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MASTER THESIS

Long-run performance of Reverse Leveraged Buy Outs

Evidence from Europe

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Glossary

IPO – Initial Public Offering – The process of when a stock of a firm is introduced to the public market.

RLBO – Reverse Leveraged Buy Out – Relates to a company that is reintroduced to the public markets through an IPO, after having been taken privately previously through an LBO by a Late Stage PE-investor.

LBO – Leveraged Buyout – Is a financial transaction mostly used by PE-investors whereby they acquire a controlling stake of a firm's equity. Typically, with the use of (high levels) of leverage.

PE – Private Equity – Is an alternative Investment asset class consisting of capital that is not listed on a Stock Exchange. After acquiring a (controlling) stake in a target firm, typically PE acts as an active investor.

VC – Venture Capital – Financing firms that invest mostly in early stage, Technology driven, or life sciences driven companies.

IRR - Internal Rate of Return – The most common used profitability measurement used in Private Equity investments.

Non-PE-backed IPO – A regular IPO, without the support of a PE-investor prior to the public offering.

Secondary Leveraged Buyout – Transaction process where a PE-investor acquires a firm from another PE-investor.

ABSTRACT:

This thesis studies the long-run performance of Reverse Leveraged Buyouts (RLBOs), i.e. the return to the public markets through an IPO of a company that had gone private after an earlier LBO. This thesis is performed on a sample of 50 RLBOs, 118 PE-backed IPOs and 645 Non-PE-backed IPOs in Europe between January 2001 and December 2015. Using several approaches including Cumulative Abnormal Returns (CAR), Buy-and-Hold Raw Returns (BHR) and Buy-and-Hold Abnormal Returns (BHAR), this thesis finds slight outperformance of RLBOs six months and one-year post-IPO, relative to the FTSE 100 benchmark. In addition, the RLBOs are also assessed against other IPOs, matched using Propensity Score Matching. The results in this analysis show a significant underperformance of RLBOs, defined as the first and second year post-IPO. These results contradict the existing literature on RLBOs. Also, this thesis studies the underlying factors driving this (under)performance and finds a positive correlation between the Firm Size and long-run performance of RLBOs three years post-IPO. Furthermore, this thesis finds the usage of leverage being negatively correlated with long-run performance of RLBOs. Lastly, a number of other valuable insights regarding value drivers of PE-investors are shown.

Keywords: Reverse Leveraged Buyout (RLBO), Initial Public Offering (IPO), Private Equity, Long-run Performance

JEL Classification: G24; G32

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NON-PLAGIARISM STATEMENT
By submitting this thesis the author declares to have written this thesis completely by himself/herself, and not to have used sources or resources other than the ones mentioned. All sources used, quotes and citations that were literally taken from publications, or that were in close accordance with the meaning of those publications, are indicated as such.

TABLE OF CONTENTS

1 Introduction

1.1 Background

In recent years, there has been intense public scrutiny and public debate surrounding the phenomenon of Reverse Leveraged Buyouts (RLBO), i.e. the return to the public markets of a company that had gone private after an earlier LBO, led by a late-stage Private Equity investor. The PE-investors have been highly criticized for acting short-term oriented, where value creation for both the stakeholders and society has been debated fiercely.[1] In public media, this negative view has been reinforced following some examples where RLBOs have significantly underperformed, causing heavy losses for public stock investors. An illustrative example of this is when Southern Cross was taken private by the well-known PE-investor Blackstone in 2004 for approximately USD 164 Million.[2] Blackstone is believed to have quadrupled the investment only two years later, by selling off the nursing homes it owned and forcing the firms to lease it back (Ruddick, 2011). Following this sale-and-lease-back strategy, Southern Cross lost almost 98% of its value once it was introduced back on the Stock Exchange from 2008 until the end of 2011. Another more general point put forward in the public media is that PE-investors are imposing too much leverage on their targets, in combination with pushing them onto public markets too soon (New York Times, 2005). Following the controversy and the public debate, one could wonder why the PE-investor considers this strategy to be preferable in the first place. Cao & Lerner (2009) found that almost 40% of the stocks after IPO stay in the hands of the PE-investor, suggesting that severe underperformance as just described would have a massive financial impact on the PE-fund itself. More importantly, the PE-investors act as repeat players in the IPO market, therefore failures of such RLBOs would lead to large reputation losses. Therefore, this debate suggests a need for a systematic look on the long-run performance of RLBOs.

1.2 Relevance

A systematic look on the long-run performance of RLBOs can shed light on some important elements that have been subject to much public debate and have large implications from both a social and economic perspective. Even though it is not always clear to which point the PE-investors' responsibility reaches; the long-run performance following such an RLBO is unquestionably important. Illustratively, InvestEurope (2018) estimated that in Europe, more than 10,5 million people worked for Private Equity controlled firms. These workers, together with all external stakeholders (including investors in public stock markets), are affected by the performance of PE-investors beyond

[1] The reader is expected to have a basic knowledge regarding the Private Equity Industry. For a more extensive explanation on the Private Equity process, please see Kaplan & Schoar (2005).
[2] Southern Cross was a private provider of health and social care services founded in 1996. In its prime it was the largest provider of care homes and care beds in the U.K. employing around 41.000 people. The company is sold to the Blackstone Group in September 2004.

their typical holding period of five or six years after which the portfolio companies are usually divested.[3]

From a researcher's and investor's perspective, a systematic look at the long-run performance of RLBOs can shed light on PE-performance in a broader sense. The value created in such an RLBO resides from 'repackaging' reforms, induced by a PE-investor during the holding period of the target, after which the company sells its shares to the public. These repackaging reforms are particularly of interest for institutional investors that provide the PE-firms with capital to invest. More specifically, the differences in such RLBO performances relative to other IPOs could form the basis of more general investment strategies for all sorts of investors. From a researcher's perspective, more fundamental questions regarding IPO pricing come to mind. If the RLBOs turn out to indeed outperform other IPOs as well as the market, as the existing literature suggests, should they not be priced as such (Cao & Lerner, 2009)? More importantly, what are the exact drivers of such outperformance? These questions have received limited answers and are of great interest to both investors as well as researchers.

1.3 Research Questions, Methodology and Contribution

Again, the discussions combined with the economic, social and investor relevance suggest a desirability of a systematic look at the long-run performance of such specific offerings, despite there being some small relevant literature on RLBOs. There has been a limited amount of literature dedicated to examining some important elements of RLBOs. The most important and comprehensive one being a research paper by Cao & Lerner (2009), who found a slight outperformance of RLBOs relative to the market and other IPOs using a sample of 526 RLBOs between 1981 and 2003 in the U.S.. They did not find any significant deterioration of this outperformance using different time intervals up to 5 years post-IPO. Antonsson & Palmér (2012) and Jensen (2020) followed up on Cao & Lerner (2009). Antonsson & Palmér (2012) found similar significant outperformance of the RLBOs relative to other IPOs and the market index based on samples in the U.S.. However, they did not find any explanations where this outperformance came from. In contrast, Jensen (2020) did not find any outperformance whatsoever, and also did not find any significant explanations for some RLBOs performing better than others. The contrasting evidence can be explained by the rapid changing Buyout market in recent years, where the samples are almost incomparable with regard to large differences both in capital deployed as well as in level of competitiveness in the Buyout markets used in the different samples. The lack of consistency on the performance of RLBOs is therefore

[3] Private equity funds raise capital from investors (mostly financial institutions), which is then managed through closed-end fund structures. The capital in these closed-end funds is invested by acquiring portfolio companies, which are typically held for 5-6 years before being divested. There are 3 widely used options for a PE-investor to divest its portfolio company. The different options for divestment include *i*. Sale to strategic buyers; *ii*. Sale to a different Private Equity firm *iii*. Divestment through an IPO.

remarkable. Moreover, the studies are almost solely based on data from the U.S., leaving the important and growing European market out of the picture. These elements lead to natural questions whether the patterns as described earlier still characterize the market, as well as questions regarding the results to be a geographically or rather a structural global phenomenon. Consequently, this leads to the first important research question:

RQ1: Do RLBOs in Europe outperform the market and other IPOs?

To answer this question, this thesis finds 50 RLBOs in Europe between January 2001 and December 2015, as well as 118 other PE-backed IPOs and 643 Non-PE-backed IPOs. To test whether the RLBOs outperform the market, both the Cumulative Abnormal Returns (CAR) and the Buy-and-Hold Abnormal Returns (BHAR) are calculated to investigate the share price development of the RLBOs relative to a market index (FTSE 100) over different time intervals. Furthermore, to compare the RLBOs relative to other IPOs, both the CAR and BHAR methods are used against a group of well-matched other IPOs (including both PE-backed and Non-PE-backed IPOs).

Using this type of analysis provides an opportunity of understanding some of the drivers imposed by PE-investors based on cross-sectional differences found within the RLBO sample. The relatively limited literature has yet to show any significant systematic evidence regarding which value enhancing mechanisms imposed by PE-investors create sustainable wealth in the long-run. The effect of high usage of leverage in a PE-investment has been highly debated in the existing literature, however many questions remain unanswered regarding the value adding mechanism imposed by PE-investors. Subsequently, the second research question of this thesis states:

RQ2: What are characteristics that make some RLBOs perform better than others?

This research question is answered using a multivariate regression analysis, including issue specific variables, accounting variables and PE-fund specific variables as possible explanatory value drivers. One of the most important elements of the accounting variables is the effect of Leverage on the long-run performance of RLBOs. This thesis will attempt to contribute to the highly debated topic in the existing literature. The PE-fund specific variables include the Holding Periods, Fund Reputation, and Deal Values. All of these different variables are expected to have a significant influence on the long-run Wealth Relatives (WR) used as the dependent variable in the regression.

Based on these two research questions this thesis contributes to the existing literature in several ways. Firstly, it sheds new light on the long-run performance of RLBOs based on an updated perspective which is needed since the Buyout market changes rapidly. Finding these new perspectives is of particular interest as the PE industry is becoming of rising importance globally, while at the same time there being a lack of recent unambiguous evidence. Secondly, this thesis finds evidence whether

the outperformance of RLBOs found in the existing literature is merely geographically based, or whether it is a structural global phenomenon. This is an important feature, as the evidence based in Europe is limited. Thirdly, this thesis contributes to the existing literature in using a new and improved approach to match the sample with its benchmarks. Using this improved approach, the highly diversified RLBOs will be better matched to a group of other PE-backed and Non-PE-backed IPOs, leading to a better interpretable result regarding the relative performance. Lastly, this thesis offers a better understanding of the drivers of outperformance of RLBOs, ranging from the holding period to the Firm Size. These insights might help pave the way for an investor's optimal strategy.

1.4 Findings

This thesis' first research question investigates if RLBOs outperform the market, as well as other IPOs including PE-backed and Non-PE-backed IPOs. Using both the CAR and BHAR method, this thesis finds significant 34.25% outperformance of RLBOs after 6 months and a 33.13% outperformance 12-months post-IPO, relative to the FTSE 100 index. More importantly, to answer the questions whether RLBOs outperform other IPOs (including PE-Backed and Non-PE-backed), the RLBOs are matched using Propensity Score Matching. Using this new and approved method of firm-matching in long-run performance of RLBOs, finds relative underperformance of RLBOs against a group of well-matched other IPOs. The performance of RLBOs is 13.63% lower than its well-matched benchmark 12 months post-IPO and 3.83% lower 24 months post-IPO. These findings are in contrast with the existing literature (Cao & Lerner, 2009; Chamberlain & Joncheray, 2017). To answer the second research question where this performance comes from, an additional investigation regarding the drivers of the performance is constructed. From this analysis can be concluded that Firm Size is positively correlated with long-run stock performance of RLBOs. Secondly, Leverage is negatively correlated with the long-run stock performance of the RLBO, defined as six-months post-IPO.

1.5 Outline

The rest of this thesis is structured as follows. Chapter 2 provides a description of the relevant theories on IPOs in general, together with an introduction to the Buyout market over time. Additionally, this chapter provides the main findings of the literature on more specific sub-section of IPOs (including PE-backed and RLBOs) and their long-run performance, together with their corresponding value drivers. Subsequently, Chapter 3 covers the hypotheses tested throughout this thesis. Chapter 4 describes the data selection and the data used in this thesis, while Chapter 5 elaborates on the Methodology used throughout the thesis. Successively, Chapter 6 provides the reader with the empirical results and robustness checks, followed by a discussion of the results in Chapter 7. Chapter 7 covers the discussion on the main findings, as well as mentioning some notable limitations and future research suggestions. Lastly, Chapter 8 concludes the thesis.

2 Literature Review

In examining the literature on RLBOs, it is important to first examine the evolution of the LBO market, as it has changed rapidly over time. Next, the literature on the general performance of IPOs is discussed, to get a better understanding of the mechanisms in such an offering. Thereafter, the existing literature on the involvement of the PE-investor is described in great detail. The literature on the long-run performance of RLBOs has remained limited, but the limited research that has been constructed is elucidated on extensively in this chapter, in order to understand IPO pricing and its underlying value drivers.

2.1 The evolution of the LBO market over time

The European Buyout industry has changed rapidly over time. The Leveraged Buyout activity has evolved through a series of boom and bust cycles over the last decades. In the 1980s the first real wave of Leveraged Buyouts hit the financial markets in Europe, finding its starting roots in the U.K.. This first real wave was the result of the birth of some large PE-funds in the U.S., that used large amounts of leverage to acquire large portfolio companies.[4] Kaplan (1989) found that in the first half of the 1980s these new LBO insights led to high success for the Buyout firms through experiencing high levels of operating profits together with low levels of default. This wave was fueled on the view that concentrated ownership together with financial incentive driven professionals was preferable over dispersed ownership in public firms (Jensen, 1989). In the beginning of the first real LBO-boom phase, the U.K. acted as a first adapter with Germany and France following quickly. In the early 80s, most of the Buyout targets were large mature firms in retail and manufacturing which earned an internal rate of return (IRR) of 47% on average.[5] Nowadays, the target market for Buyout groups are much more spread throughout different industries (media, technology, healthcare, and financial services).

A big difference between the Buyout market in the beginning of the 80s and the Buyout market in the late 80s and the 90s, is that there were massive changes in the amount of capital deployed by PE-investors and the level of competitiveness in the subsequent years. Where the IRR in the beginning of the 80s was on average 47%, this changed to an average of 10% in the beginning of the 90s. The decrease in returns of the LBOs is explained by Kaplan & Schoar (2005), who found a negative correlation between the fundraising of PE firms (capital deployed) and the return on investment. The explanation for this deterioration of returns is the increased competition for

[4] The introduction of these Leveraged Buyouts started with the firms Carlyle & Kohlberg Kravis Roberts & Co (KKR) in the beginning of the 80s. Both PE firms are still one of the biggest PE-investors to use LBOs to acquire new target firms.

[5] The IRR is the most commonly used measure of performance in PE. These calculations are based on exit values using the VentureXpert database. The data is continuously updated and therefore subject to change.

transactions. The goal of the Buyout group is to find an opportunity where one can buy a target company for a low price whilst using a lot of leverage. However, the increased competition led to the firms being required to pay higher premiums for the transactions as they were mostly auctioned off.

The beginning of the 2000s gave start to what is later described as the 'age of mega buyouts'. It was in this time that many large LBOs were committed. These massive deals were the result of the combination of low interest rates, regulatory changes for publicly traded companies, and loosening lending standards (Strömberg, 2008). These large deals coincided with the dotcom crisis in 2001, which soon after the number LBOs done decreased rapidly. In the years following the tech-bubble burst, there was a 'recovery phase' that led up to the crisis in 2008. It was in this recovering phase that the PE-firms strengthened their focus on Buyouts, many of them aimed at the more 'mature' sectors. This, in combination with affirmative macro-economic changes and low interest rates, made place for a huge boom in LBOs in the following years. It was also in this period that the public-to-private transaction became popular. Up until the crisis in 2008, both the amounts of LBOs and the number of PE firms in Europe were increasing. As expected, after the economic crash in 2008 the PE-firms were not able to raise new funds easily and could not acquire debt for financing leveraged deals. This led to a large contraction of the LBO market in Europe following the crisis.

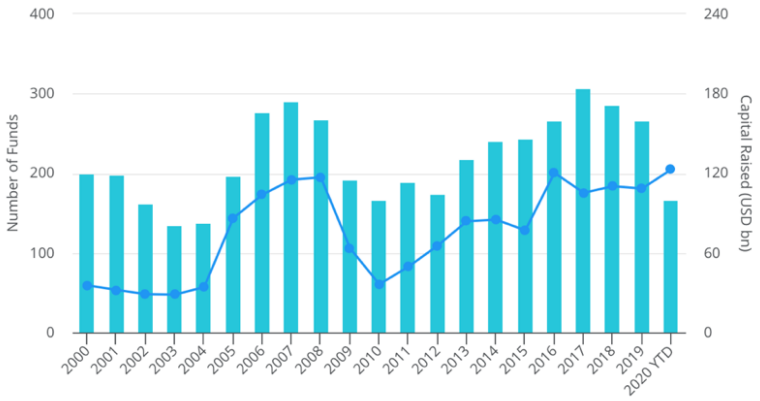
After the crisis, the Buyout market started to revive again slowly but the deal sizes remained smaller together with less leverage being used. This could be an indication for PE-firms being more cautious in buying a target with too much leverage. In the years following the crisis, the number of LBOs increased steadily together with the number of PE firms to a higher level than before the crisis. This number has steadily increased until 2015 where the data set of this thesis ends.

The most important takeaways of examining the LBO market over time, is to understand how these boom-bust cycles affect the performance of the RLBOs that are used in this thesis. Studies have shown that the increase in competitiveness in the LBO market leads to firms using more leverage to acquire firms, subsequently meaning more highly leveraged firms going public (Acharya et al., 2013). This is explained by to the growing buy side (in combination with limited supply) in the Buyout market leading to increased competition (Cao & Lerner, 2009). Figure 1 presents the number of funds and the amount of fundraising by PE-investors in Europe between 2000 and 2020. It graphically shows the economic up-and-down cycles of the Buyout market in the last two decades.

Figure 1: The number of PE-funds and fundraising in Europe in USD (Billion)

This figure shows the amount of money raised by all Private Equity funds in Europe between 2000 and 2020 (YTD [6]). It also shows the number of PE-funds in Europe during the same time period. The light blue line represents the amount of capital raised by PE-funds in USD bn in Europe between 2000 and YTD. The dark blue line represents the number of PE-funds in Europe between 2000 and YTD.

[6] The year to date (YTD) in this research paper is 1 October 2020.



Source: Preqin

2.2 General IPO performance

The literature on IPO performance is highly relevant for this thesis' topic, as this thesis examines the long-run performance of RLBOs. This entails that this thesis examines the performance after shares are publicly offered. Therefore, it is important to understand the mechanisms and pricing strategies of IPOs in general, to get a better understanding how to interpret the results. There has been a vast amount of research performed regarding both the long-run and short-term performance of IPOs globally. However, according to Ritter & Welch (2002), IPO performance is still one of the most controversial studied fields in Finance. In the existing literature on the performance of an IPO, a clear distinction is made between the performance shortly after the IPO and the performance after a number of years. So, in line with the existing literature, this sub-chapter is divided into two separate sub-chapters including short- and long-run IPO performance.

2.2.1 Short-term IPO performance

The short-term performance of IPOs has received a vast amount of research where many research papers found similar results indicative of there being an initial underpricing effect leading to short-term overperformance. Most of these papers found that the underpricing is based on initial asymmetric information between the firms offering and the people buying, where the degree of information asymmetry is positively correlated with the prediction of underpricing. This is shown by Ibbotson (1975), who found that an increase in the offer price to the closing price is indicative for initial underpricing by examining the first day of trading. A different study by Benveniste & Spindt (1989) developed a model that can extract information about the value of the shares in IPO, and it is this specific information that determines the aftermarket price. What they found is that most of the information is held by some large institutional investors, which allows for the underwriters to extract private information. This is a possible explanation for positive initial returns as a consequence of voluntary underpricing the IPO shares. Furthermore, a different explanation is given by Rock (1986),

who found that the issuers underprice their shares voluntarily, in order to induce the uninformed investors to participate in the offerings. Rock (1986) presented a model in which underpricing is explained as the result of the winner's curse problem that uninformed investors face. Rock (1986) describes this winner's curse by explaining there being two types of investors; informed and uninformed, where the uninformed subscribe to every IPO and the informed only if the offer price is less than the fair value. This results in a winner's curse for the uninformed investors and hence the shares must be offered at a discount to capture the former group. Those who have bought the shares, paid too much due to the winner's curse. Similar results are found by Chhabra & Kiran (2020), who found that new issues are indeed underpriced, and prove the existence of the winner's curse through informational variables having significant effect on the first day returns. Also, they found evidence for the long-run returns being negative as a result of this.

Overall, there is a clear consensus in the studies on short-term IPO performance that show that there is an initial underpricing of IPO shares, which is explained by initial asymmetric information between buyers and seller. Even though multiple explanations are given, similar results are found.

2.2.2 Long-run IPO performance

The long-run IPO performance also has received a vast amount of research globally. In contrast to the short-term underpricing, the studies on long-run IPO performance generally find overpricing leading to long-run underperformance. Many studies have found this result, however, according to Ritter & Welch (2002) testing the long-run IPO performance is one of the most controversial and widely studied topics in finance.

Ritter (1991) found that IPOs underperform relative to stock indices up to three years after going public. Similar results are found by Logue (1973), Titman & Truman (1986), and Loughran & Ritter (1995), who all tested the long-run performance of IPOs against a market index. There are several explanations for the underperformance of an IPO in the long run, but one of the most relevant explanation is the 'pseudo market timing theory' by Schultz (2003). This theory explains that there is a 'window of opportunity' which is the result of over-optimism in booming periods. It is because of this opportunity that firms would publicly offer their shares in periods with high abnormal returns of new issues, which leads to clustering of IPOs throughout time. This subsequently depicts that the new issue abnormal returns could be negative, despite the absence of ex-ante abnormal returns (Dahlquist & De Jong, 2008).

Jain & Kini (1994) provide an alternative explanation that explains the underperformance in the long run through having over-optimistic investors prior to the IPO. They showed that having these overoptimistic investors is not sustainable in the long run. A similar phenomenon is explained by Loughran et al. (1994), who found that there is a negative relationship between the volume of an IPO and the following years market returns. A more general economic point is put forward by Miller (1977) who has explained that the divergence in valuations is caused by the uncertainty that comes

with an IPO. It is because of this uncertainty that the stock price will be dominated by optimistic investors that buy the stock, whereafter the market will correct this overpriced stock price and therefore the price will be decreasing in the long run. Bergström et al. (2006) found similar results in different industries and countries.

To summarize, there is a lot of different evidence that showed long-run IPO underperformance relative to stock indices. However, this evidence remains controversial and there still is no clear consensus about the best way to assess IPO long-run performance. This thesis investigates long-run performance; therefore, it is important to understand the best way to assess this controversial long-run IPO performance.

2.2.3 Long-run PE-backed IPO performance

The center of gravity of this research revolves around the long-run performance of a specific sub-group of PE-backed IPOs. Interestingly, the existing evidence on long-run PE-backed IPOs is rather mixed. Whilst a considerable amount of research demonstrates outperformance of PE-backed IPOs relative to their Non-PE-backed counterparts, different studies find contrasting evidence. Furthermore, the global PE industry is still relatively immature, therefore the largest share of relevant literature will be from 1990 or later.

As described above, there has been extensive research on the initial underpricing of IPOs in the short run as a result of asymmetric information (Ibbotson,1975). To find out whether this underpricing is more or less severe if the IPO is PE-sponsored, Hogan et al. (2001) constructed a study that found that PE-backed IPOs are also underpriced in the short run. However, in comparison to Non-PE-backed issuers they found that the underpricing is relatively lower. This relatively lower underpricing is explained by Lee & Wahal (2004), who found that firms that have received PE investment apply more aggressive pricing strategies in an IPO. If the shares are more aggressively priced, this means that the pre-IPO valuation is higher and therefore the underpricing is lower. Megginson & Weiss (1991) found similar results and explanations. Therefore, it seems that the initial underpricing by PE-backed IPOs less severe. As the initial underpricing by PE-backed IPOs is publicly accepted, expected is that therefore investors would treat the PE-backed IPOs with more caution than Non-PE-backed IPOs.

For the long-run performance of PE-backed IPOs, the existing literature points in the direction of higher long-run performance than Non-PE-backed IPOs. However, there is no clear consensus in the literature, as there are some studies that do not find any significant outperformance of the PE-backed IPOs. Katz (2009) found that PE-backed IPOs significantly outperform Non-PE-backed IPOs using data from U.S. based offerings from 1987 until 2005. Moreover, Bergström et al. (2006) found similar results by using European data by covering the French and U.K. markets. Contradicting the views to the aforementioned studies are proposed by Von Drathen (2007), who found ambiguous and insignificant results for the long-run performance of PE-backed IPOs. They constructed their study

using abnormal returns against market indices. Similarly, Rindermann (2004) did not find any significant superior performance of PE-backed IPOs relative to other Non-PE-backed IPOs. Another important thing to note is that most of the studies constructed both in the U.S. and in Europe have sample sizes that consists of less than 250 PE-backed IPOs, which is considered low. This could indicate that some of the studies might be biased.

Overall, most of the literature leans towards positive abnormal returns in the long run. Even though there is no clear consensus in the literature, most of the existing literature is indicative for outperformance of PE-backed IPOs in the long-run. The causes for the relative outperformance will be examined in the next sub-chapters. The long-run performance of PE-backed IPOs remains a controversial study topic.

2.3 Value creation by a PE-investor

Despite the absence of a unanimous consensus regarding superior private equity-backed IPO performance as just described, there has been a substantial amount of literature dedicated to studying the possible drivers of this outperformance. The evidence revolves mainly around the activities of the owners prior to the listing. It is well known that in the event of a Buyout by a PE-investor, the PE-investor acts as an active investor in order to create economic value for both targets and investors. Prior to the PE-firm acquiring its stake in the target, it has searched thoroughly through many potential investment opportunities. After the acquisition, the PE-investor will from then on act as an active investor through financially engineering, monitoring and engaging actively with the target to achieve operational efficiencies (Jensen, 1986). The most common mechanisms used are financial engineering, governance engineering and operational engineering, as described by Kaplan & Strömberg (2009). The following sub-chapters elaborate on these specific mechanisms.

2.3.1 Winner Picking & Reputation

In PE the ability to 'pick' the targets with the best prospects is an advantage with large positive effects in the long run. The PE-investor makes thorough assessments of different targets before investing capital in the target company. In this assessment, it does not only evaluate the current state of the target, but it also analyses the potential of a new strategy going forward. Therefore, while there will always be some exceptions, receiving an investment from a PE-investor can be regarded as a 'good' sign of quality going forward (Meles et al., 2014). With similar regard, studies have shown that if the PE-investor is more reputable, larger, and more experienced, the more pronounced this quality stamp will be (Krishnan et al., 2011). This is also shown by Liu & Yang (2015), who found that LBOs are more likely to IPO if they are sponsored by PE-firms with a good reputation.[7] Generally, the literature suggests that it is not only the 'active' investor role of the PE that creates value in the long run, but

[7] An IPO is often the most preferable exit route for a PE-investor as the PE-investor holds a large part of the shares post-IPO (Jenkinson & Sousa, 2015)

also the ability to pick the targets with the highest growth potentials going forward. If the PE-investor has a good reputation for selecting these high growth potential targets, this will have a positive impact on the long-run performance.

2.3.2 Financial Engineering

One of the most common used practices by PE-investors is using a substantial amount of leverage to finance the acquisition of the targets.[8] The most important benefits of using this strategy are the exploitation of debt tax shields and a tightening management of the Free Cash Flows. Jensen (1986) made an important contribution to the literature by pointing out that the use of leverage is a key contributor in PE-performance. In a more recent study on this topic, Levis (2011) has shown similar results. He found that the level of leverage used in an LBO is positively correlated with the performance in the long run, up till a certain threshold level. He explained this by finding evidence where higher levels of tax-shields created positive long-run performance for the targets. Opposing views are provided by Jenkinson & Stücke (2011) who found that as leverage is available to all bidders, the additional tax benefit can be found back in the form of a higher takeover premium. Therefore, it is unlikely that tax savings are an important source of returns for PE-funds.

In addition to the high levels of tax deductibility by using leverage in acquiring the target, there is also a natural governance mechanism which puts pressure on the management of the firm in the form of reducing Free Cash Flows laying around in the firm. By using a lot of leverage, high interest payments have to be made. Many studies show that in cash-rich industries there is a tendency to waste cash through overinvestment but having a high debt level decreases this overinvestment tendency (Phan & Hill, 1995). Gompers et al. (2016) found similar results, where they found that increasing the leverage puts pressure on managers not to waste money. More pressure on the managers will result in lower levels of overinvestment. However, there is a fine line between being highly leveraged and being over-leveraged. If the leverage is too high, this can create costs of financial distress, found by Opler & Titman (1993).

Overall, the usage of leverage has remained a controversial topic in the existing literature with no clear consensus. This thesis attempts to add structural evidence to the existing literature by examining the effect of leverage on the long-run performance of RLBOs.

2.3.3 Governance engineering

Another important value adding mechanism of a PE-investor is the changes made in the governance of a portfolio company. Jensen & Meckling (1976) found that there are many agency conflicts between the managers and the shareholders. With governance engineering, the PE-investor tries to align the incentives of the managers and the shareholders in order to create better oversight to limit

[8] For a more extensive explanation on the use of leverage in the so-called LBO-model, please see Kaplan & Strömberg (2009).

opportunistic behaviour and empire building by the managers. To do this, the PE-investor provides strong equity incentives to the management of the portfolio companies (Renneboog et al., 2007). Kaplan (1989) described the change in focus of the management of the portfolio company after a PE-investment, to be more profit focused and growth driven. This is achieved by giving the management a significant upside through paying management through stocks and option-based pay, as well as downside by not being able to exercise the options early. This therefore reduces the short-term performance manipulation of the management. Leslie & Oyer (2008) also found that PE-sponsored companies use stronger incentives for their top executives relative to publicly owned companies.

Another important element PE uses in governance engineering the target is taking positions on the board of directors in order to have direct control of the future steps of the target firm. Many researches have shown that the size of the board, number of meetings a year and board structure change significantly after a PE takes a stake in a target firm e.g. Fama & Jensen (1983) and Hermalin & Weisbach (1998). Both Gertner & Kaplan (1996) and Cornelli & Karakaş (2008) also found that the boards of these portfolio companies are ran more actively through more formal meetings after the PE acquires the target. In these papers they presented a link between the number of meetings in a year and the performance of the company. Both found a significant positive correlation between the two.

All the aforementioned studies show that the PE-firms govern the target firm in two separate ways. It tries to align the managers with the shareholders by giving them a significant upside and downside. Also, the PE-investor takes control in the boards, leading to a more active and focused run company. The overall goal of the governing mechanisms is to align the interests of the shareholder and the managers in order to create high long-run performance.

2.3.4 Operational engineering

The goal of the PE firm is to create value for the target. As we've seen in the previous sub-chapters there are several mechanisms initiated by the PE-investor that are used to achieve this. The goal is to achieve operational efficiencies by governing the target in a certain way. The use of management expertise and ownership structure can be linked to what is called in recent academic work as 'operational engineering'. Here is meant the ability to have specific industry and operating expertise needed to create value for the portfolio firm (Avnimelech & Teubal, 2008). In more recent years there has been a large focus by PE-firms on hiring professionals with a specific industry knowledge or making use of internal or external consultants to create value for the portfolio company. This knowledge is not only used for creating a value creation plan, but also to identify new attractive opportunities across different industries.

Kaplan (1989) was the first to identify a significant difference in operating performance after a firm undergoes an LBO. Kaplan & Strömberg (2009) confirmed these results in a more recent study who found that private equity investments are directly associated with improvements in operating performance and productivity. Acharya et al. (2008) found that most operational improvements come

from repositioning, acquisition opportunities' and management changes and upgrades to create superior operating performance and productivity. Therefore, having a PE sponsor can help achieve operating efficiencies that create positive long-run performance. Another more general point put forward by Bernstein et al. (2019), is that during a crisis PE-backed funds decrease investments less than their Non-PE-backed peers, which leads to higher asset growth and market share. Because of the nature of committed closed-end funds, PE-funds will be less financially constrained during a crisis. In time, this leads to more investments during crisis' by PE-backed firms.
Generally, both by placing people with specific industry knowledge in the boards, together with experts in creating long-run value creation plans create operating efficiencies for the portfolio company of the PE. These operating efficiencies create value for the targets in the long run.

2.4 General literature on RLBO

The goal of this thesis is to find whether the aforementioned value adding mechanisms imposed by PE-investors have a positive effect on the long-run performance of RLBOs. For the last three decades, investors have shown an increased level of interest in RLBOs. The research on the long-run performance of the RLBOs however, has remained limited, especially those occurring in Europe. The limited literature that does exist is therefore elaborated on.

Degeorge & Zeckenhauser (1993) were the first to find an outperformance of RLBOs compared to market indices. This study was based on a sample of 62 RLBO's between 1983 and 1987 using RLBOs that occurred in the U.S. Following up on this paper, Holthausen & Larcker (1996) found that RLBOs also outperform other IPOs on the day of going public, up till four years post-IPO. This study was based on a sample of 90 RLBOs between 1983 and 1988. This paper made a first attempt in explaining the outperformance on better management and higher investment expenditure and working capital relative to other IPOs. However, they did not find any significant explanations. What they did find is a deterioration of the outperformance after two years. Mian & Rosenfeld (1993) contrast this aforementioned paper by Holthausen & Larcker (1996), as they found no deterioration using a sample of 85 RLBOs in the same period. Muscurella & Vetsuypens (1990) also found outperformance of RLBOs relative to market indices and they try to link the outperformance with the organizational changes brought in by the firms that took them public. However, they also, did not find any significant explanations for the outperformance.

More recently, Cao & Lerner (2009) found that RLBOs outperform both the market and other PE and Non-PE-backed IPOs, using a sample of 496 RLBO's between 1980 and 2002. They did not find any dissipation of the outperformance in the long run, contradicting Holthausen & Larcker (1996). Cao & Lerner (2009) is seen as the first real comprehensive study on RLBOs, as they have managed to find a substantial amount of RLBOs in a time period of 25 years where the PE market has been subject to massive growth and large changes. They also are the first to expand the study by

looking at the effect of leverage on the long-run performance. They do not find any significant correlation between the two. As described before, the effect of the use of leverage remains a highly debated topic.

Three papers followed up on the study by Cao & Lerner (2009), the first being a paper by Datta et al. (2012), who reached findings that somewhat contradict the previous conclusions on RLBOs. They found that at the time of the LBO, the RLBOs tend to be more levered, pay higher dividends, and are more profitable than their peers. At the same time however, the RLBOs have lower market valuations before the buy-out. Furthermore, their evidence suggested that it this undervaluation that is the primary motive for undertaking such an RLBO. The second paper to follow up on Cao & Lerner (2009) is a research paper by Chamberlain & Joncheray (2017), who were the first to use European data and found 52 RLBOs using IPO data from the U.K., Germany and France. They found only a slight outperformance (by a specific sub-group) of the RLBOs in comparison to Non-PE-backed IPOs and the market. They did not extend their paper in explaining the outperformance of the RLBOs, but further examined the differences of the performance before and after the crisis in 2008. They did not find any significant differences. Lastly, the most recent study on RLBOs is a research paper by Jensen (2020), who found 56 RLBOs using U.S. data. Jensen (2020) however, does not find any significant outperformance of the RLBOs relative to the market and to other PE and Non-PE-backed IPOs. The research paper was the first to match the RLBOs to specific matched group of PE-backed IPOs as well as Non-PE-backed IPOs. Furthermore, it did not find any significant differences with Non-PE-backed IPOs in terms of accounting variables and could not provide any valuable insight in which value adding mechanisms create value.

Overall, most studies provide evidence for long-run outperformance of RLBOs relative to the market, as well as other IPOs. However, explanations for the outperformance remain highly understudied. Also, the findings are difficult to compare both due to the rapid growth of the PE market in recent years as well as the different methods used to compare the RLBOs with several different benchmarks. Therefore, the first research question whether RLBOs still outperform the market and other IPOs is in much need for an updated perspective. Moreover, to answer the second research question where the outperformance comes from, new and improved methods are necessary in order to find where PE-investors create this outperformance.

3 Hypotheses Development

This thesis will answer two research questions in a sequential matter. The first main research question is about the long-run performance of RLBOs relative to different benchmarks. The second research question is then to use these results found in the long-run performance of RLBOs and try to explain it by using the existing literature on value creation by a PE-investor.

As mentioned before, there has been a limited amount of research on RLBOs. The studies that did analyze this topic are mostly constructed using U.S. data and are relatively old, which could possibly create some differences with the more recent data used in this thesis, as the Buyout market changes rapidly. The first study that looked specifically on the RLBOs is Mian & Rosenfeld (1993) who used a sample of 85 RBLOs between the years 1983 and 1988. In their research they found abnormal (positive) market returns up till three years following the public offering. Mian & Rosenfeld (1993) also found that the RLBOs slightly outperform there Non-PE-backed peers. The most comprehensive study on RLBOs by Cao & Lerner (2009), specifically looked at the 3 years after the IPO with a relatively large sample and found that the RLBOs perform better than other Non-PE-backed and PE-backed IPOs, where no deterioration over time is found. They presented a stock performance analysis that is considered to be strong, as they used a lot of different methods to control if the outperformance is significant. Similarly, Chamberlain & Joncheray (2017), who used European data, also found a slight outperformance of the RLBOs relative to their PE-backed and Non-PE-backed peers as well as different market indices. As discussed, most of the studies on RLBOs show similar results on the performance of RLBOs being positive, relative to the market as well as other IPOs. This thesis makes a distinction between the performance relative to the market and against other IPOs (including PE-backed and Non-PE-backed IPOs). Therefore, our first hypothesis will be in line with the existing literature on RLBOs and are stated as follows:

H1.A Reverse Leveraged Buyouts in Europe outperform the market

H1.B Reverse Leveraged Buyouts in Europe outperform other PE-backed and Non-PE-backed IPOs

The next step in this thesis is finding significant explanations of the performance found in H1. To do this, it is important to look at both company and PE-fund specific elements in order to find out whether these characteristics influence the long-run performance of RLBOs. As discussed in the Literature Review, there are some elements imposed by PE-investors that can influence the long-run performance of a target. In recent history the media has extensively covered some examples where PE

has acted as short-term investors and this coverage has given PE a bad name in the eyes of the public.[9] If the PE-investors are indeed short-term oriented by hyping the flotation (instead of creating structural reforms) of their target pre-IPO, this should be seen back in the form of poor long-run performance of RLBOs. The market would react accordingly to the over-priced RLBOs, by not buying the stocks which in time will lead to the long-run performance being negative post-IPO. To find out if this public view is justified, this thesis investigates the holding periods of the targets and the effect on the long-run performance. The argument being that with a longer holding period, the PE-investor will have more time to create structural improvements for the target, which in time will lead to higher long-run performance. Antonsson & Palmér (2012) found that there is indeed a positive correlation between the holding period and the long-run performance after IPO. Cao & Lerner (2009) constructed a similar analysis to find a correlation between the two. What they found was also a positive correlation with the holding period and the long-run performance of an RLBO. Lastly, Jensen (2020) also found similar results. They constructed almost exactly the same investigation as Cao & Lerner (2009) but using a more recent data set. As expected, they also found that the long-run performance is positively correlated to the holding period of the PE.

Overall, the existing literature has shown a positive correlation between the holding period and the long-run performance of an RLBO, which is explained by the extra time for financial, governance and operational engineering by an active PE-investor on its target. Notably, the way a PE-fund is constructed as a closed-end fund, this thesis expects the holding period to be five or six years on average. Therefore, if the holding period is much shorter than the average, PE-investors will indeed acts as a short-term oriented investor leading to lower long-run performance for RLBOs. Therefore, the second hypothesis is constructed as follows:

H2. RLBOs with longer holding periods are more likely to have higher long-run performance.

The existing literature on the direct changes and contributions to the target RLBOs by the PE-investor and their long-run performance post-IPO is limited. This thesis wants to find if, and if so, which of the value creating mechanisms of a PE-investor in a RLBO have effect on the long-run performance. This chapter makes the same distinction between the value enhancing elements as discussed in the Literature Review to use as our hypotheses. Firstly, with financial engineering the focus in this thesis will mostly be on the usage of leverage and their benefits for the long-run performance of an RLBO. The existing literature described both the potential benefits and drawbacks of using a lot of leverage in acquiring a target. The benefits being higher tax-deductibility and more stringent governance where no Cash Flows will be left on the table (Levis, 2011; & Knauer et al.,

[9] One of the largest examples is Refco, a company that has been taken to IPO in March 2005, quickly after it had been bought by a PE-investor with a lot of leverage. Soon after the public offering, the stocks collapsed, and the company was taken off the stock market quickly.

2014). The drawbacks on the other hand being that using too much leverage creates costs of financial distress (Opler & Titman, 1993). These studies did not study RLBOs specifically but are still important for the line of reasoning. The effect of leverage and long-run performance is still a highly debated topic in the existing literature.

The limited existing literature on RLBOs specifically and long-run performance also have tried to cover the effect on using leverage in the RLBO and their long-run performance. Cao & Lerner (2009) have found indicative evidence that firms with higher levels of leverage show higher long-run performance in the years following the IPO. Also, Jensen (2020) found indicative evidence that the usage of more leverage could partially explain a high long-run performance of the RLBO. Therefore, based on the tax deductibility and more stringent governance towards cash flows left on the table, this thesis expects the usage of leverage to be positive correlated with the long-run performance of an RLBO, and therefore the third hypothesis states:

H3. The usage of higher leverage by a PE will enhance the long-run performance of an RLBO after IPO.

Lastly, there are still a lot of things left untouched in this thesis that could also possibly influence the performance of the RLBOs in the European market. It is crucial to really understand what it is that makes an RLBO successful in the long run, as it can have large implications for the strategy of PE-investors, as well as the way the target comprehends the value enhancing strategies pushed by the PE-investors.

Another important element that this thesis therefore researches is the reputation of the PE-investor investing capital in the target. Both Krishnan et al. (2011) and Carter et al. (1998) found that the more reputable and larger the PE-firm investing is, the higher the long-run performance will be. Changa et al. (2010) also found that the reputation of the PE-investor leading the deal has a positive influence on the long-run performance after IPO. This study shows that the more reputable firms use better cash flow management than the less reputable PE firms. The literature generally states that the better the reputation of the lead PE-investor, the higher the chances of targets being well ‘picked’ as well as being better engineered which both result in higher long-run performance of RLBOs. Based on the existing literature, this thesis’ fourth hypothesis is stated as:

H4. The reputation of PE-lead investor will enhance the long-run performance of an RLBO after IPO.

4 Data

The identification of RLBO transactions in Europe and collecting reliable data on the sample and the benchmarks is challenging and time consuming. However, constructing a reliable sample is key in answering the research questions. In the existing literature on RLBOs, the number of RLBOs in the samples varies significantly, with the smallest sample consisting of 40 RLBOs and the largest consisting of 526 RLBOs (Chamberlain & Joncheray, 2017; Cao & Lerner, 2009). The difference in sample size can be explained by the different time periods used, as well as the different approaches used in identifying the RLBO sample.[10] The following sub-chapters describe the sample selection process of the RLBOs, the PE-backed IPOs and the Non-PE-backed IPOs as well as the benchmarks in more detail. Moreover, a description of the sample and the sub-samples is given.

4.1 Sample Selection

This thesis builds a comprehensive collection of RLBOs in Europe between the beginning of 2001 and the end of 2015. The cutoff point at 2015 is chosen to make sure that there is enough data for three years of stock data post-IPO, in order to be able to construct a long-run analysis of the performance of the sample. The first step in constructing the sample is finding all IPOs in the period between 2001 and 2015. Following Chamberlain & Joncheray (2017), this thesis uses the United Kingdom, Germany and France as countries where the stocks are publicly offered. These specific countries are chosen, because the combination of these countries accounts for almost 75% of all IPOs that occurred in Western Europe at the time period used in this thesis, making it a well suitable sample to explain long-run RLBO performance in Europe.[11] Choosing these specific countries also makes the results better comparable with the existing literature.

The sample consists of 811 European-backed and Non-PE-backed IPOs that have been publicly offered between the first of January 2001 and the 31th of December 2015. The starting date is chosen as such, because the data on RLBOs prior to the cutoff date is relatively incomplete and scarce. Also, by choosing 2001 as the starting date, an analysis on the RLBOs during and after the dotcom crisis is allowed for. The RLBOs in this sample are defined by using a combination of the criteria used by Cao & Lerner (2009) and Kaplan & Strömberg (2009). All the RLBOs in the sample must meet all the criteria's to be added to the RLBO sample. The criteria used in this thesis are summarized in Table 1.

[10] Different papers use a different set of stringency of rules to determine if a RLBO is really a RLBO. Differences can be seen in *i.* Some papers use a minimum market capitalization when shares are offered, some don't set this minimum. *ii.* Some papers only use the largest stock exchange of the country; others use all the stock exchanges.

[11] Calculated by dividing all the IPOs of the 4 sample countries by all the IPOs in Western Europe using the SDC Platinum's New Global New Issues Database.

Table 1: RLBO Criteria

The following table present a summary of all the criteria RLBOs need to meet in order to be added to the sample. Only if the RLBO meets all four criteria is it considered an RLBO in this thesis. If a firm only meets the first two criteria, it is considered an LBO in this thesis.

Criteria	Explanation
1	The financing of the transaction pre-IPO must be undertaken by at least one Private Equity firm.
2	The transaction prior to the IPO is characterized by the usage of at least 50% of Leverage.
3	The firms have been subject to an IPO before, or if it had belonged to a listed firm as a separate division.
4	The IPO is at least traded publicly for three-years.

4.1.1 Reverse Leveraged Buyouts

To construct the RLBO sample, first all the PE-backed IPOs from the beginning of 2001 until the end of 2015 are retrieved using SDC Thomson One and SDC Platinum's New Global New Issues Database, as the first criterium for an RLBO is that a transaction pre-IPO must be undertaken by at least one PE-firm. Using both databases, this search accumulates 168 PE-backed IPOs in our sample. The next step then is trying to identify how many of these PE-investments used more than 50% of leverage in the transaction prior to the IPO. In trying to identify this, two main obstacles are present that make this identification difficult. Firstly, Cao & Lerner (2009) showed that the PE-investors are not obligated to disclose all of their investments and transactions. Secondly, if the investments are disclosed, the usage of leverage in the Buyout by a PE is often not disclosed specifically. Similar to Kaplan & Strömberg (2009), this thesis investigates all of the financing characteristics by thoroughly reading SEC filings, the IPO prospectus' and press releases, using multiple databases and platforms including Factiva, Zephyr, SDC Thomson One and Capital IQ. If there is any absence of the 50 % threshold level of leverage used in the transaction prior to the IPO, this leads to the removal of the IPO from the sample. If a company meets the first two criteria, it is considered as an LBO in this thesis.

Once the sample of LBOs is amassed, the next step is to find out whether these LBOs have been subject to an IPO before, or if it had belonged to a listed firm as a separate division, as this is the third criterium for an RLBO. To do this, the IPO tickers of all the LBOs are downloaded using Datastream and Bloomberg.[12] With these tickers, several archives of both control and regulatory authorities as well as Factiva.com are checked to find if the LBO has been subject to an IPO before. If no sufficient information is found indicating they have been listed before using the above-mentioned tools, they are removed from the sample. Lastly, in order to investigate the long-run performance of the RLBOs in the sample, a minimum of three years' worth of stock data is needed to assess the long-run performance. Therefore, the last criterium is that the RLBO is listed for at least 3 years.

[12] Tickers refer to three or four-digit company specific codes that are used to identify publicly owned companies.

The data collection for the RLBO sample is time consuming, as hundreds of manual requests have to be entered in Factiva.com, and all IPO prospectus' have to be read thoroughly to find the information needed to add an LBO to the RLBO sample. However, the key in having reliable results, is having a reliable sample of RLBOs, that really are RLBOs. Fortunately, a mistake in the identification is unlikely. After reading each IPO prospectus and finding if the LBO has previously been subject to an IPO or had belonged to a listed group, this thesis finds 50 RLBOs in Europe.

4.1.2 PE-backed IPOs

To compare the sample of RLBOs with other PE-backed IPOs, the PE-backed IPOs are also obtained using SDC Thomson One and SDC Platinum's New Global New Issues Database. All of the PE-backed IPOs that were issued between 2001 and 2015 yield a sample of 213 IPOs. In each of these PE-backed IPOs, some company specific codes are also obtained, including the ISIN code[13], SIC code[14] and Tickers. These codes are important in order to retrieve the corresponding stock prices and company specific accounting variables. Therefore, if both SDC databases do not provide enough sufficient information regarding the aforementioned company specific codes of the PE-backed IPOs, they are removed from the sample. This led to the sample dropping from 213 to 168 PE-backed IPOs in Europe. After removing the 50 RLBOs found as described above, the PE-backed sample contains 118 PE-backed IPOs.

4.1.3 Non-PE-backed IPOs

Finally, the RLBOs will also be closely matched with Non-PE-backed IPOs. Therefore, the list of Non-PE-backed IPOs is also obtained using the SDC Thomson One and SDC Platinum's New Global New Issues Database. At first, the Non-PE-backed IPOs consist of 1471 IPOs, but after removing all the duplicates and the IPOs that do not have the company specific codes as mentioned above, the Non-PE-backed sample consists of 643 IPOs that occurred between 2001 and 2015 in Europe.

4.1.4 Benchmark Data

To find the abnormal long-run performance of all the different sub-samples, two separate benchmarks are used. For the first benchmark, the daily stock prices of the FTSE 100 are used to calculate the long-run abnormal returns of the whole sample. The FTSE 100 index is retrieved using Yahoo! Finance and cross-checked using Investopia.com. Secondly, the RLBO sample is tested against a group of well-matched benchmarks including other PE-backed IPOs as well as Non-PE-backed IPOs. How these benchmarks are matched is described in more detail in Chapter 5.

[13] The International Securities Identification Number (ISIN) is a unique alphanumeric code that uniquely identifies a specific securities issue.
[14] The Standard Industrial Classification (SIC) are four-digit codes that organize companies into different primary industries.

4.2 Sample Description

Table 2 presents an overview of the time-series distribution of the sample. From 2001 until 2004 the total number of offerings increased steadily. This increase is in line with the expectations regarding the recovery phase of the dotcom bubble, as discussed in the Literature Review. As shown in Table 2, the FTSE 100 returns are negative in the two years following the dotcom bubble, with the number of IPOs being relatively low, but increasing. After the recovery phase, the number of offerings increases steadily to eventually reach a peak in 2006 and 2007, where a combined 234 IPOs took place. The table clearly shows a significant decrease in offerings in the year 2008, which is caused by the crisis. In 2008 only 13 IPOs took place, almost 10 times less than the year before. After the crisis the number of offerings again increases steadily, similar to before the crisis. The number of offerings shadow the different boom-and-bust cycles described in the Literature Review.

Table 2: Time-series distribution and FTSE return

The total sample includes 811 IPOs of which 50 are RLBOs and 118 are PE-backed and 643 are Non-PE-backed IPOs between January 2001 and December 2015 in Europe. The FTSE 100 market return is shown as a general measure of how the markets have done in the sample years.

Year	RLBOs	PE-backed	Non-PE-backed	Total IPOs	FTSE return
2001	1	1	12	14	-16
2002	1	4	20	25	-24
2003	2	2	26	30	12
2004	6	10	60	76	7
2005	6	7	44	57	16
2006	5	12	89	106	10
2007	8	13	108	129	3
2008	0	2	11	13	-32
2009	1	3	4	8	18
2010	3	3	34	40	7
2011	1	3	29	33	-7
2012	2	6	30	38	3
2013	4	13	41	58	12
2014	6	25	71	102	-3
2015	4	14	64	82	-4
All	50	118	643	811	

Next, Table 3 presents the distribution of the sample and the sub-samples divided into their primary industries. To construct the table, the SIC numbers are used in order to distribute them into their

primary industry sectors. Table 3 shows that manufacturing is the most common industry for RLBOs with 44%. The Finance and Transportation & Utilities industries are also commonly used industries for RLBOs with a combined share of 32%. The rest of the industries all take up a relatively small share of the sample. This is explained by RLBOs generally being more established, as they've been listed prior to the LBO and are therefore more mature. Similarly, there are no technology RLBOs in the sample, which can be explained by the fact that Technology companies are generally less mature. Also, this can be linked to firms active in Technology generally receiving more interest from VC funds, relative to PE-funds. The PE-backed IPOs similarly focus more on later-stage rounds and in more established firms, with their largest share in industry also being in manufacturing with 25 %. Also, Retail Trade and Services are popular industries for PE-Backed IPOs with a combined share of 39%. Comparing the PE-backed IPOs with the Non-PE-backed IPOs in terms of industry, the Non-PE-backed IPOs show a more even distribution regarding their industries. Not surprisingly, the Non-PE-backed sub-sample also has the highest share of IPOs in the manufacturing industry, which suggests manufacturing being the most popular industry for IPOs in Europe. Differences however show in industries such as Transportation & Utilities and Retail trade, which are popular industries for both RLBOs and PE-Backed-IPOs, but not for Non-PE-backed IPOs.

Table 3: Industry Sectors

The total number of RLBOs is 50 and the distribution of which industry these RLBOs took place between 2001 and 2015 are shown is this table. The table shows the frequency and percentages of the industry distribution of RLBOs, PE-backed IPOs and Non-PE-backed IPOs respectively.

	RLBOs		**PE-backed**		**Non-PE-backed**	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Agriculture	2	4%	0	0%	6	0.9%
Construction	0	0%	0	0%	9	1.4%
Finance	9	18%	13	11%	135	21%
Manufacturing	22	44%	29	25%	206	32%
Mining	0	0%	5	4%	54	8.4%
Retail Trade	3	6%	19	16%	29	4.5%
Services	6	12%	27	23%	144	22.4%
Transportation & Utilities	8	16%	18	15%	46	7.2%
Wholesale Trade	0	0%	7	6%	14	2.2%
Total	50	100%	118	100%	643	100%

Table 4 presents the geographical distribution of the sample and the sub-samples. Inspecting the table shows that more than half of the RLBOs occurred in the U.K. (60%), which seems to be consistent with the British market being more mature than the French and German IPO markets. The total amount of IPOs is also predominantly led by the U.K. with 60% of all IPOs in the sample. Interestingly, the share of German RLBOs is relatively high (26%), with the total share of German IPOs being the lowest of the three countries (16%). In contrast, France holds a relatively lower share of RLBOs (14%), but a relatively high share in total IPOs (24%).

Table 4: Geographical distribution

This table presents the geographical distribution of the sample and the sub-samples including RLBOs, PE-Backed IPOs and Non-PE-backed IPOs. The countries where the IPOs took place consist of France, Germany and the United Kingdom. The frequency as well as the percentages are given.

	RLBO	Percentage	PE-Backed	Percentage	Non-PE-backed	Percentage	Total	Percentage
France	7	14%	19	16%	164	25%	190	24%
Germany	13	26%	24	20%	95	15%	132	16%
U.K.	30	60%	75	64%	384	60%	489	60%
All	50	100%	118	100%	643	100%	811	100%

Table 5 presents the descriptive statistics of the mean values of the RLBO sample and the sub-samples. As shown in Table 2, the amount of Non-PE-backed IPOs in Europe is a lot higher than the PE-backed IPOs, indicating that the Non-PE-backed IPOs still dominate the public markets. However, RLBOs and PE-Backed IPOs are much larger in size, where the Firm Size, calculated as the number of shares outstanding times the stock price after IPO, for RLBOs and PE-Backed IPOs is almost double the size of the Non-PE-backed IPOs. In theory, the Firm Size could be affected by irrational investor sentiment and it does not include net debt, therefore not making it a complete predictor of the enterprise value. However, the superior size of RLBOs and PE-Backed IPOs is confirmed by the Total Asset value which on average is almost 5 times higher for PE-backed IPOs (EUR 2.4 bln) in comparison to its Non-Backed counterparts (EUR 434 mln). Similarly, the Issue Size, which is calculated by multiplying the shares offered in the IPO with the offer price, shows large deviation between PE-Backed IPOs and Non-PE-backed IPOs. The mean Issue Size of the RLBOs in the sample is EUR 496 mln against the mean of EUR 248 mln for Non-PE-backed IPOs, with the mean of the PE-backed IPOs also being strikingly higher with an average of EUR 429 mln. The descriptive statistics on the Issue Size do not come as a surprise, as both the Firm Size as well as the Total Assets are a lot higher for PE-Backed IPOs relative to Non-PE-backed IPOs. One possible explanation for the dispersion in size between the different sub-samples, is the Age of the firm, which is calculated as the

interval between the founding year of a firm and its IPO date. Table 5 shows a clear difference between the Age of RLBOs (67 years) and PE-Backed IPOs (32 years) and Non-Backed IPOs (25 years). It is not surprising that RLBOs are much older relative to other IPOs, as they have been listed before, or had belonged to a listed firm. Being listed twice therefore leads to the Age being almost 2 times larger than the PE-Backed IPOs and almost 3 times higher than the Non-PE-backed IPOs. The differences in Age in this sample are similar to the results found by Cao & Lerner (2009).

One of the most important elements of Table 5 is Underpricing, which is calculated as the first day closing price minus the subscription price divided by the subscription price. Clear differences between the sample and the sub-samples in Underpricing can be inferred from Table 5. The average PE-Backed IPO underpricing level at 27% is almost half of that of IPOs without PE-backing (52.2%). The underpricing of the RLBOs showcases an average of 41.8% which lies between the PE-Backed IPOs and the Non-Backed IPOs. These results are in line with Brav & Gompers (1997), who explained the relatively lower underpricing for PE-Backed IPOs through the pricing abilities of the PE-investor and the reduction of information asymmetry. With similar regard, the Price-to-Book ratio (P/B), calculated by dividing market capitalization with total book value of the firm, is higher for the Non-PE-backed IPOs relative to both RLBOs and PE-Backed IPOs. The Price-to-Book ratio is a proxy for how well the stocks do in the market in comparison to their book value, therefore a high P/B ratio is a proxy for the stock being expensive. Table 5 depicts the Non-PE-backed IPOs have a higher P/B ratio (21) relative to RLBOs (5.9) and PE-Backed IPOs (10.8). This is all indicative for the RLBOs and the PE-Backed IPOs being less overpriced relative to the Non-Backed IPOs. Similar results are found by Cao & Lerner (2009).

Lastly, another important difference is shown in Table 5 regarding the Leverage ratio. The ratio is calculated by dividing the Total Debt with the Total Assets at the time of the IPO. As expected, the PE-backed IPOs present a higher ratio (0.318) in comparison to its Non-PE-backed counterpart (0.218). The large difference in debt is not a surprise, given the use of the LBO-model by Private Equity. The RLBOs however, have the highest use of leverage of them all with a 0.354 Leverage Ratio. Again, this is explained by the use of the LBO-model by PE-investors and in line with the existing literature (Jensen, 2020; Cao & Lerner, 2009). The Leverage ratios are similar to Levis (2011). Notably, the Leverage ratios at the time of the IPO are expected to be lower relative to the Leverage ratio shortly after the acquisition. This is explained by the PE-investors gradually paying off debt during their holding period (Appelbaum et al., 2013).

Overall, the findings in Table 5 are in line with the expectations. Both the RLBO sample and the PE-Backed IPOs are larger in terms of Firm Size, Total Assets and in Leverage, relative to Non-PE-backed IPOs. Furthermore, Underpricing is less severe for backed issues in comparison to the Non-PE-backed issues. Differences between RLBOs and PE-Backed IPOs are seen in RLBOs being older, having a larger Issue Size and using more Leverage.

Table 5: Descriptive Statistics sample

This table shows the most important descriptive statistics including initial Underpricing, the Firm size (in EUR mln), the Total Assets (in EUR mln), the Leverage Ratio (at the time of the IPO), the Age of the firm (in years), the Issue size (in EUR mln), the Price-to-Book ratio (P/B) and the 1, 2 and 3 year BHARs (in percentages).

	RLBO	PE-Backed	Non-PE-backed
Underpricing	41.8 %	27.0 %	52.2 %
FirmSize	2.041	2.453	1.113
TotalAssets	2.028	2.083	434
Leverage	0.354	0.318	0.218
Age	67.2	32.5	25.6
IssueSize	496	429	248
P/B	5.9	10.8	21.0
Bhr_1	21.55 %	58.63 %	114.14 %
Bhr_2	18.77 %	48.23 %	77.54 %
Bhr_3	27.53 %	43.64 %	87.85 %

4.3 Stock Price Data and the company specific accounting variables

Both the SDC Thomson One Database and the SDC Platinum's New Global New Issues Database Database give sufficient information regarding public offerings. However, they do lack the stock prices following the IPO, as well as any company specific accounting variables. To find these, the Compustat and Bloomberg databases are used. The Compustat database is used to retrieve all the daily stock prices of the entire sample up until three years post-IPO. To retrieve the stock prices, the closing daily prices from the first day of 2001 until the last day of 2018 are obtained, which are necessary to thoroughly assess the long-run performance of the RLBOs. These stock prices are needed to compare the RLBOs post-IPO performance relative to both a market index and other matched PE-backed IPOs and Non-PE-backed IPOs. Moreover, Compustat is also used to retrieve the quarterly accounting variables of all the IPOs in the sample. An overview of all the Accounting Variables used is shown in Table 6. Unfortunately, the accounting variables pre-IPO are too limited to construct any sort of analysis between the differences in accounting variables pre and post-IPO. Therefore, the accounting variables will be used from the first quarter up until three years post-IPO (using yearly time intervals).

Table 6: RLBO Accounting Variables

This table gives an overview of all the accounting variables used for comparison with the benchmarks in Chapter 6, consisting of the Liabilities ratio, the Return on Assets (ROA), the Return On Assets 2 (ROA2), the Sales/Turnover ratio and the Revenue ratio. The table presents the both the mean and median of the accounting variables at the time of the IPO (year 0), Year 1, Year 2 and Year 3 post-IPO, respectively.

t	Year 0		Year 1	
Ratios	Mean	Median	Mean	Median
Liabilities Ratio	0.805	0.799	0.633	0.652
Return On Assets (ROA)	0.045	0.034	0.038	0.034
Return On Assets (ROA2)	0.030	0.023	0.024	0.026
Sales/Turnover ratio	355418	138992	355114	171902
Revenue Ratio	0.324	0.260	0.281	0.204
	Year 2		**Year 3**	
Ratios	Mean	Median	Mean	Median
Liabilities Ratio	0.621	0.620	0.607	0.591
Return On Assets (ROA)	0.042	0.033	0.038	0.032
Return On Assets (ROA2)	0.029	0.021	0.026	0.021
Sales/Turnover ratio	367743	176433	354285	179707
Revenue Ratio	0.280	0.202	0.283	0.199

4.4 RLBO-specific descriptive statistics

Table 7 depicts an overview of the RLBO-fund specific descriptive statistics of the sample. These statistics are important for the regressions which are described in more detail in Chapter 5. Firstly, the Fund Size in Table 7 is the amount of capital in EUR mln of the fund with the largest known invested capital in the firm pre-IPO. To obtain these Fund Sizes, the SDC Thomson One, SDC Platinum's New Global New Issues Database, and Zephyr databases are consulted. The Fund Size (in EUR mln) averages around EUR 3,5 billion, with funds ranging between EUR 63 million to EUR 21 billion. The large varying range condemns the natural question whether these differences in fund sizes are seen back in the form of higher long-run performance of a RLBO. Similarly, the Deal Value (in EUR mln) is the largest known amount of money invested by a PE-investor in the firm prior to the IPO, which is obtained using the SDC Thomson One and Zephyr database. Similar to the Fund Size, the Deal Sizes also show a large range between EUR 40 million and EUR 2.7 billion with an average of EUR 617 million. The deal values are also expected to significantly affect the returns of the RLBOs.

Furthermore, this thesis computes a reputation rank of the PE-investors, using the private equity rankings of the *Private Equity International magazine* that are published yearly. The PE firms are ranked between 1 and 9, based on their ranking score of the *PE international Magazine*, amount of funds raised, and the IRR returns of the portfolio companies. Similar to Chamberlain & Joncheray (2017), this thesis holds the ranking constant over time, as the ranking tends to remain relatively constant over time. This thesis finds that the PE-firms with the highest rank, are often the ones with the highest number of fundraising, including Carlyle, the Blackstone Group and Kohlberg Kravis Roberts & Co (KKR). The sample also includes club syndicates, where multiple PE-firms invest in the same deal. In this case, this thesis uses the Fund Size, Deal Size and Fund Reputation of the PE-firm with the largest amount of equity invested. Lastly, the Holding Period of the portfolio company averages about 4 and half years. This is in line with the existing literature and can be explained by the PE-fund construction that is closed-end (Cao & Lerner, 2009; Antonsson & Palmér, 2012) Therefore, after an average of 53 months the RLBOs will be divested by the PE-investor through an IPO. Expected is that this is long enough for PE-investors to create structural value adding mechanisms, which then subsequently creates long-run performance for the RLBOs in our sample.

Table 7: RLBO fund Descriptive Statistics

This table shows all of the characteristics of the RLBO-fund including the Fund Size (in EUR mln), the Deal Size (in EUR mln), the Buyout Fund Rank (ranked between 1 and 9) and the holding period (in months). For all the fund descriptive statistics this table provides the mean, the median, the quartiles, the standard deviation and the minimum and maximum.

	Mean	p50	p25	p75	SD	Min	Max
FundSize	3.655	1600	323	425	4974	63	21.600
Deal Size	617	411	150	900	659	40	2.718
Sponsor Rank	5.12	5	3	7	2.57	1	9
Holding Period	53	43	31	61	43	9	250

In Appendix A, an overview of all the data sources used is given. This table includes all of the data sources used to find the complete sample. Also, the explanation of the variables is included. They consist of the stock price data, accounting variables and the PE-firm specific variables.

5 Methodology

The methodology used throughout this thesis is two-fold. In the first part of the research, the long-run performance of RLBOs is tested against several benchmarks, including a market index and firm-matched IPOs using long-run stock performance. In the second part of the research possible drivers of this performance are investigated. Notably, the Methodology follows the hypotheses in a sequential matter. All of the separate elements are explained in more detail in the following sub-chapters.

5.1 Long-run RLBO performance

The first research question of this thesis is stated as: Do European RLBOs outperform the market and other IPOs (including PE-Backed and Non-PE-backed IPOs)? To answer this, this thesis investigates two separate hypotheses divided into H1.A European RLBOs outperform the market and H1.B European RLBOs outperform other IPOs. To answer both hypotheses, similar methods are used. However, different benchmarks used to answer hypotheses H1.A and H1.B.

To answer both hypotheses H1.A and H1.B an Event Study is composed on the long-run stock returns of RLBOs. The Event study method proves useful to measure the effect of an economic event and its impact on the value of the firm (Campbell et al., 1997). In assessing the long-run performance of RLBOs, this thesis uses similar approaches and methods as constructed by Cao & Lerner (2009) and Jensen (2020). This is to ensure comparability with previous researches, who constructed similar hypotheses.

To assess the long-run performance of RLBOs, post-IPO stock returns up to and including three years post-IPO are investigated on a yearly basis, with the exception of the first interval after six months. This implies that for the RLBO sample and the two sub-samples (PE-backed and Non-PE-backed) returns after 6, 12, 24, and 36 months are calculated. The six-month starting point is chosen, because studies have shown a short-term overperformance due to underpricing at the time of the IPO (Rock, 1986). Lee & Wahal (2004) have shown that the short-term underpricing has an effect on the long-run performance, therefore this thesis follows Lee et al. (1996) and calculates the Underpricing as follows:

$$R_i = \frac{P_i - S_i}{S_i} \qquad [1]$$

where, R_i is the short-term performance, P_i is the first day closing price and S_i is the subscription price.

Similar to Jensen (2020), both the Equally and the Value Weighted returns are constructed and used in the analysis. Using the Equally Weighted approach gives an insight on how small firms' performance is different from large firms. The Value Weighted Approach on the other hand, captures the impact of the large firms, leading to an interpretation on a more overall wealth change by

measuring the companies to weight using their Market Capitalization. Using both methods also ensures robustness of the results.

5.1.1 Outperformance against the market

The first part of the first hypothesis is stated as follows: 'H1.A Reverse Leveraged Buyouts in Europe outperform the market.' To answer this, this thesis constructs the Cumulative Abnormal Returns (CAR), the Buy-and-Hold Raw Returns (BHR) and the Buy-and-Hold Abnormal Returns (BHAR). These methods are used to compare the returns of the RLBO with the market (FTSE 100), similar to the analysis as constructed by both Jensen (2020) and Cao & Lerner (2009).

To answer hypothesis H1.A, the RLBO sample will be tested against a market index. In this thesis the FTSE 100 index is used as this index contains a good overview of the most important stocks on the exchanges in the U.K. and is considered as a key indicator of the general stock market development in the U.K.. As shown in Table 4, the sample is dominated by the U.K. with 60%, therefore making the FTSE 100 a good predictor of the general economy of the whole sample. Other stock indices such as DEX 30, CAC 40 are also considered, but following Tabner (2012) the FTSE 100 is chosen, as he showed that the FTSE 100 is the most comprehensive in nature, and therefore best to use as a benchmark for this European sample.

One of the biggest advantages of using an index as a benchmark, is that indices incorporate several time factors. This implies that the economic prosperity or downturn in a certain period is shown in both the sample and the benchmark, therefore controlling for such economic ups and downs. However, there are also some drawbacks that arise from only using a market index as the benchmark, which include the new listing bias and the rebalancing bias. The new listing bias entails that as a new stock underperforms relative to market averages, through sample firms usually having a longer pre-event return record and the benchmark portfolio samples usually include firms that have only just begun trading. The rebalancing bias usually arises because the compounded return on the benchmark portfolio assumed some sort of periodic rebalancing.

5.1.2 Outperformance against other IPOs

The second part of the first hypothesis is stated as follows: 'H1.B Reverse Leveraged Buyouts in Europe outperform other PE-backed and Non-PE-backed IPOs'. To answer this, this thesis sheds light on the long-run performance of RLBOs against other PE-backed IPOs as well as Non-PE-backed IPOs. To do this, the firm-matching approach is constructed using Propensity Score Matching (PSM).

Similar to the existing literature on RLBOs, the sample of RLBOs will be matched against other IPOs (Cao & Lerner, 2009; Chamberlain & Joncheray, 2017). Using this firm-matching approach leads to the disappearance of both the new listing bias and the rebalancing bias, which appear by only using a market index as a benchmark. The new listing bias disappears in firm-matching, as both portfolios consist of newly listed companies. Also, the rebalancing bias disappears

because both of the portfolios are compounded with rebalancing. Because of the disappearance of both biases, this thesis's main emphasis will be on the firm-matching approach.

To construct a well-matched benchmark for the RLBOs, this thesis uses a similar method as constructed by Austin (2010), called Propensity Score Matching (PSM). He showed that using this method allows for the design and analysis of an observational randomized study in such a way that it becomes a randomized controlled study. More precisely, this thesis constructs a matching technique called Nearest Neighborhood Matching. Using this matching technique, for every treated unit (the RLBO sample), it searches for a control unit with the highest propensity score (Lee & Masulis, 2011). The propensity scores are obtained from a predicted probability taken from a first stage probit estimation. More specifically, the sample of RLBOs are matched with both PE-backed IPOs, as well as with Non-PE-backed IPOs based on similar characteristics in order to find significant differences. In this thesis Propensity Score Matching (PSM) is employed as an efficient way to match the RLBOs with other IPOs (including PE-backed and Non-PE-backed IPOs) based on multiple dimensions. Moreover, the PSM also addresses potential endogeneity problems that are associated with PE-investment and long-run performance. This method is especially valuable in this thesis, as many characteristics of the RLBOs sample deviate a lot from each other, making the RLBO sample diversified. The different dimensions used for the Propensity Score Matching are described in more detail below.

i. Industry Matching: This method is to make sure that the benchmark companies are active in the same industry. The SIC codes are used to divide the sub-samples into their different primary industries.

ii. Firm size matching: This thesis also constructs a method to match the benchmark based on size. To do this, the companies are matched based on their Total Assets.

iii. Date-matching: This thesis will also match the Issue dates of the IPOs, in order to control for time specific elements such as economics prosperity or downturn.

More details on the Propensity Score matching can be found in Appendix B. In this Appendix the probit regressions for establishing the 'closest' benchmark firms are given, together with the RLBOs and their matched IPOs including the difference in PSM scores. The scores give an indication of how good the match is.

5.1.3 Cumulative Abnormal Returns (CAR)

As mentioned before, to answer both H1.A and H1.B the Cumulative Abnormal Returns (CAR) method is used. In order to calculate the CAR, the first step is calculating the Abnormal Returns (AR). There are multiple possibilities for calculating the Abnormal Returns. This thesis follows the Market-adjusted Model by MacKinlay (1997), as this method is widely used in studies of underpricing of IPOs (Ritter, 1991). Once the Abnormal Returns are constructed, it is fairly simple to find the Cumulative Abnormal Returns (CAR) as well as the Buy-and-Hold Abnormal Returns (BHAR).

The Raw Returns are found using the daily percentage changes of the stock returns of the whole sample at all the different time intervals used. The Raw Returns are formally described as R_{it} in Formula [2]. In order to find the Cumulative Abnormal Returns, you take the sum of each day's or years' average abnormal returns over time. The expected return of every individual firm in the sample is calculated using the following formula:

$$AR_{it} = R_{it} - E(R_{it}), \quad [2]$$

Where, R_{it} is the daily t raw return on a sample firm, the $E(R_{it})$ as the month t expected return for the sample firm. In this thesis the R_{it} is the FTSE 100 market index as the expected return for each security.

Following Barber & Lyon (1997) aggregating this for all firms across all periods is the Cumulative Abnormal Return. The formula used for this is constructed in the following way:

$$CAR_{it} = \sum_{t=1}^{T} AR_{it}, \quad [3]$$

where, AR_{it} is the Abnormal Return calculated using Formula [2] of this thesis.

To answer hypothesis H1.A, a statistical two-sided T-test is constructed to check whether the CARs of the RLBO sample are significantly higher or lower than the market. Similarly, to answer hypothesis H1.B the same two-sided T-test is constructed to check whether the CARs of the RLBO sample are significantly higher or lower than the return of the firm-matched benchmark.

Although the CAR method is not wrong per se, it has received some criticism in the existing literature. It is realized that the CAR method ignores the compounding effect when calculating the returns, leading to a measurement bias, which could lead to positively skewed biased long-run performance results according to Barber & Lyon (1997). Moreover, in addition to the measurement bias, Barber & Lyon (1997) also find that using CAR leads to possible new listing bias and rebalancing bias. According to Barber & Lyon (1997), using the BHAR can reduce the rebalancing bias and it can measure investors' experience of holding a stock for a long period. Therefore, to mitigate the aforementioned biases, this thesis constructs a BHAR which is elaborated on in the next sub-chapter.

5.1.4 Buy-and-Hold Raw and Abnormal Return (BHR &BHAR) Approach

With similar regard, to answer both H1.A and H1.B the Buy-and-Hold Abnormal Returns are constructed (BHAR) method. As explained above, one possible drawback of using the CAR approach, is that it ignores the compounding effect, which leads to a possible measurement bias. In order to cope

with this, Barber & Lyon (1997) provided an alternative way to assess the long-run Abnormal Returns. Using the Buy-and-Hold Abnormal Returns (BHAR), which differs from CAR by using the firm's Abnormal return and subsequently including the mean 'compounded' returns as a measure of performance (Gregoriou & Kooli, 2006). More specifically, the average multiyear return from a strategy that is completed after an event is included. After an event, using BHAR, there is a given holding period (in this thesis maximum of 3 years) where the strategy ends. Using this method therefore includes the perspective of a private investor who was not able to partake in the IPO initially. To explain this in a more illustrative fashion, the stock price after six months is calculated, and the daily returns are compounded, whereafter the benchmark is subtracted. This will provide the Buy-and-Hold Abnormal Returns of a separate offering. By using BHAR, there will be a more sophisticated estimation of the performance of the RLBOs, without the measurement bias, as the BHAR accounts for the compounding effect of returns. Therefore, the main emphasis of this thesis will therefore be on the BHAR method, where CAR is used to control for the robustness of the results. The formula for the Equally Weighted BHAR is described in Formula [4] and calculates the Buy-and-Hold Abnormal Returns of all the IPOs in the sample.

$$BHAR_{it} = \prod_{t=1}^{T}[1 + R_{it}] - \prod_{t=1}^{T}[1 + E(R_{mt})], \qquad [4]$$

where, R_{it} are the daily raw returns of the IPO, $E(R_{it})$ are the monthly raw returns of the sample and $E(R_{mt})$ are the monthly returns of the FTSE 100 index.

The Buy and Hold Raw Returns are shown as R_{it} in formula [2]. For both H1.A and H1.B, this thesis constructs both the Equally and the Value Weighted returns of the portfolios of the benchmarks. The difference between the two is how the underlying holdings of the benchmarks are held in different proportions. In the Equally Weighted approach the underlying holdings are equally divided, whereas in the Value Weighted Approach there is a distinction made between firms with regard to their Market Capitalization weight relative the total Market Value. Brav et al. (2000) found that both approaches show significantly different outcomes. By using both, a clearer interpretation of the overall wealth deviation is shown. To calculate the Value Weighted Return of the Buy-and-Hold Abnormal Returns, the formula is constructed as follows:

$$BHAR_{it} = w_i \sum_{i}^{N}[\prod_{t=1}^{T}[1 + R_{it}] - \prod_{t=1}^{T}[1 + E(R_{mt})]], \qquad [5]$$

where w_i is calculated as $w_{i^{15}} = \frac{1}{N}, w_i = \frac{Mcap_i}{\sum_i^N Mcap_i}$, N is the number of observations, R_{it} are the raw returns of the stocks of the IPO and $E(R_{mt})$ are the monthly returns of the FTSE 100 index.

Eckbo et al. (2007) found that using the BHAR without an adjustment could lead to a skewness bias, as the lower limit is set to -100% and the upper limit is unlimited theoretically in long-run stock returns. Moreover, if the observations cannot be assumed to be normally distributed, the significance tests cannot be constructed properly. The solution to this problem is constructed by Lyon et al. (1999), who developed a bootstrapped skewness-adjusted T-statistic to address the problems described above. To answer H1.A, whether RLBOs significantly outperform the market, the following formula is used and applies to test both mean and median values of the returns. A one-sided Wilcoxon test is used when the data cannot be assumed to follow a normal distribution.

$$t_{sa} = \sqrt{n}\left(S + \frac{1}{3}\gamma S^2 + \frac{1}{6n}\gamma\right), \qquad [6]$$

where, $S = \frac{\overline{\mathrm{BHAR_t}}}{\sigma\,(\mathrm{BHAR_t})}$, $\hat{y} = \frac{\sum_{i=1}^{n}(\mathrm{BHAR_{it}} - \overline{\mathrm{BHAR}})^3}{n\sigma\,(\mathrm{BHAR_t})^3}$, n is the number of observations, $BHAR_{it}$ is the $BHAR$ of the IPO for time *t,* $\overline{BHAR_t}$ is the sample mean or median and the σ is the standard deviation of the abnormal returns of the sample.

Furthermore, to answer H1.B, whether RLBOs outperform other IPOs, similar significance tests on the BHAR returns are used as described in Formula [6]. This approach only applies when the data cannot be assumed to follow a normal distribution. By using these formulas, the non-normally distributed observations are then changed in such a way that they now can be assumed to be normally distributed. This way the significance tests can be applied properly. The main emphasis of this thesis will be on the BHAR method.

5.2 Cross-Sectional Multivariate Regression Model

The next step in this thesis is to answer Research Question 2, which is stated as: 'What are characteristics that make some RLBOs perform better than others'? The answers will be given following the second, third, and fourth hypothesis as stated in Chapter 3. To do this, this thesis constructs a cross-sectional multivariate regression analysis. To answer H2, H3, and H4, a combination of issue, company, and fund-specific characteristics are used in the regression analysis. The following sub-chapters discuss the regression analysis in more detail.

[15] The weight used in the formula is the Market Capitalization, following a study by Dias (2013) that found using the size and market capitalization control for the least amount of biases in using long-run stock performance.

5.2.1 Wealth Relatives (Dependent Variables)

Following Brav & Gompers (1997), Wealth Relatives (WRs) are used as the dependent variable in order to measure the performance of RLBOs. To obtain the Wealth Relatives (WRs), this thesis constructs the Value Weighted returns using yearly time intervals up till and including 3 years post-IPO. This implies that the 6-, 12-, 24- and 36-months Wealth Relatives (WRs) are calculated, using the following formula:

$$Wealth\ Relative\ i,t = \frac{(1+Company\ Return\ i,t)}{(1+Benchmark\ Return\ i,t)}, \quad [7]$$

Where, $Company\ Return\ i,t$ is the Buy-and-Hold Return for the observed company i for period t. The $Benchmark\ Return\ i,t$ is the Buy-and-Hold Return for the benchmark portfolio over the same observation period.

This method is used in a small fraction of the existing literature on long-run performance of RLBOs (Cao & Lerner, 2009; Antonsson & Palmér, 2012). If the Wealth Relative is larger than 1, this means that the company has outperformed the benchmark portfolio. Correspondingly, if the Wealth Relative is significantly lower than 1, the company has underperformed relative to the benchmark portfolio. The assumption is made that the investor will hold the stock (Buy-and-Hold) for the chosen time horizons. The Wealth Relatives of the different time-intervals used as a dependent variable allow for a valuable interpretation regarding the wealth creation as it measures the wealth created by RLBOs relative to the wealth created by the benchmark.

5.2.2 Holding Period, Leverage and Fund Reputation (Independent Variables)

This thesis constructs different explanatory variables that help answer H2, H3, and H4. To answer the second hypothesis, which is stated as: 'H2. RLBOs with longer holding periods are more likely to have higher long-run performance', this thesis adds the natural logarithm of the Holding Period (in months) of the PE-funds as an explanatory variable in the regression. As described in Chapter 3, multiple studies have found a positive relation between the Holding Period of a PE-fund and the long-run performance of a RLBO (Antonsson & Palmér, 2012; Cao & Lerner, 2009). The argument being that with a longer Holding Period, the PE-investor will have more time to create structural improvements for the target, which in time will lead to higher long-run performance. Therefore, the explanatory variable Holding Period in the regression is expected to be positive and significant. If so, the second hypothesis is accepted.

Next, to answer the third hypothesis which is stated as: H3. The usage of higher leverage by a PE will enhance the long-run performance of an RLBO after IPO', Leverage (Leverage Ratio) and Leverage Sqaured are added to the regression. As discussed, PE-investors tend to use a lot of leverage in acquiring their targets. The high levels of leverage can be explained by the high levels of tax-deductibility, as well as for the tightening of the free cash flows in the firm. Some of the literature on

Leverage and long-run performance are in favor of using leverage and explain that it creates higher long-run performance (Levis, 2011). Opposers state that it causes firms to get into financial distress, therefore creating worse long-run performance (Opler & Titman, 1993). So, there is no real clear consensus in the literature on having large amount of leverage and long-run performance. Therefore, by adding the Leverage ratio into the regression, this thesis will contribute to the existing literature with structural evidence. As hypothesized, this thesis expects a positive sign for the effect of Leverage on the Wealth Relatives for RLBOs up until a certain threshold level, as described by Opler & Titman (1993). To control for the non-linear effect of Leverage on long-run performance, Leverage Squared is also added to the regression. Following Demiroglu & James (2010), this thesis expects Leverage to follow an inverse U-shape on the long-run performance, as explained by the trade-off theory by Modigliani & Miller (1958). More specifically, a positive sign for Leverage and a negative sign for Leverage Sqaured is expected. If Leverage is positive and significant in the regression, H3 is accepted.

Lastly, to answer the fourth hypothesis, which is stated as: 'H4. The reputation of PE-lead investor will enhance the long-run performance of an RLBO after IPO', the natural logarithm of Fund Rank (between 1 and 9) is added to the regression. As described in the Literature Review, the more reputable funds tend to have higher long-run performance (Krishnan et al., 2011; Carter et al., 1998). This is explained by the fact that reputable firms haven proven to be well capable in picking 'winners' and governing the target firms in making them more efficient and profitable. Therefore, expected is that the Fund Rank in the regression is positively correlated with the long-run performance of RLBOs. Therefore, if Fund Rank is positive and significant in the regression, H4 will be accepted.

5.2.3 Control Variables

Apart from the aforementioned explanatory variables that give answer to H2, H3, and H4, there are also other control variables that might explain deviations in long-run performance between the sample. The different control variables are grouped into Issue Specific, Company Specific, and PE-fund specific variables. The control variables' explanations together with the expected regression signs are discussed in the next sub-chapters. Furthermore, the formal notation of the formulas used for the regression are also presented.

5.2.3.1 Issue specific control variables

The first group of independent variables used in this thesis, are Issue specific elements and include elements of companies that are newly listed. The regression is composed in the following way:

$$WR_1 = a + \beta_1 R_i + \beta_2 \, Ln\, FirmSize + \beta_3 MB + \beta_4 Ln\, IssueSize + \varepsilon_i \qquad [8]$$

One of the most important control variables in the regression is Underpricing (R_i). Using the existing literature, this variable can be explained in two separate ways. Firstly, IPOs that are subject to high investor sentiment on the first day of trading, are expected to be followed by negative long-run

performance as the companies are incapable of living up to the high expectations (Purnanandam & Swaminathan, 2004). This lower long-run performance due to overreaction of investors is described as the overreaction theory by DeBondt & Thaler (1985). Secondly, as previously discussed in the Literature Review, PE-investors tend to inflate certain operating-specific performance indicators which would result in higher initial valuations (Jensen, 2020). Following Purnanandam & Swaminathan (2004) this thesis expects a negative sign in the regression, based on the overreaction theory.

The Firm Size is calculated by the total number of outstanding shares multiplied with the stock price. The Firm Size is used in this regression, as Firm Size tends to be positively related to long-run performance as shown by Lee (2009). Moreover, larger firms are generally more diversified relative to small firms, and thereby have less risk exposure. The results of the existing literature suggest a positive correlation between Firm Size and the long-run Wealth Relatives. Next, a higher Price-to-Book (P/B) ratio is expected to show lower aftermarket performance. The Price-to-Book ratio is calculated as the market value of equity at the time of the IPO divided by the book value of equity. Therefore, a higher gap between the value of the company in the books and in the market would lead to higher uncertainty. In this thesis, higher uncertainty is expected to result in lower aftermarket performance. Therefore, a negative sign is expected.

Lastly, this thesis controls for the Issue Size. The Issue Size is defined as the net proceeds of the IPO, computed by the gross IPO proceeds minus fees and expenses. Generally, having a larger Issue Size generates more positive sentiments from market investors in the short run. However, in the long run it would generally lead to lower long-run performance (Dhamija & Arora, 2017). Therefore, a negative sign is expected in the regression.

5.2.3.2 Company specific control variables

The second group of control variables for the regression include the company specific operational and firm specific variables. These variables are also added to the regressions on the Wealth Relatives from one to three years post-IPO. The formal notation of the new regression is constructed as:

$$WR_2 = a + \beta_1 R_i + \beta_2 \, Ln\, FirmSize + \beta_3 PB + \beta_4 Ln\, IssueSize + \beta_4 Leverage + \beta_5 \, Leverage2 + \beta_6 \, Ln\, Age + \varepsilon_i \quad [9]$$

Besides Leverage and Leveraged Squared that are previously discussed as explanatory variables, another important variable in the company specific variables is Firm Age. The firms' natural logarithm of Age is constructed as the length of a company's operating history pre-IPO, which is calculated as the interval between the IPO year and the founded year. According to Ritter (1991), younger IPOs have lower long-run performance. Ritter (1991) explained this by showing that investors in older firms are generally overoptimistic. Therefore, a negative sign is expected.

5.2.3.3 Private Equity fund specific control variables

Lastly, the PE-fund specific elements are added to the regression, to assess whether differences in the PE-funds explain deviations of the Wealth Relatives in the long run. The final regression is constructed as follows:

$$WR_3 = a + \beta_1 R_i + \beta_2 \, Ln\, FirmSize + \beta_3 MB + \beta_4 Ln\, IssueSize + \beta_4 Leverage + \beta_5 \, Leverage2 + \beta_6 \, Ln\, Age + \beta_7 \, FundSize \, + \beta_8 \, Deal\, Size + \beta_9 \, Fund\, Rank + \beta_{10} \, Ln\, Holding\, Period + \varepsilon_i \quad [10]$$

Apart from the Fund Rank and Holding period, there are other PE-fund specific variables that might explain wealth deviations between the sample. Firstly, the Fund Size of the largest known fund that invested in the target prior to the IPO is investigated as a potential driver for outperformance of the IPO. Especially in the later years of the sample, the competition in PE has grown substantially. Therefore, investigating if the Fund Size has a positive influence on the long-run performance can show if the larger funds are indeed able to 'pick' winners better and subsequently show significantly better governing in the targets, which should be seen back in better long-run performance. Expected is that the larger funds have both better 'winner picking' ability and better governing abilities which creates long-run value for the RLBOs. With similar regard, the amount invested is also expected to be positively correlated with the Wealth Relatives.

5.3 Endogeneity

One of the most important issues in researching PE-investment and long-run performance is the problem of endogeneity in explanatory variables in regression models. This endogeneity issue can stem from different sources including omitted variables, simultaneity, and measurement error leading to spurious coefficient estimations (Roberts & Whited, 2013). The endogeneity problem that arises from PE-funding decisions have been addressed by many researchers and describe there being clear patterns in certain IPO characteristics and distributions which determine whether a company would receive backing (Lee & Wahal, 2004). The crux of the problem is therefore that in some cases, the PE-backing is not randomly distributed and therefore representing an endogenous choice. Because the PE-backing is not random, this introduces a selectivity bias where firms self-select for going into an RLBO or an IPO. As shown in Table 5, the large difference in Underpricing between PE-backed IPOs and Non-PE-backed IPOs is where the self-selection bias becomes visible. Therefore, this thesis' interest is in controlling for the Underpricing of PE-backed IPOs. Ideally, you would want to observe Underpricing for a PE-backed IPO and the Underpricing that the same IPO would experience, if it has not received the PE-backing. Unfortunately, due to the nonexperimental nature of the data, we actually observe Underpricing for PE-backed IPOs and Non-PE-backed IPOs. In other words, there are some (endogenous) decision made by PE-investors that might affect Underpricing, that need to be controlled for in order to find meaningful results.

To do this, this thesis uses two separate approaches to mitigate the issue. The first one being firm-matching, as similarly constructed by several researchers on RLBOs (Chamberlain & Joncheray, 2017; Cao & Lerner, 2009). Secondly, a Two-Stage Least Squares (2SLS) Regression Analysis is constructed as a control for firm-matching, as well as finding any prediction in choices of PE-funding. The 2SLS regression is used as a special case of estimating Instrumental Variables (IV), that possibly explain certain characteristics and distributions which determine whether a company would receive PE-backing (Lee & Wahal, 2004). Instrumental Variables (IVs) are used to detect the real causal relationship in the presence of endogenous explanatory variables. In other words, they are instruments which are correlated with the choices of PE-investments but are not directly correlated with IPO performance. This thesis uses 3 different IVs. Following Baker & Gompers (2003), the first IV is the company location of the PE-backed IPOs. The second IVs are dummy calendar years, to control for any IPO waves that have occurred in the past decades. The last IVs used are based on a firm's Total Assets. A 2SLS uses two separate regressions, where the first stage of the regression estimates the possibility for a company receiving PE-funding, PE in formula [11], as predicted by the instruments and control variables. In the second regression, the expected values from formula [11] are inserted into the second stage equation to see whether PE-backing would affect both Underpricing (R_i) and long-run performance ($BHAR$). The rest of the explanatory variables are the same as used in formula [10]. An overview of all the explanatory variables is shown in Table 8. The formal notation of the first regression formula is:

$$PE = \hat{a} + \beta_1 Ln\ FirmSize + \beta_2\ Leverage + \beta_3 Ln\ HoldingPeriod + \beta_4 PB + \beta_5\ Ln\ Age + \beta_6\ Ln\ IssueSize + \beta_7\ CountryDummy + \beta_8\ Year + \varepsilon_i \quad [11]$$

The formal notation of the second stage regressions are stated as:

$$R_i = a + \beta_1 \widehat{PE} + \beta_2\ Ln\ FirmSize + \beta_3\ Leverage + \beta_4 Ln\ HoldingPeriod + \beta_5 PB + \beta_6 Ln\ Age + \beta_7\ Ln\ IssueSize + \varepsilon_i \quad [12]$$

$$BHAR = a + \beta_1 \widehat{PE} + \beta_2\ Ln\ FirmSize + \beta_3\ Leverage + \beta_4 Ln\ HoldingPeriod + \beta_5 PB + \beta_6 Ln\ Age + \beta_7\ Ln\ IssueSize + \beta_8\ R_i + \varepsilon_i \quad [13]$$

Overall, it is important to control for a possible endogeneity issue, that has been discussed in many research papers regarding PE-funding decisions (Lee & Wahal, 2004). This thesis uses both firm-matching (based on PSM) as well as a 2SLS regression to control for this issue. Moreover, the main emphasis of this thesis is on the regression analysis as constructed in formula [10], to answer H2,

H3, and H4. The 2SLS regression, as constructed in formula 11-13, is used as an extra control for the robustness of the results found in the multivariate regression.

Table 8: Regression Variables overview

This table contains an overview of all the independent and control variables used for the regression, together with their description and expected regression result. There are three 'groups' of variables, including Issue specific, Operating & Firm specific and RLBO fund specific.

Issue Specific	Description	Expected Sign
Underpricing	Logarithm of the first day return of the stock, which is the first day of trading closing price divided by the offer price	-
Firm Size	Logarithm of the Market Capitalization at the first month after trading. Calculated as the offer price multiplied by the number of shares outstanding	+
Price-to-Book Ratio	Logarithm of the Market Capitalization divided by the total equity.	-
Issue Size	The net proceeds of an IPO, computed by the gross IPO proceeds minus fees and expenses. The natural logarithm if the issue size is applied.	-
Operating/Firm specific	**Description**	**Expected Sign**
Leverage	Ratio of the total debt (long-term and short-term) by the total assets.	+
Leverage Squared	The squared ratio of the total debt (long and short) by the total assets.	-
Firm Age	The logarithm length of the company's operating history before IPO, calculated as the interval between IPO year and founded year.	-
RLBO fund specific	**Description**	**Expected Sign**
Fund Size	Fund Size of the PE firm with the largest known Euro amount invested in the company prior to the IPO.	+
Invested Amount	The combined value of invest amount by PE (in EUR) that is invested in the company before the IPO.	+
Fund Rank	The fund rank is calculated using a rank between 1 and 9 (where 1 is the lowest, and 9 the highest), the natural logarithm is applied	+
Holding Period	The holding period is calculated as the interval between investment date and IPO date in months.	+

6 Empirical Results

This chapter provides an outline of all the empirical results and findings of this research. This chapter starts with results of long-run performance of RLBOs against a market index, followed by an analysis on the long-run performance of RLBOs against firm-matched IPOs. Next, the main findings regarding the drivers of the RLBO performance are presented. Furthermore, this chapter also contains the results of certain robustness checks to control if the results found are strong and well-interpretable. Notably, the results and the corresponding answers to the tested hypotheses are treated in separate subchapters.

6.1 Long-run IPO performance

. Firstly, the results of H1.A: 'RLBOs outperform the market in the long run' is discussed, followed by answering H1.B: 'RLBOs outperform other IPOs (including other PE-backed and Non-PE-backed IPOs) in the long run'. To do this, the long-run stock performance of RLBOs are presented using Buy-and-Hold Raw Returns (BHR), Cumulative Abnormal Returns (CAR) and Buy-and-Hold Abnormal Returns (BHAR), respectively. This chapter is structured as such, to provide answers to the hypotheses in a sequential matter

6.1.1 Do RLBOs outperform the market?

As described in Chapter 3, the first part of the first part of the first hypothesis is stated as follows:

H1.A. RLBOs outperform the market in the long run.

To find the answer, Table 9 presents the Equally and the Value Weighted Buy-and-Hold Raw Returns of the whole sample divided into the RLBO sample and two sub-samples, including the PE-backed IPOs and the Non-PE-backed IPOs. All the results are presented using a three-year horizon with yearly intervals (with the exception of the first interval at six months). The table can be interpreted as the Equally and Value Weighted average of holding an IPO within one of the three categories.

Table 9: The Buy-and-Hold Raw Returns (BHR)

This table contains the Buy-and-Hold Raw Returns of the RLBO sample, as well as the sub-samples including PE-Backed IPOs and Non-PE-backed IPOs. The table is separated into two separate panels where Panel A represents the Equally Weighted Approach, and Panel B the Value Weighted Approach. The time frames used are 6 months, 1 year, 2 years and 3 years after IPO. Statistical significance is denoted as *, **, ***, for the significance levels 10%, 5% and 1% level, respectively.

Panel A Equally Weighted								
t	6 Months		12 Months		24 Months		36 Months	
	Mean	p50	Mean	p50	Mean	p50	Mean	p50
RLBO	24.58***	15.52	23.62***	3.80	19.75	1.32	31.90	-2.19
PE-Backed	46.70***	27.12***	60.70***	36.70***	49.20***	44.85***	48.01***	34.06
Non-PE-Backed	58.56***	22.47***	116.21	25.77	78.51***	45.15	92.23***	58.69
Panel B Value Weighted								
RLBO	12.15*	15.94	23.21***	25.61	29.08	2.26	24.72	-19.41
PE-Backed	46.17***	36.80***	55.61***	43.17***	50.56***	70.74***	32.40***	5.69
Non-PE-Backed	60.25***	14.36***	30.64	-5.76	31.60*	-8.41	30.42	-14.91

Inspecting the table, it appears that RLBOs perform the worst, relative to other PE-backed as well as Non-PE-backed IPOs. However, the RLBOs do perform relatively well in the first six months and the first year with 24.58% and 23.62 % respectively, at a 1% significance interval in the Equally Weighted approach. The results in the Value Weighted approach show similar outcomes with 12.15%, significant at a 10% confidence interval after six months, and a 23.21% significant performance at a 1% confidence interval after one year. Moreover, the PE-backed IPOs tend to perform well in all different time intervals used, which is in line with the existing literature on long-run PE-backed IPO performance (Levis, 2011). On the other hand, the Non-PE-backed IPOs also perform well, but only significant in the first 6-months after IPO.

Furthermore, it is interesting that the difference in the mean and the medians in the RLBO sample are rather substantial. This is indicative for there being a large dispersion within the RLBO sample. This large dispersion has also been visible in previous studies on RLBOs and is therefore in line with the existing literature (Jensen, 2020).

Overall, Table 9 presents the Buy-and-Hold Raw Returns of all the IPOs in de sample, divided into an RLBO sample and two different sub-samples. Table 9 shows buying in on RLBOs is generally a good strategy at all the different time intervals used, especially in the first six months and year. Furthermore, it also presents indicative evidence for there being a large dispersion in the RLBO sample, seen through the large dispersion between the means and the medians. The large dispersion is in line with expectations and could important implications in the following sub-chapters. Next, the Cumulative Abnormal Returns and Buy-and-Hold Abnormal returns are discussed, which will make it possible to give answer to both H1.A and H1.B.

Following the Buy-and-Hold Raw Returns (BHR), this thesis presents the Cumulative Abnormal Returns (CAR) of the whole sample divided into three different sub-samples including the RLBOs, the PE-backed IPOs and the Non-PE-backed IPOs. Table 10 presents the IPO returns of sample and all the different sub-samples against the market return of the FTSE 100, to find out if RLBOs indeed outperform the market significantly.

Table 10: Cumulative Abnormal Returns (CAR) with FTSE 100

This table contains the Cumulative Abnormal Returns (CAR) of the RLBO sample, as well as the sub-samples including PE-backed IPOs and Non-PE-backed IPOs. The table is separated into two separate panels where Panel A represents the Equally Weighted Approach, and Panel B the Value Weighted Approach. The time frames are 6 months, 1 year, 2 years and 3 years after IPO. Statistical significance is denoted as *, **, ***, for the significance levels 10%, 5% and 1% level, respectively.

Panel A Equally Weighted								
t	6 Months		12 Months		24 Months		36 Months	
	Mean	p50	Mean	p50	Mean	p50	Mean	p50
RLBO	34.25***	20.73*	33.13***	22.79*	25.33***	6.07	30.61***	16.52
PE-Backed	38.32***	33.66***	44.88***	40.32***	46.41***	46.84***	45.13***	49.38***
Non-PE-Backed	54.88***	23.88***	57.67***	33.62***	58.77***	65.60***	80.57***	68.99***
Panel B Value Weighted								
RLBO	10.99	19.73*	18.32***	23.25*	21.85***	16.11	26.59*	14.29
PE-Backed	34.45***	33.81***	45.38***	45.43***	62.82***	71.05***	64.82***	73.40***
Non-PE-Backed	48.18	18.65***	27.59***	27.59***	76.82***	60.78***	84.06***	52.96***

Inspecting the RLBO sample, Table 10 presents outperformance in the Equally Weighted approach that remains relatively constant with a 34.25% higher return after 6 months and a 30.61% higher return 3 years post-IPO all significant at a 1% level. The Value Weighted approach also shows constant significant outperformance in both the means and the medians over all time intervals used at a 1% significance level. The returns are however lower in the Value Weighted Approach, ranging from 19.73% higher returns after 6 months to 26.58% after 3 years, which can explained by the large dispersion in the RLBO sample, as shown in Table 9. Using the Value Weighted approach, some large outliers are now controlled for. However, the returns do remain positively significant which is evidence for outperformance of the RLBOs relative to the market index.

Furthermore, Table 10 shows PE-backed IPOs also outperform the market index. In the Equally Weighted approaches the PE-backed IPOs show significant outperformance (at a 1% confidence interval) relative to the market with the returns ranging from 38.32 % in the first six months to 49.38%, 3 years post-IPO. The PE-backed IPOs show evidence for their outperformance to be increasing in the years following the IPO. This is in line with the existing literature (Levis, 2011). Similar results are found for the Non-PE-backed IPOs, where there is an outperformance that ranges from 16.65% in the first 6 months to 52.96% to 3 years post-IPO. Similar to the PE-backed sub-sample, all the results are significant at a 1% confidence interval.

Overall, Table 10 gives evidence for RLBOs outperforming the market significantly using CAR, for every time interval used in this thesis. The results are in line with the existing literature and the first part of the first hypothesis, where RLBOs are expected to outperform the market (Cao & Lerner, 2009; Jensen, 2020).

As previously discussed, only using the CAR method against a market index could lead to possible biased results. To control for these possible positively skewed results, Barber & Lyon (1997) presented the Buy-and-Hold Abnormal Returns to control for the measurement bias. Therefore, to control for the results shown in Table 10, the next step is to present the results of the Buy-and-Hold Abnormal Returns of the sample (and sub-samples) against the FTSE 100. The results are presented in Table 11 and are similarly divided into two separate panels in order to find both the Equally Weighted returns as well as the Value Weighted returns. As previously discussed, the main emphasis of this thesis is on the BHAR approach.

Table 11: Buy-and-Hold Abnormal Returns (BHAR) with FTSE 100

This table contains the Buy-and-Hold Abnormal Returns (BHAR) of the RLBO sample, as well as the sub-samples including PE-backed IPOs and Non-PE-backed IPOs. The table is separated into two separate panels where Panel A represents the Equally Weighted approach, and Panel B the Value Weighted Approach. The time frames are 6 months, 1 year, 2 years and 3 years after IPO. Statistical significance is denoted as *, **, ***, for the significance levels 10%, 5% and 1% level, respectively.

Panel A Equally Weighted								
t	6 Months		12 Months		24 Months		36 Months	
	Mean	p50	Mean	p50	Mean	p50	Mean	p50
RLBO	24.35***	18.79	21.55***	12.53	18.77	-5.78	27.53	-1.29
PE-Backed	46.47***	34.41***	58.63***	34.46***	48.23***	54.64*	43.64***	36.23
Non-PE-Backed	58.32***	21.26***	114.14	25.92*	77.54***	44.76	87.85***	49.94
Panel B Value Weighted								
RLBO	10.91	17.40	19.75*	21.52	28.62	8.11	33.00	0.10
PE-Backed	37.61***	37.21***	57.48***	35.06***	74.70***	73.28*	81.80***	88.20
Non-PE-Backed	61.42	19.12***	65.59*	18.61*	87.42***	54.12	106.13***	50.69

Inspecting Table 11 shows that the RLBO sample shows similar outperformance relative to the market as seen using the CAR approach. The difference however, is that the outperformance of RLBOs relative to the market benchmark is now only significant in the first 6 months and the first year using the Equally Weighted Approach, where the CAR shows significance in all different time intervals used. The returns do remain relatively constant, with the returns being 24.35% (at a 1% significance level) in the first six months and 27.53% (no significance) 3 years post-IPO. In the Value

Weighted approach, the returns drop to 10.91% relative the market index after 6 months to 33% after 3 years post-IPO. The only significance here is found after 1-year post IPO at a significance level of 10%. This is indicative evidence for deterioration of the long-run performance of RLBOs, with high returns close after the IPO, and decreasing in the following years up till 3 years post-IPO. Moreover, the PE-backed IPOs and the Non-PE-backed IPOs also outperform the market significantly, again similar to the results as with using CAR. For the PE-backed IPOs the returns close after the IPO are 37.61% higher than the market benchmark at a 1% level and increasing to an 43.64% higher return 3 years post-IPO. Also, the Non-PE-backed IPOs show indicative evidence for outperformance, however only significant two years post-IPO.

Overall, the answer H1.A: 'RLBOs outperform the market', the answer is yes. The answer is consistent with multiple approaches including BHR, CAR and BHAR. However, as described in Chapter 5, investigating long-run stock performance against a market index can lead to possible biased results. Therefore, the main emphasis of this thesis is on the firm-matching approach to answer whether RLBOs also outperform other IPOs (including PE-backed and Non-PE-backed IPOs). The results of this approach are discussed in the next sub-chapter.

6.1.2 Do RLBOs outperform other IPOs?

The results from Tables 9, 10 and 11 show outperformance of RLBOs against a market index (FTSE 100). More importantly however, is to find out if the RLBOs also outperform other IPOs, including PE-backed IPOs and Non-PE-backed IPOs. As described in the Chapter 4, there are large differences visible between the sample and the sub-samples. Therefore, the RLBOs are matched against other IPOs based on highest Propensity Score Matching (PSM) scores, to ensure that the benchmark and the sample share commonalities. The details of the PSM are explained in more detail in Appendix C. The second part of the first hypothesis is stated as follows:

H1.B. RLBOs outperform other IPOs, including both other PE-backed IPOs as well as Non-PE-backed IPOs.

To find the answer, first the results of the CAR method of RLBOs against their matched benchmark are displayed in Table 12, which contains both the Equally and Value Weighted Cumulative Abnormal Returns. Table 12 shows the difference between the long-run performance of RLBOs against their well-matched group of other PE-backed IPOs and Non-PE-backed IPOs.

Table 12: Cumulative Abnormal Returns (Matched Benchmark)

This table contains the Equally and Value Weighted Cumulative Abnormal Returns (CAR) of the RLBO sample, as well as the sub-samples including PE-backed IPOs and Non-PE-backed IPOs. The Returns are relative to a benchmark constructed through Propensity Score Matching of both PE-backed IPOs as well as Non-PE-backed IPOs. The time frames are 6 months, 1 year, 2 years and 3

years after IPO. Statistical significance is denoted as *, **, ***, for the significance levels 10%, 5% and 1% level, respectively.

t	6 Months		12 Months		24 Months		36 Months	
	Mean	p50	Mean	p50	Mean	p50	Mean	p50
Equally Weighted	-10.50	-20.03	-18.74	-13.72*	-27.48*	-31.87***	-33.78*	-50.49***
Value Weighted	-35.82***	-36.30	-25.24***	-17.12*	-36.03***	-17.51***	-32.62***	-25.95***

Table 12 shows that in the Equally Weighted Approach there is a significant underperformance of RLBOs relative to their benchmarks, ranging from -13.72 % after one year to -33.78 % after three years, both significant at a 10% significance level. The performance after six months, using the Equally Weighted approach, denotes -10.50%, but does not show any significance. Furthermore, when inspecting the Value Weighted Approach after six months, there is a 35.82 % significant underperformance of RLBOs, significant at a 1% level and a 32.62 % lower performance after three years post-IPO. Both in the Equally and the Value Weighted approach the returns remain negative at all the different time intervals used.

Overall, Table 12 shows that RLBOs significantly underperform relative to a well-matched benchmark based on Propensity Score Matching. The results are in contrast with the second part of the first hypothesis. Similar to the previous sub-chapter, the next step is to examine the BHAR in order to control for certain biases. The results for the BHAR method against the benchmark are presented in Table 13. As discussed in Chapter 5, the results of the CAR method might be positively skewed which might lead to possible biased results. To control for these biases, the BHAR method is used against the same matched benchmark as used in Table 12. The results of the BHAR method are shown in Table 13.

Table 13: Buy-and-hold Abnormal Return (Matched Benchmark)

This table contains the Equally and Value Weighted Buy-and-hold Abnormal Returns against a matched benchmark. The Returns are relative to a benchmark constructed through Propensity Score Matching of both PE-backed IPOs as well as Non-PE-backed IPOs. The time frames are 6 months, 1 year, 2 years and 3 years after IPO. Statistical significance is denoted as *, **, ***, for the significance levels 10%, 5% and 1% level, respectively.

t	6 Months		12 Months		24 Months		36 Months	
	Mean	p50	Mean	p50	Mean	p50	Mean	p50
Equally Weighted	-28.94	-21.00	-48.80	-30.06*	-48.86	-28.13	-58.24	-28.44
Value Weighted	-45.84	-34.30	-28.18	-13.63*	-30.69	-3.83***	-26.41	-8.97

Table 13 shows that in the Equally Weighted Approach, the performance of the RLBOs have a 21% (insignificant) lower return after 6 months up till 28.44% (insignificant) lower returns after 3 years, relative to their well-matched benchmark. The only significance in the Equally Weighted Approach comes from the returns after one years, where the RLBOs have on average a 30.06 % lower return at a 10% significance level. In the Value Weighted Approach similar results are found, where there is a 13.63 % lower return for RLBOs after one year, significant at a 10 % level. Furthermore, using the Value Weighted Approach also shows a significant lower performance of RLBOs 2 years post-IPO, with a 3.83% lower return which is significant as a 1% level. The results are similar to the results using the CAR method. The main difference stems from the results 3 years-post IPO, which are significant using the CAR method but insignificant using the BHAR method. As discussed, the main emphasis of this thesis is on the BHAR method, as it controls for certain aforementioned biases. The results imply that the RLBOs significantly underperform relative to their benchmark one year and two years post-IPO. Again, these results are in contrast with the existing literature on RLBOs (Cao & Lerner, 2009). The discussion and possible explanation for the deviation with the existing literature is elaborated on in Chapter 7.

Overall, the results in Table 13 display significant underperformance of RLBOs relative to other matched IPOs, defined as one- and two-years post-IPO. Combining the results shown in Table 12 and Table 13 concludes significant underperformance of RLBOs relative to other matched IPOs, based on Propensity Score Matching. These results contradict H1.B, where outperformance of RLBOs against other IPOs is expected. The results are therefore also not in line with the existing literature on long-run IPO performance (Cao & Lerner, 2009; Jensen, 2020). Therefore, H1.B is rejected.

6.2 Cross sectional Investigation of RLBO performance

6.2.1 The effect of the holding period, leverage and reputation on long-run IPO performance

One of the key contributions of this thesis is researching whether and which of the value adding mechanisms imposed by the PE-investor creates structural differences in value in the long-run performance of RLBOs in Europe. To examine this, a multivariate regression analysis is constructed to find out whether issue specific variables, accounting variables and PE-fund specific variables influence the long-run Wealth Relative at different time intervals. The after-market IPO performance can be driven by the structural differences in characteristics or by the initial valuation of the firms

paired with the expectations of the performance of the company in the future. To provide additional insights in whether structural differences between RLBOs influence the long-run performance, Table 15 provides the findings of the cross-sectional multivariate regression analysis.

Table 15: Multivariate Regression Analysis

This multivariate regression analysis shows the effect of certain issue specific variables, accounting variables and PE-fund specific variables to explain any deviance in the Wealth Relatives up till 3 years after the IPO. All the standard errors in the regressions are robust standard errors. Statistical significance is denoted as *, **, ***, for the significance levels 10%, 5% and 1% level, respectively.

	Wealth - 6	Wealth - 12	Wealth - 24	Wealth - 36
	(1)	(2)	(3)	(4)
FirmSize	0.013	0.061	0.126	0.329**
	(0.52)	(1.47)	(1.69)	(2.25)
Leverage	-0.018***	-0.015	0.010	0.022
	(-3.64)	(-1.38)	(0.43)	(0.59)
Leverage2	-0.000	0.002***	0.004**	0.007*
	(-0.97)	(3.24)	(2.35)	(2.15)
M/B	0.000	0.002**	0.003**	0.007*
	(0.86)	(2.52)	(2.35)	(2.17)
FundSize	-0.038	0.016	0.020	0.281
	(-0.70)	(0.18)	(0.15)	(1.03)
DealSize	-0.042	-0.095	-0.279	-1.059*
	(-0.79)	(-0.83)	(-0.96)	(-1.75)
FundRank	-0.013	0.015	0.083	0.104
	(-0.36)	(0.30)	(1.00)	(0.64)
HoldingPeriod	0.000	0.000	-0.001	0.000
	(0.01)	(0.21)	(-0.55)	(0.12)
Underpricing	0.108*	0.117	0.027	0.287
	(2.04)	(1.72)	(0.21)	(1.02)
FirmAge	-0.001*	-0.001**	-0.001*	-0.001
	(-1.89)	(-2.13)	(-1.97)	(-0.83)
IssueSize	0.000	0.000	-0.000	-0.000
	(0.87)	(0.11)	(-0.88)	(-0.05)
Constant	2.237**	1.105	3.272	8.855
	(2.24)	(0.73)	(1.02)	(1.35)
R2	0.305	0.187	0.229	0.465
N	37	37	37	37

As discussed in Chapter 5, multiple hypotheses are tested in the multivariate regression analysis, with the first hypothesis stated as follows:

H2. RLBOs with longer holding periods are more likely to have higher long-run performance.

As shown in Table 15, there is no effect of the logarithm of the holding periods on the long-run Wealth Relatives of the RLBOs in our sample. The results are therefore not in line with H2 and is therefore rejected. Even though the finding is not in line with most of the literature, similar results are found by Chamberlain & Joncheray (2017), who also used a European RLBO sample. Next, Table 15 answers H3, which is stated as follows:

H3. The usage of higher leverage by a PE will enhance the long-run performance of an RLBO after IPO.

One of the most important elements in the regression is the Leverage ratio, as the effect of Leverage on the long-run performance has remained a highly debated topic in the existing literature. As shown in Table 15, higher leverage results in a -0.018% lower Wealth Relative after six months, significant at a 1% significance level. The effect of the Leverage Ratio on the 12-month Wealth Relative remains negative at -0.015, without any statistical significance. After 24 and 36 months, the effect of leverage on the Wealth Relatives depicts positive coefficients of 0.010 and 0.022, respectively. To conclude, the results in Table 15 show the opposite effect of H3 and is therefore rejected.

Important to note is that the rejection of H3 is based on the linear effect of the Leverage Ratio on the Wealth Relatives. To control for the non-linear aspect of the Leverage Ratio, the Leverage Squared is also added to the regression. As described in Chapter 5, the Leverage Squared is expected to have a negative sign, as Opler & Titman (1993) described there is a fine line between being highly levered and over levered. In contrast with expectations, Leverage Squared has a positive coefficient of 0.002 after 12 months, which is significant at a 1 percent significance level. This thesis' evidence contradicts the findings by Demiroglu & James (2010), who found Leverage to follow an inverse U-shape.

Overall, the effect of Leverage on the long-run Wealth Relatives of the RLBOs is negative. This result contradicts H3 and is therefore rejected. The last hypothesis that is tested in Table 15 is described as follows:

H4. The reputation of PE-lead investor will enhance the long-run performance of an RLBO after IPO.

As stated in Chapter 3, the reputation of the lead PE-investor is expected to be positively correlated to the long-run stock performance of the RLBOs in the sample. Inspecting Table 15 shows positive coefficients after 12, 24 and 36. The coefficients are also increasing, with 0.015 after 12 months and 0.104 after 36 months. However, Table 15 does not depict any statistical significance on Fund Rank. Therefore, Table 15 presents indicative evidence for the Fund Reputation (Fund Rank in the regression) to have a positive influence on the long-run Wealth Relatives of the RLBOs. The indicative evidence is in line with Krishnan et al. (2011), who also found positive correlations between Fund Reputation and long-run stock performance. However, Table 15 does not denote any statistical significance at any time interval used. Therefore, H4 is rejected.

6.2.2 Other explanatory variables

Aside from the variables used to answer the hypotheses, there are other important elements in Table 15 that might explain structural differences between RLBOs and their long-run performance. One of the most important ones being the Firm size. As shown in Table 15, the coefficients for Firm Size on the long-run Wealth Relatives are positive and increasing in the different time intervals, with 0.013 after six months and 0.126 after 24 months, with no statistical significance. The only significance is shown after 36 months, with a coefficient of 0.329 at a 5% significance level. Therefore, this thesis finds the Firm Size of RLBOs to have a positive effect on the long-run performance, defined as 3 years post-IPO. These findings are in line with the existing literature (Chamberlain & Joncheray, 2017). With similar regard, the expected sign Deal Size is positive, as described in Chapter 5. However, as shown in Table 15, Deal Size is negatively correlated with the Wealth Relative after 36 months with -1.059, significant at a 10% confidence level. Therefore, Deal Size negatively effects the long-run performance of RLBOs, defined as 36 months post-IPO. This is in contrast with the existing literature.

Another important element shown in Table 15 is the Age of the firm. As described in Chapter 5, an older firm is expected to have a positive sign in the regression. When inspecting Table 15 however, the opposite is shown. In the first 3-time intervals (6, 12 and 24 months, respectively) used, the coefficient is -0.001, significant at a 10% confidence interval. Therefore, in contrast with the expected sign, the Age of the RLBO is negatively correlated with the long-run Wealth Relatives, defined as 6, 12- and 24-months post-IPO.

Another important control variable in Table 15 is underpricing. As discussed in the Methodology, some of the decisions made by a PE-investor during the holding period might affect the Underpricing. The importance for this control for endogeneity stems from certain self-selection choices the PE-investor makes in terms of Firm Size, Issue Size and Price-to-Book ratios, that translate into lower underpricing (as seen in Table 5). By adding Underpricing as an explanatory variable in the regression leads to a proxy variable for the overreaction theory, which is described by De Bondt & Thaler (1985). They described that the overreaction of investors would lead to higher

underpricing, and poorer long-run performance. As shown in Table 15, the underpricing effect on the 6-month Wealth Relative is positive at 0.108, significant at a 10% confidence level. Even though the Underpricing is only significant after 6 months, the result is in contrast with the expectations. With similar regard, the Price-to-Book ratio is also expected to largely influence the underpricing as well as the long-run performance. In contrast with the expectations however, the Price-to-Book ratio denotes positive coefficients on the Wealth Relatives after 12, 24 and 36 months respectively, significant at a 5% confidence level.

6.3 Robustness Checks

To control for robustness of the results, this thesis uses several methods. First and foremost, the usage of three separate methods (BHR, CAR and BHAR) in answering the first research question: 'Do RLBOs outperform both the market as well as other IPOs?', is considered a strong robustness check. Even though the emphasis of this thesis is on the BHAR method, both the BHR and the CAR both display similar results regarding the first research question. With similar regard, using both the Equally and Value Weighted approach contributes to robustness of the results, as both methods display similar results. Therefore, the results that show RLBOs underperforming relative to other IPOs is considered strong and robust evidence.

To control for the answers found for the second research question, stated as: 'What are characteristics that make some RLBOs perform better than others?', this thesis applies a 2SLS regression to control two separate elements. First, it is used as a robustness check for firm-matching based on PSM. From inspecting Appendix B and C, the IVs used in the regression show many similarities with the probit regression of the PSM. In other words, both regressions find similar distribution of PE-funding. From this can be concluded that the firm-matching has brought the benchmark closer to the sample, thereby creating better interpretable results that are considered robust.

Next, this thesis uses a multivariate regression analysis based on cross-sectional differences between the RLBO sample. As previously discussed, there might be an endogeneity issue in the possibly nonexperimental data. Therefore, the 2SLS also a control for this endogeneity issue. Appendix Table 5 does not show any significance of the PE-dummy, country dummy or calendar year dummy having a significant effect on Underpricing. This can conclude that the endogeneity issue in this sample is not as severe as some of the existing literature have suggested (Lee & Wahal, 2004). Therefore, the interpretation of the results of the multivariate regression analysis is considered strong and robust.

Overall, using several alternative methodologies including BHR, CAR, BHAR as well as Equally and Value Weighted approach to answer to the first research question, the results are considered robust. Secondly, using a 2SLS regression to control both PSM as well as an alternative method for controlling the endogeneity issue, the results for the second research question are also considered strong and robust.

7 Discussion

This chapter discusses the possible explanations for the main results found in Chapter 6. Furthermore, this chapter discusses the limitations of this thesis and provides valuable suggestions for future research.

7.1 Aftermarket IPO performance

This thesis finds evidence of outperformance of RLBOs against the market, which is defined as the first 6-months and first year post-IPO. More importantly, this thesis finds a significant underperformance of RLBOs against other firm-matched IPOs (including PE-backed IPOs as well as Non-PE-backed IPOs), which is defined as the first- and second-year post-IPO. The main conclusion of this thesis is that European RLBOs underperform significantly against other matched IPOs, which is in contrast with most of the existing literature on RLBOs (Cao & Lerner, 2009; Mian & Rosenfeld, 1993). Even though the methods used are different, the opposing results remain quite striking. Difficulties arise in understanding where the difference comes from, as none of the related research papers have shown clear evidence in the underlying value drivers behind this outperformance.

One possible explanation however, that can clarify a large part of the difference, is the methods used regarding the construction of the benchmarks. For example, Cao & Lerner (2009) and Antonsson & Palmér (2012) used different sub-samples of RLBOs relative to other IPOs (including PE-backed and Non-PE-backed) to compare the long-run performance. Comparing different sub-samples with the same benchmark firms makes the benchmarks differ a lot from the sample, which leads to the results possibly being inflated and misinterpreted. The benchmark matching is important, as there is large dispersion in the sample shown in firm size, geography and industry. An illustrative example of the importance of matching is shown in the most recent study on RLBOs by Jensen (2020), who matched the RLBO sample with the benchmarks based on the same ICB industry and the same issuing year. Using this approach, the benchmark was closer to the sample, and therefore the interpretation of the results more meaningful. Jensen (2020) also did not find any significance in outperformance relative to their matched PE-backed IPOs and Non-PE-backed IPOs, whilst using a more precise matched benchmark. As discussed, this thesis uses an even more precise benchmark, based on Propensity Score Matching. Therefore, this might partially explain the differences in results with the existing literature.

Furthermore, as discussed in the Literature Review, the Buyout market has changed rapidly over time. This leads to a large dispersion in the results of the relatively older literature in comparison to more recent academic work on RLBOs. One big difference is seen in examining the differences in long-run performance of the studies that investigated samples of RLBOs prior and after 2000, where significantly larger samples sizes are found prior to 2000 (Holthausen & Larcker, 1996; Cao & Lerner, 2009). Both research papers used a large sample of RLBOs before and after 2000 and found

significant outperformance of the RLBOs relative to other IPOs. However, the outperformance of both papers is not found to be significant in every sub-sample used. They both divided their large RLBO sample into different sub-samples based on Issue years and found RLBOs to perform as well or better than other IPOs, depending on the specification. The specification used in these papers are quite narrow and are mostly sub-samples of the earlier RLBOs used in their sample that show outperformance relative to other IPOs. Similarly, Antonnson & Palmer (2012) only found significant outperformance of the RLBOs in two separate sub-samples before 2000, where the final sub-group after 2000 did not show any outperformance relative to both the market and other IPOs.[16] This could be indicative evidence that the higher competition after 2000 leads to lower performance of RLBOs (Kaplan & Schoar, 2005). Another illustrative example is a research paper by Jensen (2020), who used a sample of 53 RLBOs that occurred in the U.S. between 2003 and 2015 who also did not find any significant outperformance of the RLBOs. Therefore, using a set of more recent RLBOs in this thesis, where the competition has become fiercer, this partially explains the relatively lower performance of the RLBOs found. The results can be interpreted as the new wave of Private Equity leading to lower results for the RLBOs as competition has increased rapidly in recent years. This is a possible explanation in the dissimilarity between the older literature and the more recent research on RLBOs.

Lastly, this thesis contributes to the existing literature by investigating whether the outperformance found in samples based on U.S. data samples is a local phenomenon or rather an evidently structural global outcome. Based on the results found in this thesis, it can be described as a structural global phenomenon as the RLBOs also outperform the market index in Europe. However, the comparison of the RLBOs and the other PE-backed IPOs and Non-PE-backed IPOs leads to a more difficult interpretation of the results. Here our findings are in contrast with most of the existing literature on RLBOs. However, no real conclusion can be drawn as to what the reasons are for the underperformance of the RLBOs in Europe. Similarly, the only other existing research paper on RLBOs using European data doesn't draw any conclusions of why there is an outperformance shown in the results (Chamberlain & Joncheray, 2017). Therefore, the reason for the deviation in the results are not prone to any geographical implications, but rather the differences in benchmark matching approaches as well as the time varying deviations from the existing literature.

7.2 Sources of Performance

This thesis finds that the RLBOs underperform relative to a matched group of other PE-backed IPOs and Non-PE-backed IPOs. The relative underperformance in the first- and second-year post-IPO, based on the BHAR method, does not directly support the view that RLBOs do not create value in the long run.

[16] Antonsson & Palmér (2012) used different sub-samples based on different time periods. The final sub-group consisted of RLBOs between 2000 and 2007 in the U.S.

The research on the potential underlying drivers based on issue-specific, accounting and PE-fund specific variables give rise to some valuable insights. Most of the results of the regression are in line with the expectations based on the existing literature. Considering RLBOs performinging well against a market index, it does not come as a surprise that the Firm Size results in better aftermarket performance, as larger RLBOs are usually more diversified for different risks, which is expected to lead to higher post-IPO performance. The findings are in line with the existing literature (Chamberlain & Joncheray, 2017). From inspecting the regression in Table 15, a surprising variable comes forward as a significant source of performance. As shown, the Price-to-Book ratio has a positive significant influence on the long-run Wealth Relatives for RLBOs, which is in contrast with the existing literature. The Price-to-Book ratio is used as an indicator for how much a company is worth in the market, against how much it is worth on paper. A high number could imply that the firm is overvalued, which would lead to worse long-run performance. However, in this thesis the higher Price-to-Book ratio results in higher long-run performance. The contrasting evidence might imply that RLBOs with high Price-to-Book ratios are valued based on them having large intangible assets and large growth opportunities, as these are not part of the ratio.

On the contrary, arguably one of the most important contributors of long-run performance of PE-backed IPOs is the usage of high leverage in acquiring their targets (Jensen, 1986). As discussed, the LBO model is expected to positively impact the long-run performance of RLBOs in our sample. However, as depicted in Table 15, the opposite is true. This thesis finds a negative effect of higher leverage on the long-run stock performance of RLBOs after six months. This contradiction with the existing literature is partially explained by RLBOs generally already have high leverage, where taking on more leverage would lead to a negative effect after 6 months post-IPO. The results are in favor of the view of Opler & Titman (1993), who described there being a fine line between highly levered and over levered. As shown in Table 5, the Leverage for RLBOs is higher relative to its PE-backed and Non-PE-backed IPOs. Therefore, taking on more Leverage as an RLBO in this thesis might lead to being ‘over levered’ and leads to lower long-run performance after 6-months. Similar conclusions are drawn by Antonsson & Palmér (2012). Moreover, to control for the non-linear effect of Leverage, Leverage Squared is added in the regression. As discussed in Chapter 5, an inverse U-shape is expected, where Leverage has a positive effect and Leverage Squared a negative effect (Demiroglu & James, 2010). However, the opposite results are found. Similarly, the Age of the firm is expected to be positively correlated with the long-run performance. However, the opposite results are shown.

In addition to the regression analysis, this thesis constructed an additional investigation regarding the operational efficiencies of the RLBO sample against their firm-matched benchmark. The results are shown in Appendix Table 8. As discussed in the Literature Review, one of the elements for PE-investors to create value is to inflate certain operating-specific performance indicators which would result in higher initial valuations (Jensen, 2020). However, no all-encompassing conclusion can be drawn from Appendix Table 8. Even though there are some variables that differ significantly with

the matched benchmarks, most of them are only significant in the first quarter post-IPO. To find out how PE-investors have inflated the operating specific performance indicators, data prior to the IPO is necessary. However, this data is inadequate for a reasonable analysis.

Moreover, the insights regarding the PE-involvement (shown both in the Fund Size as well as in Deal Size) resulting in better long-run performance for the target is rather speculative. This mainly stems from the fact that some paramount data on the exact PE-involvement is missing. For example, there is no data provided regarding how much value is extracted during the holding period in terms of dividends and proceeds for reintroduction to public markets. These specific missing data points could lead to ambiguous results, as there might be some hidden channels that are profitable for PE-investors in the holding period that might harm the long-run stock performance. For example, the Deal Size is expected to have a positive effect on the long-run performance, but the opposite is shown in the regression analysis. A possible explanation could be that the subsequent acquisitions done by a PE-investor with the RLBO leads to an overvalued IPO (where the acquisition price increases with each acquisition round as it only sells at its required returns) which is not identified by the market as such. Again, the argument remains ambiguous, as no sufficient data is given regarding pre-IPO acquisitions.

7.3 Limitations

In this chapter, noteworthy limitations of this thesis are discussed as well as consequent suggestions for further research. Notwithstanding the fact that a considerable effort is dedicated to resolving some encountered limitations, this thesis remains prone to some shortcomings. The most debatable part of this thesis concerns the measurement of the IPO performance, due to the lack of consensus on the best way to assess the long-run performance. In the Methodology chapter most of the shortcomings are already discussed. By using both the CAR and BHAR method, together with a control group based on the highest Propensity Score Matching score, it is fair to assume that using all the different methods serves as a decent cross check to find well interpretable outcomes. As previously mentioned, the main emphasis of this thesis is on the firm-matching approach, using the BHAR. Using both firm-matching based on PSM and the BHAR method curtails most of the possible biases and therefore leads to robust evidence.

Another notable limitation is that this thesis is based on the use of SDC Thomson One Database and the SDC Platinum's New Global New Issues Database. While the databases provide sufficient information that can be used to identify RLBOs in Europe, it is not certain that all RLBOs are discovered. This is the result of the lack of information available on LBOs, rather than a mistake of the Methodology. The final sample comprised only 50 RLBOs from a total of 811 IPOs that included sufficient information for further analysis. Furthermore, this lack of sufficient information provided by the databases do not only affect the sample size, but also result in a substantial lack of relevant data on the accounting variables as well as PE-fund specifics. The lack of information led a significant drop in

the sample, leading to most of the variables in the regression analysis being insignificant. This leads to no real conclusion being drawn in this research regarding structural PE characteristics that influence the long-run performance of IPOs. Especially the lack in data regarding the operational efficiencies prior to the IPO lead to difficulties in drawing conclusion on whether RLBOs create value by PE-investors actions. However, with further maturity of the PE industry, it is likely that data on deal specifics as well as accounting variables become more accessible for the public, in contrast with the secretive nature currently (especially in Europe). Therefore, updates of a similar analysis (including new and improved accounting and PE-fund specific variables) as constructed in this thesis can lead to important additional insights regarding RLBOs and the underlying factors driving it.

As discussed before, another notable limitation that is prone to studies that involve both VC and PE-investments is the endogeneity issue. As described by Lee & Wahal (2004), there are clear patterns in VC (and in our case PE) backed IPO characteristics that determine whether a company receives PE-investment. It is argued that some choices made by the PE-investor affect these characteristics, and therefore it is important to control for. This thesis attempts to solve the endogeneity issue by using a both firm-matching based on Propensity Score matching and a Two-Stages-Least-Squared regression analysis (2SLS), both described in more detail in Appendix B and C. From Appendix B and C can be concluded that there is not enough proof for there being a significant endogeneity issue in this sample that affect the conclusions made. This also allows for the multivariate regression analysis to include endogenous choices, as they do not affect the variables in such a way that the self-selection bias is hurtful for the interpretation of the results.

Lastly, this thesis lacks paramount data on the operating efficiencies imposed by PE-investors to construct a valuable analysis on it. As previously mentioned, in order to find how PE-investors use operational engineering, accounting data is required pre-IPO. Using a similar analysis as constructed in Appendix Table 8, including the additional accounting data from the moment the target is acquired until 3 years post-IPO would lead to valuable new insights regarding operational engineering by PE-investors. Although this section discusses several limitations of the undertaken research, the main results are still highly relevant for both investors as well as researchers on RLBOs.

7.4 Further Research suggestions

With regard to the limitations prone to this thesis, this thesis leaves a number of questions open for further research that can add new valuable insights to the existing literature. As this thesis finds an underperformance of RLBOs relative to other IPOs in the first- and second-year post-IPO, it can be interesting to gain more understanding regarding differences between the PE-backed IPOs and the RLBOs. A suggestion for further research can be running a more comprehensive cross-sectional regression analysis, including Non-PE-backed IPOs and other PE-backed IPOs separately in the regression. However, this will require a different type of method to investigate. Another element that

needs more specific attention, is the fact that the RLBO sample found is highly diversified, resulting in very different performance levels within the sample. It could be interesting to divide the sample into separate sub-samples including the RLBOs that perform well and the ones that do not and trying to find out why this is. To construct this type of analysis, the sample size must be a lot larger. Similarly, having a larger sample size would allow for an industry adjusted RLBO regression. Using such an industry-adjusted regression could provide evidence whether there are any industries where RLBOs perform better than others. Also, a comparison can be made between firms that were relisted and compare them with similar firms that stayed public. Using this type of difference-in-difference approach might answer some question regarding the 'real value creation' by a PE-investor. Additionally, this thesis tries to contribute to the highly debated use of leverage in long-run performance discussion. A more thorough analysis on the usage of leverage and both pre- and post-IPO would add valuable insights to the existing literature. Similarly, some specific fund-related elements could be researched more specifically. For example, this study only uses the largest known fund as the initiator and the firm engineering the target, even though there are club syndicates in the sample. Using a specific dummy for club syndicates could present interesting results. This way there might be differences between club syndicates and stand-alone long-run RLBO performance.

8 Conclusion

This thesis takes a comprehensive view of a sample of 50 European Reverse Leveraged Buyouts (i.e. the return to the public markets of a company that had gone private after an earlier LBO, led by a Private Equity investor) that have occurred in the last two decades. The Private Equity market has changed very rapidly, and this has changed the industry's structure, which suggests a certain desirability of understanding such specific offerings. The existing literature on RLBOs found outperformance of RLBOs relative to a market index and against other IPOs including other PE-backed IPOs and Non-PE-backed IPOs (Cao & Lerner, 2009; Chamberlain & Joncheray, 2017; Antonsson & Palmér, 2012). However, a thorough understanding behind the outperformance has remained very limited and this thesis contributes to this by answering two main research questions. Research Question 1 being: Do RLBOs outperform the market as well as other IPOs (including PE-Backed and Non-PE-backed IPOs). To answer this, two separate hypotheses are constructed including H1.A stated as RLBOs outperform the market and H1.B RLBOs outperform other IPOs (including Non-PE-backed and PE-backed IPOs). To answer both H1.A and H1.B this constructs both the Cumulative Abnormal Returns (CAR) and the Buy-and-Hold Abnormal Returns (BHAR). Against the FTSE 100 market index, a slight outperformance of RLBOs is found in the first 6-months and first-year post-IPO. The main emphasis of this thesis is based on H1.B, stated as RLBOs outperform other IPOs (including Non-PE-backed and PE-backed IPOs). To answer H1.B, the RLBO sample is matched to a benchmark based on similarities in Industry, Size, and Issue Year using Propensity Score Matching (PSM). By using this new and improved approach for firm-matching, this thesis finds that RLBOs significantly underperform relative to other IPOs, defined as one- and two-years post-IPO. This evidence is in contrast with both the expectations and the existing literature. However, the deviation in results can partially be explained by the improved firm-matching approach, as well as the use of a more recent dataset. Research Question 2 is stated as: What are characteristics that make some RLBOs perform better than others? To answer where the performance in RLBOs comes from, this thesis answers 3 separate hypotheses. H2, stated as longer holding periods (by the PE-investor) give rise to higher long-run performance, is rejected using a multivariate regression. Similarly, H3, stated as the usage of higher leverage in an RLBO will positively affect the long-run performance, is rejected based on the same multivariate regression. This evidence contributes to the highly debated topic in the existing literature on the usage of leverage on long-run performance. This thesis finds that using too much leverage creates negative long-run performance for RLBOs in Europe, defined as 6-months post-IPO. Lastly, H4, stated as the reputation of PE-lead investors will positively affect the long-run performance of RLBOs, is also rejected. Even though many questions remain unanswered regarding characterizing the extent of the PE-investors involvement, the main results remain highly relevant both for practitioners as well as investors in RLBOs.

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Appendix A Overview Data Sources used

Appendix Table 1: Overview of the used data sources

In this table an overview of all the data sources used to find the complete sample is shown. Also, the explanation of the variables is included. They consist of stock price data; accounting variables and the PE-firm specific variables.

Data Item	Explenation	Source
Stock Prices	In EUR, daily	Compustat & Bloomberg
Number of shares outstanding	In thousands	Computat
Holding Period	In months	SDC Thomson One & Zephyr
Fund size	In EUR (mln)	SDC Thomson One & Zephyr
Deal Size	In EUR (mln)	SDC Thomson One & Zephyr
Buyout Sponsor Rank	Ranked between 1 and 9	Private Equity International magazine
EBIT	In EUR (mln)	Compustat
EBITDA	In EUR (mln)	Compustat
Total assets	In EUR (mln)	Compustat
Sales/Turnover	In EUR (mln)	Compustat
Long-term Debt	In EUR (mln)	Compustat
Capital Expenditures	In EUR (mln)	Compustat
FTSE 100 index	In EUR (mln), daily [17]	Yahoo! Finance & Investopia.com
Issue Size	In EUR (mln)	SDC Thomson One & Zephyr
Firm age	In years	SDC Thomson One & Zephyr

[17] Calculated using an exchange rate converting from Pounds to Euros.

Appendix B Propensity Score Matching

Appendix Table 2: PSM with PE-backed IPOs

This table presents the coefficients, standard deviation, error term, z-control, and the confidence intervals of the first stage probit regression that a company is an RLBO based on a set of variables. The variables include the Industries, Issue Year and Total Assets. The dependent variable is a dummy that is 1, if it is a RLBO and 0 if it is not. The probit regression are run against other PE-backed IPOs to find the closest match. By using this table, the PSM scores (as displayed in Appendix Table 4) are constructed for every RLBO with a PE-backed IPO.

PE	Coef.	Std.	Err.	z	P>|z|	[95%]
TA_0	0.0000158	0.0000347	0.46	0.648	-0.0000521	0.0000837
sic						
Construction	0					
Finance	1.173	.497	2.36	0.018	.199	2.148
Manufacturing	.691	.482	1.43	0.152	-.254	1.637
Mining	.637	.533	1.20	0.232	-.407	1.682
Retail Trade	-.235	.545	-0.43	0.666	-1.305	.834
Services	.708	.531	1.33	0.182	-.333	1.750
Trans & Ut.	0					
Wholesale	0					
year						
2001	0					
2002	0					
2003	0					
2004	-.218	.587	-0.37	0.709	-1.369	.931
2005	-.129	.645	-0.20	0.842	-1.393	1.135
2006	.1457	.603	0.24	0.809	-1.037	1.328
2007	-.0407	.622	-0.07	0.948	-1.261	1.179
2008	0					
2009	0					
2010	.817	.816	1.00	0.317	-.783	2.418
2011	-.0124	.910	-0.01	0.989	-1.796	1.771
2012	0					
2013	-.558	.624	-0.90	0.371	-1.782	.664
2014	.132	.541	0.24	0.807	-.929	1.194
2015	0					
_cons	-1.131	.487	-2.32	0.020	-2.086	-.176

Appendix Table 3: PSM with Non-PE-backed IPOs

This table presents the coefficients, standard deviation, error term, z-control, and the confidence intervals of the first stage probit regression that a company is an RLBO based on a set of variables. The variables include the Industries, Issue Year and Total Assets. The dependent variable is a dummy that is 1, if it is a RLBO and 0 if it is not. The probit regression are run against other Non-PE-backed IPOs to find the closest match. By using this table, the PSM scores (as displayed in Appendix Table 4) are constructed for every RLBO with a Non-PE-backed IPO.

NON	Coef.	Std.	Err.	z	P>|z|	[95%]
TA_0	1.70e-06	7.90e-06	0.22	0.830	-.0000138	.0000172
sic						
Construction	0					
Finance	-.771	.701	-1.10	0.271	-2.145	.602
Manufacturing	-.544	.687	-0.79	0.428	-1.892	.803
Mining	-.481	.704	-0.68	0.494	-1.861	.898
Retail Trade	-.928	.751	-1.24	0.216	-2.401	.543
Services	-.952	.693	-1.37	0.170	-2.311	.407
Trans & Ut.	-1.258	.712	-1.77	0.078	-2.655	.138
Wholesale	0					
year						
2001	0					
2002	0					
2003	-.0635	.5659	-0.11	0.911	-1.172	1.045
2004	.0705	.389	0.18	0.856	-.692	.833
2005	.118	.417	0.28	0.777	-.699	.935
2006	.0208	.367	0.06	0.955	-.700	.742
2007	-.024	.368	-0.07	0.948	-.747	.699
2008	0					
2009	.783	.696	1.12	0.261	-.581	2.147
2010	.159	.460	0.35	0.730	-.744	1.062
2011	-.106	.559	-0.19	0.849	-1.203	.990
2012	0					
2013	.268	.404	0.66	0.508	-.525	1.061
2014	.366	.348	1.05	0.293	-.316	1.050
2015	0					
_cons	-.850	.725	-1.17	0.241	-2.272	.572

Appendix Table 4: PSM scores (PE-Backed, Non-PE-Backed)

This table contains RLBOs, PE-backed IPOs and Non-PE-backed IPOs that are based on their closest Propensity Score Matching Score (derived from Appendix Table 2 and 3). For every RLBO an estimated probability is calculated and based on the closest estimated probabilities of the previous Tables, the closest probability of the closest individual RLBO is presented. The pdif_PE shows the difference between the propensity score between the RLBO and the PE-backed IPO, in other words, how close the estimated chance is. Similarly, the pdif_Non shows the difference between the propensity score between the RLBO and the Non-PE-backed IPO. Notably, all the closest matches are presented in the table.

RLBO	PE-Backed IPOs	pdif_pe	Non-PE-Backed IPOs	Pdif_Non
MTU Aero Engines GmbH	Demag Cranes AG	0.004606564	Q-Cells AG	0.000152815
Muehlhan AG	Medtech SA	0.000527314	Proton Power Systems PLC	3.51489E-05
Gerresheimer AG	Plastics Capital PLC	0.002656613	Kodal Minerals PLC	9.93289E-06
Tognum AG	Norma Group AG	0.005457193	Hikma Pharmaceuticals PLC	9.53246E-05
Immobilien AG	Nexity SA	0.002126906	Vista Group PLC	6.26672E-05
SHW AG	SLM Solutions Group AG	0.005020741	Asia Energy PLC	0.000187046
Evonik Industries AG	Virgin Money Holdings (UK) PLC	0.068935789	KTG Agrar AG	7.25266E-05
Kabel Deutschland Holding AG	Tele Columbus AG	0.010187783	Sareum Holdings PLC	0.000183392
VTG AG	Inmarsat PLC	0.002948277	Martinco plc	0.000032756
Center Parcs	m-u-t AG	0.001008656	Worldline SA	8.78408E-05
Tarkett SA	Stock Spirits Group Plc	0.002585048	SergeFerrari Group SA	0.000243904
Saft Groupe SA	Gulf Marine Services PLC	0.001190218	Vtion Wireless Technology AG	2.16606E-05
Eutelsat SA	Brenntag AG	0.009110895	Sabien Technology Group PLC	7.92671E-06
Store Electronic Systems SA	aleo solar AG	0.000104739	IT'S	1.46969E-05
Legrand SA	Ipsogen SA	0.003768048	Enfis Group Ltd	7.89019E-05
Centaur Holdings PLC	ProStrakan Group PLC	0.004594108	Printing.com Plc	1.10258E-05
BBI Holdings PLC	Phoqus Ltd	0.001215674	Cozart PLC	3.09823E-07
ArmorGroup International PLC	Merlin Entertainments plc	0.000113373	Dealogic Ltd	2.01073E-06
Nationwide Accident Repair Services plc	Card Factory PLC	0.000135025	Dunelm Group PLC	3.82369E-05
Safestore Holdings PLC	Numericable Group SA	0.005365246	ADO Properties SA	1.25067E-05
CVS (UK) Ltd	Gaztransport & Technigaz SAS	0.037415775	Ibstock PLC	0.000223601
Jupiter Fund Management PLC	Foxtons Group Plc	0.005802121	123 Multimedia SA	2.83475E-05
Just Retirement Group plc	Wellstream Holdings PLC	0.010884305	Hastings Group Holdings PLC	0.000266927
McColls Retail Group Plc	Poundland Group Plc	0.006897885	ScS Group Plc	2.15095E-05
DX(Group)Plc	ID Logistics SA	0.002908719	Royal Mail Plc	6.77444E-06
Brit PLC	Delticom AG	0.001384255	Parrot SA	5.0935E-06

FDM Group PLC (holding)	Wincor Nixdorf AG	4.46805E-05	IMImobile Ltd	8.57444E-07
Game Digital Plc	Stroeer Out-of-Home Media AG	0.000682877	ecotel communication AG	3.97779E-05
DFS Furniture PLC	Umbro PLC	0.005150422	African Barrick Gold PLC	0.000109288
Eurocell PLC	KION Group AG	0.014929399	Erlebnis Akademie AG	4.99101E-05
McCarthy & Stone Plc	Admiral Group Plc	0.000651652	Eclectic Bar Group PLC	0.000167965
Gartmore Group Ltd	GSW Immobilien AG	0.001520991	Madison Property AG	8.33637E-05

Appendix C 2SLS Regression

Appendix Table 5: First Stage Regression with IVs:

This is the first stage regression of the 2SLS which contains the three different IVs including Total Assets, Country and Calendar Dummy's for IPO issue year. The regression presents the possibility for a company receiving PE-investment both on short-term Underpricing (R_i) and long-run BHAR. Notably, all the variables used in this regression are previously discussed in Chapter 5 and are summarized in Table 8. All the standard errors in the regressions are robust standard errors. Statistical significance is denoted as *, **, ***, for the significance levels 10%, 5% and 1% level, respectively.

	PE	PE
	(Underpricing)	(BHAR)
Ln Firm Size	0.061	0.089*
	(1.60)	(1.73)
Leverage	0.010	-0.011
	(1.22)	(1.04)
Leverage2	0.030	0.001
	(-0.36)	(-0.68)
Ln HoldingP.	0.000	0.001
	(0.22)	(0.46)
P/B	-0.002	0.000
	(-0.18)	(0.03)
Ln Age	-0.003	-0.002
	(-1.09)	(-0.73)
Ln Issuesize	-0.000	-0.000
	(-0.39)	(-0.88)
U.K.	0.411	0.448
	(1.43)	(1.33)
Germany	0.464	0.728*
	(1.30)	(1.94)

2004.year	0.286	-1.090
	(0.79)	(-1.49)
2005.year	0.254	-1.264
	(0.73)	(-1.24)
2006.year	0.642*	-0.720
	(2.02)	(-0.76)
2007.year	0.423	-0.920
	(1.06)	(-0.96)
2008.year	1.344***	0.211
	(3.45)	(0.24)
2010.year	-0.281	-1.717*
	(-0.75)	(-1.77)
2011.year	1.726	-0.164
	(1.06)	(-0.08)
2013.year	0.484	-1.019
	(1.14)	(-1.03)
2014.year	0.548	-0.926
	(1.69)	(-1.08)
2015.year	-0.084	-1.751
	(-0.65)	(-1.72)
Constant	-1.426	-0.550
	(-1.56)	(-0.41)
R2	0.370	0.426
R2_A	0.115	0.149
F		
N	43	40

Appendix Table 6: Second Stage Regression:

This table presents the second stage regression of the 2SLS. The coefficients of Appendix Table 5 are used in the Second Stage regression. The first dependent variable is Underpricing (R_i). In this regression, the independent variables explain whether Underpricing would be affected. In the regressions from 2-5, the 6-, 12-, 24- and 36-month BHAR are used as the dependent variables, respectively. Here the explanatory variables can be interpreted without the self-selection bias. All the standard errors in the regressions are robust standard errors. Statistical significance is denoted as *, **, ***, for the significance levels 10%, 5% and 1% level, respectively.

	Underpricing(R_i)	BHAR - 6	BHAR - 12	BHAR - 24	BHAR - 36
	(1)	(2)	(3)	(4)	(5)
$\widehat{PE}$	-0.255	0.277	0.639	0.150	-0.043
	(-1.19)	(1.00)	(1.34)	(0.56)	(-0.13)
Ln FirmSize	-0.031	0.010	0.063	0.060	0.065
	(-0.52)	(0.27)	(0.93)	(0.83)	(0.93)
Leverage	-0.005	-0.007	-0.016*	-0.018*	-0.026*
	(-1.03)	(-1.15)	(-1.94)	(-1.83)	(-2.00)
Ln HoldingP.	0.001	0.001	0.001	0.002	0.005**
	(0.42)	(0.91)	(0.63)	(1.34)	(2.34)
P/B	0.005	0.008	0.015	0.023	0.032
	(1.01)	(1.27)	(1.45)	(1.51)	(1.63)
Ln Age	-0.001**	-0.000	0.001	0.000	0.000
	(-2.12)	(-0.88)	(0.98)	(0.10)	(0.40)
Ln Issuesize	-0.000	-0.000	-0.000	-0.000	-0.000
	(-1.67)	(-0.39)	(-0.60)	(-1.24)	(-0.95)
Underpricing		0.423	0.599	0.139	0.278
		(0.98)	(0.97)	(0.58)	(0.91)
Constant	1.202	-0.179	-1.392	-1.139	-1.420
	(0.92)	(-0.22)	(-0.94)	(-0.79)	(-1.05)
R2	0.139	0.234	0.224	0.221	0.258
R2_A		0.178	0.197	0.187	0.212
F	2.396**	2.968**	1.493	0.938	1.302
N	40	40	40	40	40

Appendix D Multicollinearity

Appendix Table 7: Multicollinearity Test

This table contains a correlation Matrix of all the different variables used in the regressions. From the Table becomes clear that there is almost no statistical significance shown between the explanatory variables, meaning there is no multicollinearity issue found in this thesis. Statistical significance is denoted as *, **, ***, for the significance levels 10%, 5% and 1% level, respectively.
The only significance found is at a 10% level, which is considered low.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) BHR_6	1.000							
(2) BHR_12	0.770*	1.000						
(3) BHR_24	0.524*	0.852*	1.000					
(4) BHR_36	0.532*	0.851*	0.939*	1.000				
(5) BHR_b6	0.430*	0.554*	0.592*	0.572*	1.000			
(6) BHR_b12	0.038	0.158	0.249	0.248	0.553*	1.000		
(7) BHR_b24	0.090	0.099	0.178	0.190	0.529*	0.871*	1.000	
(8) BHR_b36	-0.030	-0.042	0.071	0.033	0.325	0.417*	0.539*	1.000
(9) WR6	0.593*	0.249	-0.041	-0.020	-0.429*	-0.436*	-0.380*	-0.296
(10) WR12	0.457*	0.579*	0.359*	0.409*	-0.128	-0.539*	-0.550*	-0.436*
(11) WR24	0.353*	0.706*	0.703*	0.673*	0.168	-0.208	-0.441*	-0.346
(12) WR36	0.490*	0.823*	0.731*	0.768*	0.309	-0.035	-0.206	-0.314
(13) MarketCap	-0.165	0.005	0.089	0.111	0.152	-0.001	0.083	0.032
(14) Leverage	-0.216	-0.016	-0.169	-0.117	0.105	-0.102	-0.107	0.002
(15) FundSize	-0.160	-0.068	-0.064	-0.069	0.269	-0.021	0.024	-0.136
(16) DealAmount	-0.365*	-0.251	-0.194	-0.248	0.042	-0.018	0.063	0.114
(17) FundRank	-0.148	-0.055	0.075	0.036	0.229	0.033	0.086	-0.113
(18) HoldingPeriod	0.164	0.218	0.144	0.182	0.237	0.141	0.166	-0.008

(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
1.000									
0.555*	1.000								
0.153	0.693*	1.000							
0.133	0.652*	0.893*	1.000						
-0.305	-0.023	0.015	0.053	1.000					
-0.180	0.121	-0.022	-0.105	0.158	1.000				
-0.427*	-0.037	-0.046	0.016	0.414*	0.218	1.000			
-0.393*	-0.170	-0.243	-0.350*	0.521*	0.394*	0.601*	1.000		
-0.402*	-0.102	-0.052	-0.041	0.296	0.052	0.775*	0.555*	1.000	
-0.039	0.019	-0.054	0.037	-0.279	0.095	0.127	-0.112	-0.047	1.000

Appendix E Operational Performance Ratios

Appendix Table 8: Operating Performance Ratios

This table gives an overview of all the Operating performance ratios of the RLBOs against their matched benchmarks and the difference between them. The timeframe for the operating performance ratios starts with one quarter post-IPO up until 3 years post-IPO with yearly time intervals. The benchmark used in this table is similar to the benchmark used to answer H1.B and is constructed using Propensity Score Matching (PSM). More information on matching can be found in Appendix Table 4. The operating performance ratios used are the Liabilities Ratio (Total Liabilities divided by Total Assets), the ROA (EBITDA divided by Total Assets), ROA2 (EBIT divided by Total Assets), Sales/Turnover Ratio (Sales divided by amount of product stock sold), and the Revenue Ratio (Revenue divided by Total Assets). Statistical significance is denoted as *, **, ***, for the significance levels 10%, 5% and 1% level, respectively.

t Ratios	Year 0	Year 0		Year 1		
	RLBO	Benchmark	Diff.	RLBO	Benchmark	Diff.
Liabilities Ratio	0.799	0.664	0.093***	0.512	0.120	0.620
Return On Assets (ROA)	0.034	0.037	-0.037*	0.036	-0.016	0.032
Return On Assets (ROA2)	0.023	0.023	0.002	0.021	0.107	0.021
Sales/Turnover ratio	138.992	61.997	0.383***	171.902	85.028	0.338*
Revenue Ratio	0.260	0.182	0.177***	0.204	0.198	0.014*
	Year 2			**Year 3**		
Ratios	RLBO	Benchmark	Diff.	RLBO	Benchmark	Diff.
Liabilities Ratio	0.620	0.513	0.095	0.591	0.559	0.027
Return On Assets (ROA)	0.033	0.032	0.010*	0.032	0.027	0.086
Return On Assets (ROA2)	0.021	0.020	0.035	0.021	0.017	0.101
Sales/Turnover ratio	176.433	85.400	0.348*	179.707	80.767	0.380*
Revenue Ratio	0.202	0.181	0.055	0.199	0.193	0.017