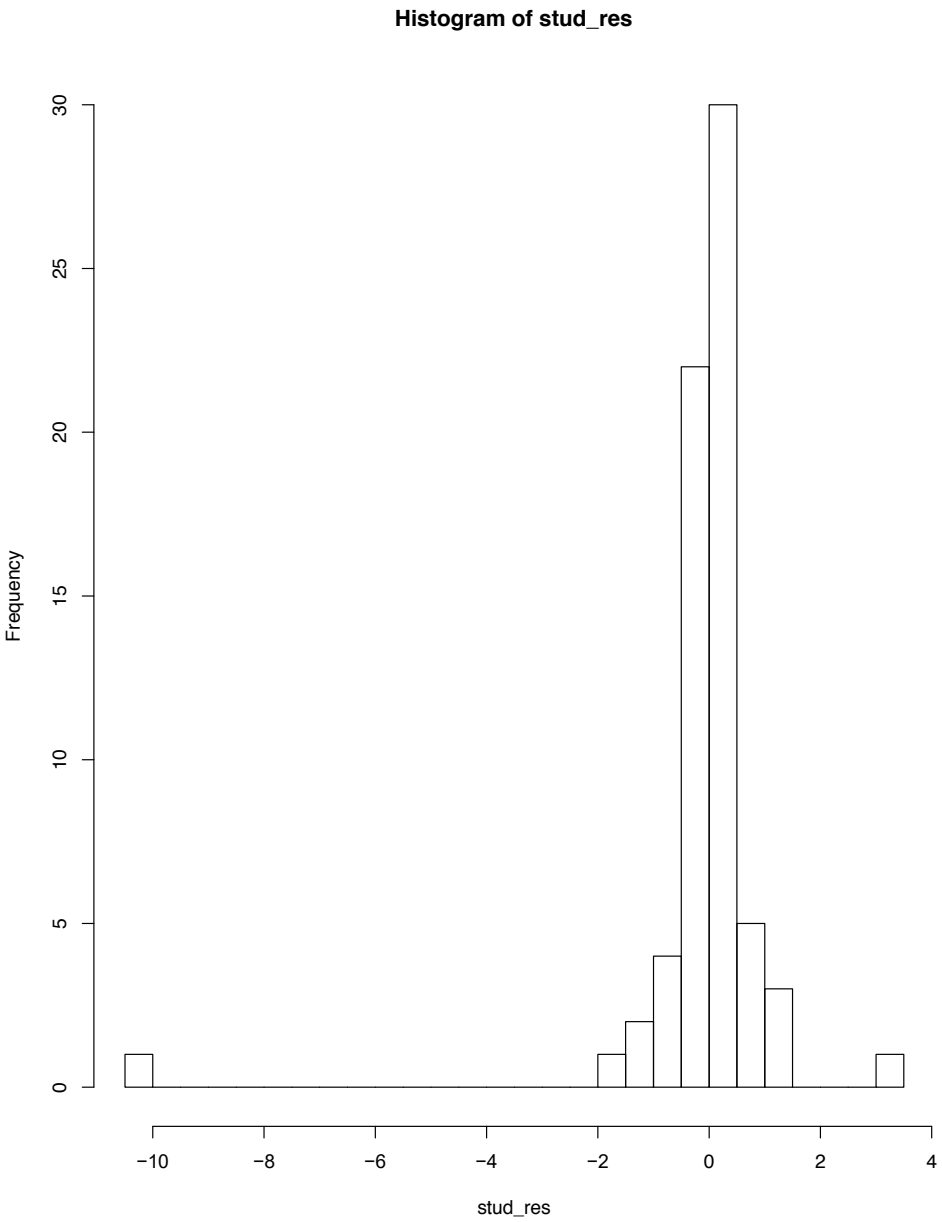
argumentation in 4.7.2 these observations are removed from the data and the model is refit. This gives the following result:

```
Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -8.77879    1.89593  -4.630  1.8e-05 ***
vHold3       0.14845    0.04588   3.235  0.00191 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 7.6 on 65 degrees of freedom
  (13 observations deleted due to missingness)
Multiple R-squared:  0.1387,    Adjusted R-squared:  0.1255
F-statistic: 10.47 on 1 and 65 DF,  p-value: 0.001912
```

Comparing this to the original model reveals that the conclusions are the same. Both the intercept and the estimated coefficient for holding period decrease, but the signs remain unchanged. Moreover, both coefficients increase in significance in the new model and multiple R^2 almost doubles. Thus, it is concluded that the model is robust to the assumption regarding absence of influential observations.

Normal distribution of error terms

The plot below shows the distribution of the standardized residuals. Clearly it does not follow a normal distribution perfectly, however, it is unimodal. In particular, there are outliers (these were treated in the section on influential observations). Therefore, the values of the p-values should be treated as exact, but the distribution of the error terms is close enough to a normal distribution that the conclusion are still valid.


Histogram of stud_res
Frequency
0
5
10
15
20
25
30
−10
−8
−6
−4
−2
0
2
4
stud_res

13 Appendix E – Post-IPO operating performance - China

Post-IPO operating performance – **median change** - China

	ROA (pp)			Profit margin (pp)			CF-ROA (pp)		
Time horizon	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value
Year -1 to 0	-3.01***	-9.66***	0.0008***	-0.16	-0.89**	0.6089	-4.53***	-10.66***	>0.001***
Observations	*53*	*58*		*52*	*58*		*53*	*57*	
Year -1 to 1	-3.97***	-10.20***	0.0216**	-1.59***	-2.90***	0.4278	-4.75***	-10.48***	0.0079***
Observations	*50*	*56*		*48*	*55*		*50*	*55*	
Year -1 to 2	-5.82***	-9.50***	0.5537	-4.35***	-5.65***	0.3546	-6.17***	-10.39***	0.3720
Observations	*46*	*56*		*44*	*56*		*46*	*55*	
Year -1 to 3	-7.15***	-10.71***	0.3086	-6.57***	-5.86***	0.6850	-8.05***	-11.28***	0.3393
Observations	*45*	*56*		*43*	*55*		*45*	*56*	

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of two-sided Wilcoxon signed rank test

Post-IPO operating performance – **median change** - China

	ROA (%)			Profit margin (%)			CF-ROA (%)		
Time horizon	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value	PE-backed IPOs	Non-backed IPOs	p-value
Year -1	10.59	16.25	0.0019***	16.50	17.80	0.4010	12.72	18.57	0.0024***
Observations	*53*	*58*		*52*	*58*		*53*	*57*	
Year 0	6.04	6.51	0.4287	16.74	16.23	0.5534	7.90	8.29	0.8627
Observations	*60*	*60*		*60*	*60*		*60*	*60*	
Year 1	5.71	7.12	0.2314	12.82	14.31	0.7465	8.20	8.64	0.6668
Observations	*57*	*57*		*56*	*56*		*57*	*57*	
Year 2	4.04	5.78	0.0020***	7.18	11.27	0.0817*	6.01	8.06	0.003***
Observations	*53*	*57*		*52*	*57*		*53*	*57*	
Year 3	3.23	4.98	0.0136**	8.37	10.83	0.1262	6.09	7.33	0.0378**
Observations	*51*	*57*		*50*	*56*		*51*	*58*	

*, **, and *** signifies significance at the 90%, 95%, and 99% confidence level, respectively. The reported p-values indicate the level of significance of two-sided Wilcoxon signed rank test

14 Appendix F – Standard deviation of performance of Chinese IPOs

Standard deviation of operating performance

	ROA			Profit margin			CF-ROA		
	PE-backed IPOs	Non-backed IPOs	Difference	PE-backed IPOs	Non-backed IPOs	Difference	PE-backed IPOs	Non-backed IPOs	Difference
Year -1	16.34	8.60	7.75	18.84	12.37	6.47	15.33	8.45	6.89
Year 0	7.40	6.75	0.65	20.59	16.79	3.81	7.32	6.06	1.26
Year 1	7.01	13.18	-6.17	13.50	14.36	-0.87	6.95	5.89	1.05
Year 2	16.66	8.68	7.98	17.09	16.53	0.56	16.87	8.01	8.85
Year 3	10.03	14.64	-4.61	14.39	13.72	0.67	10.31	6.90	3.41