

Performance of buyout-backed initial public offerings - Evidence from the United States

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Abstract

PURPOSE OF THE STUDY

The purpose of this study is to research whether initial public offerings (IPOs) backed by buyout sponsors are able to deliver superior stock performance over non-backed issues. Based on the benefits brought by the leveraged buyout model, the information asymmetry issues are likely to be mitigated in buyout-backed offerings. This indicates less negative surprises in the aftermarket and is expected to reflect on better stock market performance.

I utilize buy-and-hold abnormal returns against three different benchmarks and time periods of 12, 24 and 36 months to detect patterns in stock performance between buyout- and non-backed IPOs. In addition, the causes of performance are studied in multivariate regressions to gain insight on which offer-, company-, and owner-specific factors drive the stock's performance.

DATA

The sample contains 2,021 IPOs listed in the United States between April 1996 and December 2008. The SDC Platinum's dataset of buyout-backed offerings is validated by studying their IPO prospectuses, identifying 321 issues as buyout-backed ones. Stock price data is obtained from Center for Research in Security Prices, and accounting items from Compustat.

RESULTS

I find strong evidence for buyout-backed offerings outperforming their non-backed peers and the S&P 500 benchmark over the first year of trading. Still, the persistence of outperformance does not hold consistently for longer time periods or against all benchmarks.

This study shows support for buyout-firm reputation, length of buyout-firm involvement and earnings quality to have a significant positive impact on the stock performance of buyout-backed offerings. However, I find no evidence on the size of buyout-firm's ownership share to affect the performance.

Keywords Initial public offering, private equity, leveraged buyout

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TUTKIMUKSEN TAVOITTEET

Tutkimuksen tavoitteena on selvittää, saavuttavatko pääomasijoittajien tukemat listautumisannit muita listautuvia yrityksiä paremman kurssikehityksen. Velkarahoitteisen yritysostomallin (LBO) tuomien etujen oletetaan vähentävän informaatioasymmetriaa ja sen tuomia ongelmia pääomasijoittajien omistamissa yrityksissä. Vähäisempi informaatioasymmetria tuottaa oletuksena vähemmän negatiivisia yllätyksiä listautumisen jälkeen, minkä pitäisi näkyä parempana kurssikehityksenä.

Käytän kurssikehityksen mittaamiseen epänormaaleja tuottoja 12, 24 ja 36 kuukauden ajalta listautumisen jälkeen, verraten tuottoja kolmeen eri verrokkiin. Lisäksi tutkin monimuuttujaregressioiden avulla mitkä anti-, yritys- ja omistajakohtaiset tekijät vaikuttavat osakkeen epänormaaliin kurssikehitykseen.

LÄHDEAINEISTO

Aineisto koostuu Yhdysvalloissa huhtikuun 1996 ja joulukuun 2008 välillä suoritetusta 2021 listautumisannista. 321 antia on tunnistettu pääomasijoittajien tukemaksi käymällä läpi näiden listautumisesitteet SDC Platinumin ”velkarahoitteiset yritysostot” -aineiston pohjalta. Osakkeiden hintatiedot ovat peräisin Center for Research in Security Prices tietokannasta, ja muut yritysokohtaiset tiedot Compustatista.

TULOKSET

Tulokset osoittavat, että pääomasijoittajien tukemat annit tuottavat positiivisia epänormaaleja tuottoja muihin listautumisanteihin sekä S&P 500 indeksiin nähden ensimmäisen vuoden aikana. Tämä positiivinen kehitys ei kuitenkaan toteudu johdonmukaisesti pidemmällä ajanjaksoilla tai kaikkiin verrokkeihin nähden.

Tutkituista tekijöistä pääomasijoittajan maineella, omistuksen kestolla, sekä kirjanpidon luotettavuudella on vahva positiivinen vaikutus yrityksen osakekurssin kehitykseen. Pääomasijoittajan omistusosuuden koolla ei kuitenkaan tulosteni perusteella ole merkittävää vaikutusta.

Avainsanat listautumisanti, pääomasijoittaminen, velkarahoitteinen yritysosto

Table of Contents

1 Introduction.....	1
1.1 Background	1
1.2 Research question and contribution	2
1.3 Main findings	4
1.4 Structure of the study	5
2 Private equity industry	6
2.1 Definitions.....	6
2.2 Private equity model.....	7
2.2.1 Firm structure.....	7
2.2.2 Levers of value creation.....	9
2.2.3 Compensation	10
2.2.4 Exit channels.....	10
2.3 The U.S. private equity industry	11
3 Related literature	13
3.1 Stock market performance of IPOs	13
3.1.1 Underpricing	13
3.1.2 Aftermarket performance.....	14
3.2 Private equity ownership in mitigating information asymmetry.....	16
3.2.1 Agency theory.....	16
3.2.2 Adverse selection.....	17
3.3 Private equity involvement in IPO context	18
3.3.1 Aftermarket performance of private equity -backed IPOs	18
3.3.2 Sources of outperformance	19
4 Hypotheses	21
4.1 Outperformance.....	21
4.2 Drivers of performance	22

5 Data and methodology	24
5.1 Sample selection.....	24
5.1.1 Event data – buyout-backed IPOs.....	25
5.1.2 Event data – other IPOs	26
5.1.3 Stock market and accounting items	27
5.1.4 Other (benchmark) data	28
5.2 Measurement of abnormal performance.....	28
5.2.1 Buy-and-hold returns	29
5.2.2 Benchmark portfolios	30
5.2.3 Operating performance	31
5.3 Drivers of (abnormal) performance.....	31
6 Results and analysis	35
6.1 Comparative statistics.....	35
6.2 Long-run aftermarket performance	37
6.3 Drivers of aftermarket performance	41
7 Discussion and conclusions	46
7.1 Outperformance of buyout-backed offerings	46
7.2. Drivers of performance	48
7.3. Avenues for further research	49
8 References.....	51

List of Figures

Figure 1. Typical private equity firm structure	8
Figure 2. Share of private equity portfolio company exits.....	11

List of Tables

Table 1. Global PE industry development.....	12
Table 2. Sample selection process.....	24
Table 3. Annual distribution of IPOs by number and average market value.....	27
Table 4. Data items utilized in the study.....	28
Table 5. Explanatory variables used to explain IPOs' aftermarket performance.....	33
Table 6. Summary statistics for each IPO group.....	36
Table 7. First-day returns for IPO groups.....	37
Table 8. Buy-and-hold abnormal returns.....	39
Table 9. 12-month BHARs (S&P benchmark) by issue year.....	41
Table 10. Operating performance before and after IPO.....	42
Table 11. Multivariate cross-sectional regressions of 12-month aftermarket performance.....	44
Table 12. Summary of key findings.....	47

1 Introduction

1.1 Background

Private equity (PE) industry¹ has become a key player in the global financial markets during the last three decades. It serves as a key player in M&A market, provides capital for companies, and also bears a large importance in taking companies public through initial public offerings (IPOs). Leveraged buyouts² (LBOs) are an important part of private equity, and differ from the likes of venture capital on several dimensions. Typically LBOs are used to acquire majority share in more mature, cash flow -steady companies, which are either private or public (usually taken private after the transaction). These transactions are financed mostly by third party equity investors, as well as high amounts of debt. After several years of financial, operational and governance improvements, private equity firms then exit their buyout investments through a sale to other party, or via listing the stock for public exchange.

Long-run stock market performance of initial public offerings continues to be an area of controversy in the world of corporate finance, as emphasized in the reviewing study by Ritter and Welch (2002). These controversies are amplified on issues backed by a financial sponsors, such as private equity firms. Academics have generally seen private equity backing as a quality label for IPOs due to its reducing effect on information asymmetries. Several studies (see for example Bergström, 2006, Cao and Lerner, 2009, Levis, 2011) show significant positive abnormal performance over non-backed issues in both European and American context. However, these findings are challenged by works of Rindermann (2004) and Jelic, Saadouni, Wright (2005) who do not document similar performance differences between backed and non-backed offerings.

Buyout industry has also received critique for their short-termism and exploitation of investor sentiment through favorable market timing. Cao (2011) suggests that PE sponsors' ability to create value is mostly attributable to successful timing while also the financial press has pointed several shortcomings in the value creation of the LBO model. For example, New York Post business reporter

¹ Private equity refers to long-term equity and mezzanine investments in private companies, and in this paper the term is used to describe the industry as whole, i.e. both venture capital and buyout investing

² Leveraged buyouts are a specific type of investments and hence one part of private equity concept. With the focus of this paper being on buyouts, I use terms buyout-backed, private equity -backed and LBOs interchangeably when referring to IPOs that were previously acquired in a leveraged buyout transaction.

Josh Kosman has dedicated an entire book³ discussing the detrimental effect of private equity on the American economy, criticizing their short-termism and detrimental effects on employment.

Buyout-backed IPOs are an interesting topic also from the viewpoint of exit type that the PE firms choose for their portfolio companies. Kaplan and Strömberg (2008) portray exit characteristics of LBOs over time, and it appears evident that popularity of an IPO exit has decreased. In early 1990's almost a quarter of investments exited via the IPO channel, whereas that ratio has dropped to around 10 % for the 21st century. Meanwhile, other exit channels such as secondary buyouts (financial sponsor selling to another financial sponsor) have increased in popularity. Such development could hint towards private equity firms being less confident about the sustainability of their improvements post-IPO, and they do not necessarily prefer to continue holding shares in portfolio companies but rather prefer a full exit. Still, private equity IPOs remain rather popular and recently constituted for one-third of global IPO value in Q1 2012⁴.

Considering the controversial academic findings, mixed reception among general public, and private equity industry's important presence in M&A and capital markets, I find the buyout-backed IPOs an important and interesting topic to study. The possible outperformance to non-backed IPOs is an interesting phenomenon in that if buyout-backed issues are able to consistently deliver superior stock returns, why are they not priced accordingly? Which drivers cause this outperformance? This study examines these performance patterns between buyout-backed and non-backed offerings, and provides evidence on which factors drive the performance.

1.2 Research question and contribution

The research proposition in my thesis is to study whether IPOs backed by buyout sponsors are capable of delivering superior stock performance over non-backed issues. Study is conducted on IPOs listed in the United States between April 1996 and December 2008.

The first objective is to compare the stock market performance of buyout-backed and non-backed IPOs for up to 36 months after flotation. The motivation for this research setting comes from the characteristics of private equity. The involvement of private equity sponsors before and after the IPO should allow continuous improvement of company's operational performance through better governance and management incentives. Also the benefits associated with the LBO model (leverage, picking high quality companies for investment) and the implementation of the offering (better

³ *The Buyout of America – How Private Equity is destroying jobs and killing the American economy*, 2010.

⁴ *Ernst & Young*, <http://www.ey.com/GL/en/Newsroom/News-releases/Q1-2012--Europe-saw-the-largest-PE-backed-IPO-in-18-months>

reputation leading to high quality underwriters, suitable market timing) motivate the expectation of buyout-backed issues to outperform others. In order to answer to this research objective, I utilize buy-and-hold abnormal returns against three different benchmarks and time periods of 12, 24 and 36 months to detect patterns in stock performance between buyout- and non-backed IPOs.

Second main research objective is related to which factors impact the stock market performance in case of buyout-backed IPOs. The causes of performance are studied in multivariate regressions to gain insight on which offer-, company-, and owner-specific factors drive the stock's performance. I investigate the effect of buyout-sponsors' ownership share after the offering – larger holding is expected to reflect in better stock-market performance due to improved monitoring (Katz, 2009). The reputational dimension of the buyout sponsor is also under study, with previous research providing support for better-reputational PE firms being able to select high-quality portfolio companies, having access to underwriters of better quality, as well as delivering superior governance. Furthermore, I examine the impact of LBO duration on the stock performance. Longer time under PE ownership is expected to improve the performance due to time allowing more complete value creation in the LBO process (Cao, 2011). Finally, the effects of earnings quality on buyout-IPOs performance are investigated. Following Katz (2009), better earnings quality associated with private equity sponsors should result in fewer negative surprises in the aftermarket, and hence better stock market performance.

I follow the approach taken by Levis (2011) but conduct this research in American setting and for an extended time period to reflect on the impact of the recent credit crunch. Methodologically I supplement his work by also comparing the IPOs performance to industry-, size- and style-matched control firms in order to alleviate the effects of such variables on IPOs performance. Furthermore, this research is complemented with several variables omitted by Levis (2011). Private equity owners' reputation and earnings quality of the listing company are both studied as possible drivers of IPOs' aftermarket performance.

My thesis contributes to current literature by providing an updated view on the performance of buyout-backed IPOs in American stock markets. Majority of literature on the performance of PE-backed issues have related to the involvement of venture capitalists (see for example Brav and Gompers, 1997) or a specific type of deals (for example reverse LBOs⁵ in Cao and Lerner, 2009). Buyout-backed offerings are chosen under study due to their unique characteristics of high leverage

⁵ Reverse LBOs refer to private equity firms purchasing a company off the stock market, and then re-listing it after the holding period

utilization and investment choice of struggling, mature companies or divisions. Furthermore, with time period of my study extending to include the latest financial crisis – a period of greater uncertainty – it will be interesting to see whether the PE sponsors' good relationships with financial institutions have provided some needed flexibility during these financially distressed times.

Additionally, my thesis provides more clarification on the sources of buyout-backed IPOs' performance. Issue-specific drivers such as underpricing and size are studied, as well as operating indicators like asset turnover and leverage. Of most interest are however the buyout-specific variables' (size of an ownership stake, reputation, length of investment and earnings quality) as performance drivers, since academic evidence on these factors is still somewhat controversial. For example, leverage is shown to improve stock performance in Levis (2011), and Hou and Robinson (2006), while Cao and Lerner (2009) do not find evidence for similar relation.

To sum up, the main research questions of this study are summarized below:

Q₁: Do the buyout-backed IPOs outperform other, non-backed IPOs in terms of aftermarket stock performance?

Q₂: Which company-, owner- and offer -specific factors drive the stock market performance of buyout-backed IPOs?

1.3 Main findings

This study provides evidence for buyout-backed IPOs outperforming their non-backed peers in terms of stock market performance in the American stock markets, in support of previous findings by Bergström et al. (2006) in France and United Kingdom, Cao and Lerner (2009) in United States, Levis (2011) in United Kingdom among others. On average the buyout-backed IPOs delivered buy-and-hold abnormal returns of 10 percent above the S&P500 benchmark during the first 12 months of trading, in comparison to non-backed issues negative 6 percent. Buyout-backed offerings outperform the others also for 24- and 36-month terms, but the persistence of generating statistically significant abnormal returns over the market benchmark does not apply. Further study of aftermarket performance by IPO year shows that buyout-backed IPOs good performance seems not dependent on successful market timing, but rather a continuous phenomenon - illustrated by them outperforming the S&P500 index ten times out of the studied thirteen years.

Secondly, this study gives insight on drivers of IPO's performance. As expected from studies by Purnanandam and Swaminathan (2004) and Levis (2011), high first-day returns correlate negatively with new stock's development. Likewise, market capitalization and book-to-price are shown to have

significant positive impact, which might be due to lower risks associated with such larger and more stable companies. Of the operating characteristics, asset turnover surprisingly does not seem to have a significant relation to performance, whereas leverage has a positive impact on stock's development. However, this study shows that buyout-backed IPOs operating performance levels (measured in terms of asset turnover and operating margin) before the IPO are far superior to non-backed issues, and also that they manage to maintain such performance after IPO more persistently.

In addition to offer-specific variables and operating characteristics, this study also provides evidence that both the private equity sponsor's reputation (measured by assets under management) and length of their involvement in the portfolio company drive the aftermarket performance positively. However, the size of the private equity ownership stake does not seem to have such significance, contradicting with findings by Levis (2011). It might be that PE houses continue active ownership after the actual IPO event despite the size of their stake. They still have their reputational concerns, lock-up agreements as well as large financial gains associated with the performance of the stock to consider. Finally, earnings quality emerges as a relevant positive driver of buyout-IPOs' performance in this study. As Katz (2009) suggests, reputational measures and tighter monitoring employed by PE sponsors drives better earnings quality and hence should reflect on lack of negative earnings surprises.

1.4 Structure of the study

This thesis is structured as follows. Section 2 introduces the private equity industry in general by describing their investment process and levers of value creation, as well as taking a look in the development of the industry. Section 3 presents the main theories and empirical findings in the fields of IPO performance, information asymmetry associated with new stock listing and private equity involvement in IPO context. In section 4, the testable hypotheses are derived from the theoretical frameworks. Section 5 describes the data retrieval process and its specifications, and presents the main methods that are utilized in this study. In section 6 the empirical results are presented and analyzed. Finally, section 7 concludes and provides suggestions for future research.

2 Private equity industry

This section presents an introduction to the private equity industry with specific focus on the buyout investments. The characteristics of private equity model, including firm and compensation structures, exit channels and the private equity value creation levers are described in addition to a brief look on the development of the industry.

2.1 Definitions

Private equity is often broadly defined to include medium to long-term investments of equity and equity-related instruments in non-public companies. The wide range of different types of investments range from early stage venture funding and mezzanine financing⁶ to large leveraged public-to-private transactions where a listed company is bought off the public trading. Generally, the private equity investments bear low liquidity and transparency, since valuation of private stock is not continuous, nor are their disclosure requirements comparable to those of publicly traded corporations.

Even though there are variations regarding how terms such as venture capital or buyout are used, they generally reflect on the stage of development that the portfolio company is in. Private equity could be broadly classified to three subcategories: venture capital, growth equity and leveraged buyouts. Venture capital (VC) financing is most commonly utilized in rather early stage financing of companies with good growth prospects but limited revenue and high risk, such as start-ups. Typical for venture capitalists is also that they do not acquire a majority share via their investments but rather look for having a broad portfolio of investments to diversify the high risk associated with venture capital investments. Growth equity bears similarities to venture capital in that it often targets also minority ownership, but investment focus is more towards established companies rather than long-shot ventures.

Leveraged buyout transactions are the main focus of this study, and they refer to companies being acquired with typically a large debt financing component in addition to relatively small equity investment. In these buyout transactions the private equity sponsor(s) often purchase majority ownership in the company to be able to exercise control easily over firm's operations. Targets of buyouts are generally large, more mature firms with stable cash flows but some operational issues that the buyout firm is looking to turn over. In addition to the majority ownership, a key distinction

⁶ Mezzanine financing is the term used to describe structures with debt- and equity-like features, such as preferred equity or heavily subordinated debt

from venture capital is the buyouts' focus on operational, governance and financial improvements instead of VCs' target of growing new business.

The buyout transactions can be further classified on the basis of what is the driving force behind the transaction. A general distinction is often made between outsider-driven (i.e. private equity fund) institutional buyouts (IBOs) and insider-driven management buyouts (MBOs⁷). However, for the purposes of this study the split mentioned above is not required, and I will be referring to all types of buyout investments with the term buyout-backed.

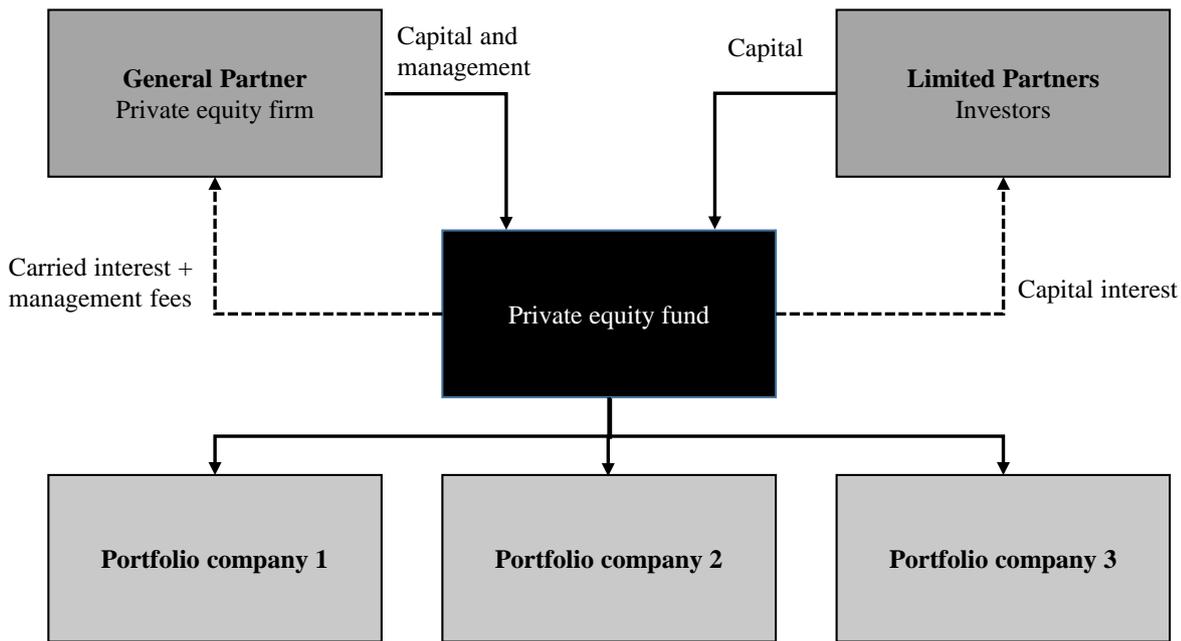
2.2 Private equity model

This section presents the characteristics of private equity model with specific focus on buyout investments. Typical firm and transaction structures are described, as well as presenting the ways in which private equity firms create value, how they are compensated and how they exit their investments.

2.2.1 Firm structure

Private equity firm is typically organized as a partnership or a limited liability corporation (Kaplan and Strömberg, 2008). Their investment process starts from raising capital through a private equity fund that gathers targeted level of financing from institutional investors and wealthy individuals. Most often funds are closed-end, meaning that investors cannot withdraw their investments until the fund is terminated. The fund is organized around the general partners, i.e. the private equity firm that manages the fund, and limited partners who simply provide the capital for investment. General partners also provide capital to the fund but often only a small fraction of total commitment. They do search for suitable investment targets and engage in active management of the portfolio companies, whereas limited partners do not have a say on the investment decisions per se, as long as certain covenants are obeyed. Figure 1 below shows an exemplary structure of private equity fund.

⁷ Management-driven buyouts are further classified into buy-ins and buyouts, depending on whether an outsider management team is involved in the investment

Figure 1. Typical private equity firm structure

The private equity fund that has been raised has typically a lifetime of ten years. First five years are generally reserved for the firm to invest the committed capital into companies, whereas the latter five with a possible three year extension are focused on exiting the investments and returning the capital to investors. In the investment phase the investment opportunities are thoroughly scanned and when a potential deal is identified, a capital call is issued for the limited partners to pay for portion of their initial commitment. The year when fund starts making investments is called vintage year.

In the actual buyout transaction, the fund generally forms a new holding company to acquire the ownership of identified target. These transactions are generally implemented via three different ways: exclusive one-on-one negotiations that are popular mostly on smaller deals, via auctions with multiple buyers competing, or by fund-driven tender offers on publicly listed corporations.

To allow the new holding company acquire the target, the buyout firm often negotiates the debt financing raised in the name of the holding company. Use of leverage is by definition rather extensive in buyouts, with Kaplan and Strömberg (2009) reporting typical transaction financing to contain 60 to 90 percent of debt, often including various instruments from senior bank debt to subordinated debt with different tranches and mezzanine components. This newly raised debt is backed by the portfolio company's assets and hence the more stable businesses targeted by buyouts are a good match to allow for serving the debt in the future.

2.2.2 Levers of value creation

After making an investment in the portfolio company, the phase of private equity value creation is initiated. Kaplan and Strömberg (2009) identify three main areas in which private equity companies look to enhance the value of their portfolio company: financial, governance and operational engineering.

Financial engineering is mostly associated with the benefits brought by extensive use of leverage. The financial benefits of leverage come from tax deductibility of interest payments, allowing reduction in the cost of capital. Secondly, the leverage and related interest payments put more pressure on management, mitigating the free cash flow issues presented by Jensen (1986). The boosting impact on portfolio company valuation created by leverage has been shown to be significant in study by Acharya, Gottschaig, Hahn and Kehoe (2013). They find that 25 to 35 percent of average deal internal rate of return come from effects of financial leverage among large private equity deals in the United Kingdom.

Governance engineering refers to activities taken by the private equity sponsor to allow efficient monitoring and reducing agency problems through that. Governance engineering is enforced through active ownership associated with private equity companies. Firstly, Cornelli and Karakas (2008) document that portfolio companies' Board of Directors are smaller and meet more frequently than for comparable public corporations. Second part of active ownership is associated with private equity's rapid actions when in need of a turnaround. Acharya et al. (2013) show that one third of portfolio companies CEOs are replaced during the first 100 days.

Another key mechanism in reducing the need for monitoring are the management incentives. In addition to often requiring management to invest their personal wealth in corresponding portfolio company, stock- and option-based compensation schemes yield large equity upside for management teams. Kaplan's (1989) findings demonstrate that management ownership is four-fold in transfers from public to private ownership. A more recent update by Kaplan and Strömberg (2009) supports this by showing an average of 16 % equity upside for management of U.S. -based LBOs. This way management's intent can be well aligned with that of owners. Furthermore, with private equity company's stock being illiquid, the usual issues of manipulating short-term performance can be mitigated.

Kaplan and Strömberg (2009) note that private equity value creation was mainly driven by financial and governance engineering in the 1980s, whereas the operational engineering is a more recent phenomenon. Operational engineering refers to adding value by leveraging industrial and operating

expertise for improvements in portfolio companies, and as a result of which several PE houses are organized around a clear industry focus. This also means that private equity houses need to make large investments prior to buyout transaction in terms of due diligence and strategic planning.

2.2.3 Compensation

Private equity firms are compensated in three ways, containing fixed element as well as performance-based variable components. Firstly, the general partner earns a fixed annual management fee reflecting on the management of private equity fund. This compensation is generally a fixed percentage of committed capital, and as investments are realized a percentage of capital employed, but also variable percentages and other calculation methods are used for defining the management fee in fund contracts. Metrick and Yasuda (2010) provide detailed insight on the fee structures, and also document that around two thirds of private equity firms' expected revenue come from this fixed source.

Main variable component of PE earnings come from share of fund's profits, called the carried interest. The industry standard of 20 percent carried interest appears to be used constantly in the study of 144 buyout funds by Metrick and Yasuda, 2010. However, definitions vary across partnership contracts, in regards to how are the profits measured, what performance level must the fund exceed and when are the profits distributed. Other variable components in private equity firms' compensation include transaction and monitoring fees, both being dependent on company size and performance. Transaction or deal fees are charged in a similar fashion to M&A advisory services, when company is sold or bought. Monitoring fees are associated with the active ownership of portfolio companies, and are often charged on basis of a certain percent of EBITDA.

2.2.4 Exit channels

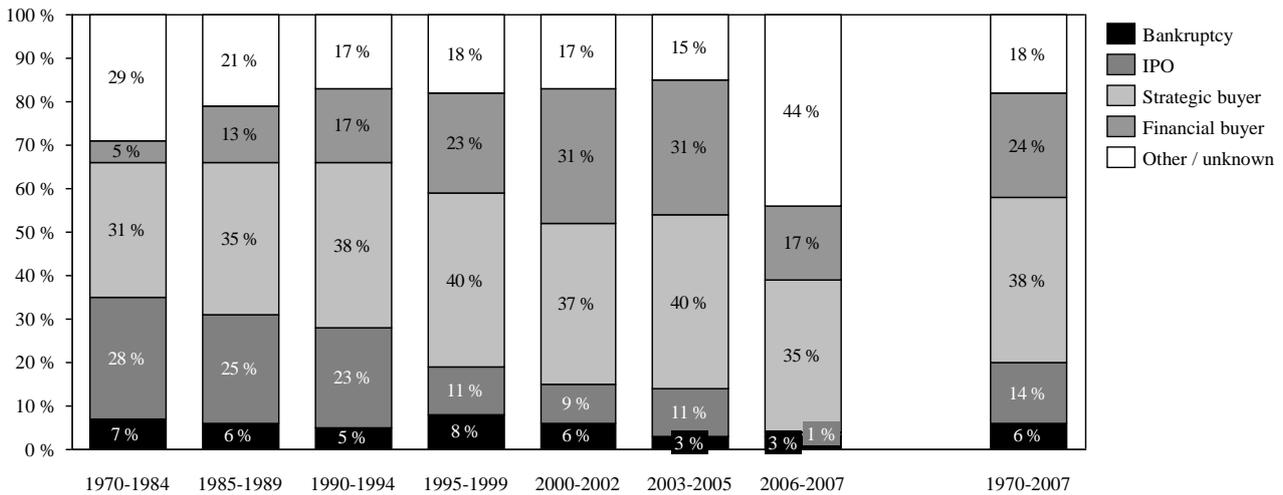
Exiting in private equity context refers to transfer of portfolio company ownership. With funds having a limited lifetime, the capital invested must be returned to limited partners within time. Furthermore, successful portfolio company exits bring financial returns to the fund investors, as well as for general partner in terms of carried interest.

Kaplan and Strömberg (2009) document exit types for a worldwide sample of 17,000 LBOs between 1970 and 2007. Patterns in development of different exit channels are presented in Figure 2. Sale of a portfolio company to a strategic⁸ buyer appears most popular with a 38 percent share of the exits. The second popular exit vehicle is secondary buyout, sale to another private equity fund or another

⁸ strategic buyer refers simply to a non-financial institution in this case

financial sponsor. This exit type is characterized in 24 percent of the studied LBOs, and has been gaining in popularity in 2000s. Initial public offerings are the third main exit channel for private equity portfolio companies, accounting for 14 percent of exits. Interestingly, this exit channel that is also the focus of this study, has decreased in importance since mid-1990s, amounting to one quarter of exit volume previously.

Figure 2. Share of private equity portfolio company exits



As buyout transactions employ a high level of debt to benefit from financial engineering, it might be expected that a large fraction of portfolio investments would result in bankruptcy. However, data gathered by Kaplan and Strömberg (2009) shows that only 6 percent of deals have faced such situation. Assuming a six year holding period on average, the annual default rate of 1.2 % appears below that of average for all U.S corporate bond issuers between 1980 and 2002. (Kaplan and Strömberg (2009)).

2.3 The U.S. private equity industry

Leveraged buyouts started to emerge as significant phenomenon in early 1980s, with growth being initiated in United States, and later on followed by United Kingdom and rest of Europe. According to review by Kaplan and Strömberg (2009), 87 % of buyout transactions took place in North America in late 1980s. Europe started to catch up quickly in the 1990s, eventually exceeding North America in early 2000s with a 49 % share of the global volume. Overall, the global private equity deal values amounted to some 200 billion USD in 2012⁹. Spurred by the attractive returns, also fund commitments

⁹ <http://www.ey.com/GL/en/Industries/Private-Equity/Global-PE-Watch-2013---Challenges-and-opportunities>

have risen greatly in United States from 0.2 billion in 1980 to above 200 billion of late 2000s (Kaplan and Strömberg, 2009).

This growth pattern in buyout industry has not been a continuous improvement but rather a quite cyclical development, both in terms of deal activity and fundraising. Kaplan and Strömberg (2009) suggest the pro-cyclicality be driven by credit market conditions: easy access to leverage leads to more buyout transactions and higher leverage ratios. Consequently, meeting the debt payments for high leverage during a downturn might be troublesome for the portfolio companies. Furthermore, with high market sentiment company valuations are inflated as well, making it difficult to employ value creation and exit profitably.

Table 1 below illustrates the impact of credit crunch on global private equity industry. The amount of funds, committed capital, deal volumes and values, amount of leverage and IPO exit volume are all decreasing after the peak years of 2007-2008.

Table 1. Global PE industry development

This table illustrates key private equity industry statistics globally. Data has been retrieved from Ernst & Young's Global Private Equity watch report 2013.

	2007	2008	2009	2010	2011	2012
Funds closed	1,073	1,024	638	590	603	589
Committed capital (US\$ b)	611	631	285	253	257	282
Announced deals	3,349	2,680	1,847	2,265	2,306	2,233
Announced deal value (US\$ b)	734	219	138	240	223	206
Average leverage	69 %	61 %	54 %	59 %	62 %	62 %
PE-backed IPOs (US\$ b)	58	11	17	35	39	22

3 Related literature

My thesis is related to performance of IPO stocks in general, with specific emphasis on the effects of private equity ownership in such issues. This section presents the main theories and key findings among underpricing, IPO aftermarket performance, the role of concentrated ownership, and implications of private equity involvement.

3.1 Stock market performance of IPOs

Studies on IPOs in general have shown the issues to provide significant abnormal returns on the first trading day (see for example Ibbotson, 1975) while subsequent stock price development of these issues has been inferior in the aftermarket (see for example Ritter, 1991). In their reviewing paper on IPO-related matters, Ritter and Welch (2002) state that the long-run performance of IPOs is one the most controversial and broadly-studied areas of finance research.

3.1.1 Underpricing

Underpricing in IPO context describes the regular phenomenon of stock appreciation from its offer price to the closing of first trading day. Research by Ritter and Welch (2002) documents average underpricing of 18.8 % in the United States' sample of 6,249 IPOs between 1980 and 2001, with approximately 70 % of the IPOs ending first day of trading above offer price. Other global data points document underpricing levels of 24 % in Germany, 11 % in France, 16 % in United Kingdom and 137 % in China to name a few (see Loughran, Ritter and Rydqvist, 1994 for more evidence).

Ritter and Welch (2002) conclude that first day returns for operating companies are on average positive in all countries. Authors argue that these large positive first day returns cannot be justified by previously studied motivations, such as risk premiums related to new offerings or simple market misvaluation. They suggest that underpricing phenomenon is more derived from the offer price setting, i.e. the underwriter-driven process of matching supply and demand.

Underpricing theories can be divided into two on the assumptions of information asymmetry. In the presence of issuer being better informed than investors, there is a fear for a lemons problem similar to the one proposed by Akerlof (1970). Due to this uncertainty-related problem only companies with lower-than-average quality would be willing to sell their stock at average price. In order to distinguish from low-quality issuers, high-quality companies may try to signal their class by offering stock below its value. This is suggested to stop low-quality companies from imitating since they are unwilling to offer stock below its value, and perhaps reveal their true quality voluntarily. Furthermore, this initial sacrifice of underpricing could then be compensated in benefits such as future issuing activity. Welch

(1989) for example shows that companies doing an IPO are seeking for a multi-issue strategy with future seasoned equity offerings (SEOs) in sight. After firm's true quality has been discovered at the market after IPO, the higher pricing at the SEO is well justified to compensate for the uncertainty-driven initial underpricing.

In the case of investors being better informed, the underpricing can be explained as a necessity for demand to exist – rational investors would not be willing to participate in offerings unless they were offered at discount to their valuations. Perhaps more realistic versions of this theory assume that investors are differently informed. In this setting underpricing is required to compensate for uninformed investors' fears of winner's curse, i.e. getting full allocation of overpriced offerings while receiving poor allocation in underpriced ones.

Other suggested reasons for the underpricing phenomenon are related to share allocation in IPOs and the bookbuilding process. For example, Loughran and Ritter (2002) argue that underpricing is set by the conflict of interest between issuers and underwriters. This suggests that underwriters would engage in more severe underpricing than necessary as a reward for their buy-side clients for future business. Authors justify the issuers' acceptance of this by applying the prospect theory initiated by Kahneman and Tversky (1979). According to this issuers are tolerant to the more severe underpricing due to the great increase in wealth brought by a successful IPO.

3.1.2 Aftermarket performance

There is a broad collection of studies that show evidence for recent listings performing poorly in comparison to various benchmarks. Ritter (1991) shows that investing in IPO stocks would have resulted in 17 percent less wealth in comparison to investing in a group of size- and industry matched firms in the New York Stock Exchange. Similarly Loughran and Ritter (1995) study American IPOs and SEOs between 1970 and 1990, finding that their average annual returns over a five-year holding period are less than half of returns generated by non-issuing companies. Also Carter, Dark and Singh (1998) document similar underperformance for all new listing companies.

Brav and Gompers (1997) study U.S. companies that went public between 1972 and 1992, and show that such underperformance is not unique to companies issuing equity. They find similarly poor performance from companies that are of similar size and book-to-market valuation, and that have not issued equity. Authors suggest that underperformance is not an IPO effect but rather related to other firm characteristics. Ritter and Welch (2002) provide support for this view that poor long-term performance extends beyond just IPOs. As IPO companies are often small growth companies, their

underperformance appears rather normal when taking into account that such companies have been the worst-performing style category of recent decades.

With conflicting findings on the matter, this poor performance has not yet been universally explained, as one would expect IPO stocks to trade alike any other stock post-issue. Despite evidence on certain firm characteristics driving underperformance, the presence of efficient markets should suggest that such stocks are priced accordingly to match risk and return.

Finance literature offers several plausible explanations for the IPO underperformance. Firstly, Miller (1977) argues that since new issues are associated with a considerable amount of uncertainty, the valuation opinions regarding the issuing firm also appear rather divergent. With only the more optimistic investors participating in this specific issue, the expectations are inflated on average, i.e. the price is set by the minority of investors believing in the issuing firm. Over time as the issuing firm proves its “track record” the variance in expectations reduces and drifts more towards the mean valuation, resulting in a fall in stock price.

Second key reasoning for the underperformance is derived from management behavior both pre- and post-IPO. Teoh et al. (1998) show that companies associated with most aggressive and optimistic earnings management underperformed other issuers by some 20 percent over three years after stock listing. Such window-dressing is then reflected in poor stock market performance should the goals based on prospectus forecasts not be achieved. Secondly, as suggested by Heaton (2002) manager overoptimism combined with a good availability of funds (as is often the case after a stock offering) could show signs of overinvestment problem, i.e. management engaging in negative-NPV projects that destroy shareholder value.

The optimism around IPOs is not restricted to just the management but rather for the whole stock market. Purnanandam and Swaminathan (2004) measure companies’ intrinsic valuation via industry-matched sales and EBITDA multiples. Authors find that IPO firms are priced 50 % above comparables at the listing, and that this overpricing against peers helps predict long-run underperformance.

Timing of the offering is one suggested factor impacting the performance of IPOs. Schultz (2003) proposes that a “hot” period of IPOs follows a period of successful IPOs, i.e. more and more companies will seek listing in a rising market. This results in more offerings taking place at peak valuations, as well as the average quality of IPO firms being poorer since during market upturn it is easier to go public. Author refers to this as pseudo market timing – issuing companies deliberately

try to utilize favorable pricing and positive investor sentiment but they are not aware prices are peaking when they issue stock. Consequently when IPO performance studies contain relatively more of these poorer quality companies, the underperformance on average occurs. However, this explanation is challenged by the works of Helwege and Liang (2004), who research companies both in hot and cold IPO markets between 1982 and 1993. They find no major differences in firm composition between hot and cold markets but rather that they are of similar size and come from largely the same industries.

3.2 Private equity ownership in mitigating information asymmetry

Majority of IPO-related literature tackles with the issue of information asymmetry, i.e. when parties to the offering bear different levels of information on the flotation process, company itself, as well as the stock market situation. Concentrated ownership with good reputation, such as the one provided by private equity firms, has been shown to effectively reduce these problems arising from the asymmetric information.

3.2.1 Agency theory

The principal-agency problem in company context was initially derived by Jensen and Meckling (1976), who state that agency costs incur in a relationship, in which one person, “the agent”, makes decisions on behalf of the other, “the principal”. The costs arise from different objectives of these players. For example, with owners’ objectives generally being increase in firm value, the management might pursue empire building or other value-destroying measures to increase their personal utility.

Owner can mitigate these agency costs through closer monitoring, and better contracts such as management incentives set to pay on performance. However, for a pack of owners with only minority holdings these measures come costly to implement, and may create further agency problems, such as the free-rider problem, between the owners. Concentrated ownership should help mitigating the issue in theory. As Roe (2004) discusses, in a setting with concentrated shareholding the monitoring becomes more beneficial in reducing managerial misbehavior by setting governance accordingly.

However, this might induce further agency problems, especially in the case of private equity firms. The interesting profit-sharing model introduced in section 2.2.3 creates further principal-agent relationships between the general and limited partners, as well as the management of the portfolio company – all of which might have differences in their objectives. For example, whereas general and limited partners mainly aim to benefit from the investment financially, management must also consider their personal reputation and continuation at the portfolio company after the sponsors have realized their investments.

However, it can be argued that with the reputational capital of Private Equity firms in play (Cao and Lerner, 2009), these issues are mitigated to large extent. In addition to the financial gains, it is in the best interest of PE sponsors to operate towards satisfying all stakeholders in order to guarantee successful business for the future as well.

3.2.2 Adverse selection

Akerlof (1970) presents the issue of adverse selection in the context of used car markets. He presents that since the product quality at the market is unknown, participants face the fear of purchasing a “lemon”, i.e. a poor quality product, and as a response request a discount for participation in the market. This consequently leads to high quality products being absent from the market, i.e. the market being filled with poor quality. Similar reasoning can be derived to the IPO markets, a case in which insiders are seen as not disclosing all information regarding the company. On the contrary, they would try to benefit on lifting the company valuation by earnings management and unrealistic, optimistic performance forecasts (Teoh, 1998).

Within adverse selection problem, signaling theory has been suggested as a tool in mitigating the information asymmetry issues. Insiders provide a signal in the form of disclosing further pieces of information to the uninformed parties. In the case of IPOs, underpricing is often interpreted as such signal mitigating the information asymmetry. Allen and Faulhaber (1989) propose that underpricing works as credible signal of firm quality since only good companies can recoup this initial loss after their performance is realized in the stock market, whereas poor-quality companies cannot afford to do so.

In addition to underpricing, firm quality can be signaled by reputational means. In such cases adverse selection problem can be mitigated by a certification role taken by the underwriter in charge of the issue, or by the owner(s) taking the company public. Underwriter’s role in the IPO process is crucial – they work as the middlemen in warranting that offer price reflects the inside information and hence providing fairly priced equity to the market. Carter and Manaster (1990) find that prestigious underwriters only work with IPOs that are associated with lower information asymmetry, and hence better quality, to maintain their reputation. This is supported by the study of Carter et al. (1998) who show that the certification brought by high-quality underwriters also translates into better long-term stock performance.

The certification role of the owners is also derived from reputational issues. Since private equity firms exit their investments through IPOs on a regular basis, they have their reputation to protect in the process. Their need to be able to take their portfolio companies public in the future provides a quality

stamp on the issue – they cannot be associated with failures since investors would not be willing to participate in their IPO exits further. Also, successful IPO exits could make it easier for PE funds to raise money from investors. Gompers (1996) stresses the importance of this reputation building in his work on venture capital IPOs.

3.3 Private equity involvement in IPO context

Private equity firms are a good example of an active, concentrated owner presented in section 3.2. Their role as a concentrated owner, along with beneficial use of leverage should allow better monitoring and governance in companies also after their IPO, translating into better performance over long-term. In practice, these benefits are achieved by the PE sponsor setting a high quality management team and appropriate incentives for them, reducing agency problems in intra-firm setting, while also pulling several strategic and operational changes needed to improve accounting performance. Still, this area of private equity involvement is very controversial with several academic findings suggesting differing views. This section provides the contrasting findings on the performance of private equity -backed IPOs, as well as proposing several theories on sources of superior performance.

3.3.1 Aftermarket performance of private equity -backed IPOs

The studies regarding aftermarket performance and the different types of owner-backing show some interestingly contrasting views. Many studies have shown that LBO- and venture capital -backed offerings seem to provide superior stock performance in comparison to non-backed issues. However, several papers are also more supportive of efficient markets hypothesis in that they document no evidence in performance between different types of IPOs.

In a recent study on the London Stock Exchange, Levis (2011) finds that IPOs with private equity -backing achieve significantly positive abnormal returns in comparison to venture capital -backed and non-backed issues. Outperformance in comparison to other IPOs is also documented in a study by Bergström et al. (2006), focused on PE-backed IPOs in London and Paris. However, their sample of PE-backed IPOs still generated significantly negative abnormal returns in comparison to overall stock market benchmarks. In a somewhat differing fashion, Cao and Lerner (2009) document US-based reverse leveraged buyouts to outperform both other IPOs as well as the S&P500 market index.

Differing views to the superior performance of PE-backed IPOs are offered by Rindermann (2004). He does not find evidence on PE-backed issues in general outperforming non-backed ones in France, Germany or United Kingdom, but rather only a subgroup of international venture capitalists succeeding to spur the aftermarket performance of their portfolio companies. Consequently, venture

backing does not seem to have an impact in aftermarket performance of management buyout –based IPOs. Jelic et al. (2005) compare those to both non-backed issuers and matching firms in the United Kingdom, and document no significant performance differences. Some studies on the United States' LBO market also provide no evidence on the superiority of PE-backed issues. Holthausen and Larcker (1996) find no evidence of American RLBOs being associated with abnormal IPO performance, even though their accounting performance continues to outperform industry peers. More recently, Cao (2011) documents that a subgroup of backed offerings, so called “quick flips”, in which portfolio companies are floated too quickly, underperform and show greater bankrupt probability.

3.3.2 Sources of outperformance

Despite lack of general consensus among academics on the aftermarket performance of private equity -backed IPOs, studies have found support for several owner and market specific drivers of these outperforming IPO stocks. These stem from the benefits of the LBO model (winner selecting, leverage, continuing involvement in governance) but also from market timing.

Jensen's (1989) work on value drivers of private equity model suggest that superb operational performance is achieved through closer monitoring, management expertise and high leverage. Generally it is expected that this value is added when company is under private control. However, as Levis (2011) argues one could expect these monitoring and management practices to be continuously utilized also after PE house's (partial) IPO exit. This is justified by the major impact of private equity in the actual IPO process, being generally active in setting the terms, timing and structure of the offering. Furthermore, lock-up agreements and liquidity considerations generally result in financial sponsors retaining a significant holding post-IPO as well, implying that it is in their interest to continue active engagement with the portfolio company after the IPO.

Companies receiving investment from buyout sponsors have generally gone through a very thorough screening process of firm quality and especially potential. Naturally there are failures associated with buyout investments but in general it signals of good firm quality for it to have proceeded into IPO process. This is especially the case for more reputable financial sponsors: the more experienced players with the largest funds that continue to outperform their competitors. Krishnan et al. (2011) show that more reputable venture capitalists are associated with superior long-term performance in American IPOs for 1993-2004. This stems from their better ability to pick high-quality firms for investment and should be equally adaptable in the context of buyout firms. Better reputation of PE sponsors is also associated with better relationships with financial institutions. Concerning this, Brav and Gompers (1997) suggest that better-reputational venture capitalists could alleviate the

information asymmetry issues and gain in better stock performance through their access to top-tier underwriters for the IPO.

The reputational measures are also related to better monitoring. Financial sponsors with better reputation are engaging in more active corporate governance also post-issue and hence are associated with better long-term performance in comparison to non-backed issues in the U.S. (Krishnan et al., 2011). These findings would suggest that sponsor's measures in operational and governance engineering continue to be value-adding also after the issue. This is especially the case in companies, in which buyout sponsors hold a majority interest. Katz (2009) finds in his study on American IPOs that stock market performance of firms majority-held by private equity sponsors is significantly better than that of minority-held or management-owned companies, mainly due to their higher earnings quality.

Related to the better governance engineering are Katz's (2009) suggestions on buyout-backed companies having better earnings quality both prior to and after an IPO. He hypothesizes that tighter monitoring employed by PE firms gives management much less leeway to manage earnings upwards. Also in the case of LBOs the presence of demanding debtholders results in more timely loss recognition for the portfolio company. Overall, these principles ought to result in better, more realistic financial reporting quality and make the buyout-backed IPOs differ positively from generally upward-biased forecasts that are associated with IPOs of small growth companies.

Financial engineering, i.e. leverage is a descriptive element in buyout-backed companies but the empirical evidence regarding its relation to stock performance is rather mixed. The studies by Levis (2011) on British non-backed and sponsor-backed IPOs show that leverage is a significant positive contributor for the success of PE-backed issues. This is in line with the PE value creation mechanisms suggested initially by Jensen (1989), and also supported by empirical findings on American stocks by Hou and Robinson (2006). However, in the study on RLBO performance by Cao and Lerner (2009) they do not find such significant relation between leverage and buyout-backed IPOs aftermarket performance. Consequently Korteweg's (2010) research on net benefits of leverage proves advantages of debt to be decreasing but only when leverage is high.

Cao (2011) finds evidence on IPOs with shorter PE-sponsor involvement facing larger decreases in operating performance than issues with longer duration. Additionally, he shows that there is a certain relation between sponsor involvement pre-IPO and market timing. Under poor market conditions sponsors spend more time on making the issue a success while that does not matter so much when the market conditions are favorable. Bergström et al. (2006) also note that private equity firms do not

seem to actively take advantage of windows of opportunity presented by hot IPO markets. Authors rationalize this by characterizing PE-backed IPOs as less subject to investor sentiment. With such issues being allocated mainly to institutional investors rather than more sentimental retail investors, PE firms are less dependent on successful market conditions in exiting through IPO. This way the market peaks with overly-inflated equity prices and consequently future growth expectations can be better avoided, and the IPO valuations should match the intrinsic stock valuation better.

4 Hypotheses

This section presents my hypotheses and the related justifications behind the choice of them. Hypotheses are presented in two main parts, derived from the following research questions:

Q₁: Do the buyout-backed IPOs outperform other, non-backed IPOs in terms of aftermarket stock performance?

Q₂: Which company-, owner- and offer -specific factors drive the stock market performance of buyout-backed IPOs?

4.1 Outperformance

In comparison to non-backed IPOs the buyout-backed ones bear several advantages which might result in better aftermarket performance. Average IPO stocks have generally been rather small growth companies, which are associated with high levels of information asymmetry. This information asymmetry issue can be more alleviated by upwards earnings management and too optimistic IPO prospectus forecasts. Such exploitation of investor sentiment by the management of non-backed offerings could be associated with more severe mispricing, and generally followed by poorer performance in the aftermarket for not meeting the inflated expectations. With the private equity quality stamp mitigating the information asymmetry problem, PE-backed IPOs should be priced closer to the intrinsic value of the stock. Based on these differences it appears natural that there would be more negative surprises associated with the non-backed offers capitalizing on the information asymmetry.

With concentrated ownership from financial sponsors specializing in management of companies this asymmetry issue can be mitigated. First of all, being repetitive players in IPO markets, PE sponsors have their reputation at stake with each offering, and should hence benefit in the long-term on providing more honest information on the floating company, effectively reducing the information asymmetry on the issue (Cao and Lerner, 2009). Secondly, the better earning quality as evidenced by

Katz (2009) further improves the information available on buyout-backed IPOs. This should show over time in better meeting performance expectations, and consequently more favorable share price reactions.

Additionally, it can be argued that private equity value creation does not end at the partial IPO exit but rather that their efficient management structures (governance, executive compensation, relationships with financial institutions) are continuously developed for the benefit of the company. Levis (2011) for example justifies the PE-backed IPO outperformance on investors being surprised by the continuous involvement of private equity sponsors. Initially, aggressive offer pricing and risks related to high leverage result in such issues starting to trade at modest first-day returns. However, the continuing involvement of PE sponsors provides robust operational performance to continue after flotation, while high debt levels are rapidly reduced after IPO. These features should result in upward revision in investors' valuation. Consequently, my first hypothesis predicts IPOs backed by a buyout sponsor to have a better stock market performance than non-backed IPOs.

H₁: Buyout-backed IPOs experience superior aftermarket performance in comparison to other, non-backed IPOs.

4.2 Drivers of performance

Regular performance drivers affecting IPOs' stock market performance can be classified into issue-specific drivers such company size, style (growth vs. value), level of underpricing and market timing, as well as operational characteristics like asset turnover, operating margin or leverage ratio. Focus of this study is on the private equity -related drivers, with sponsors' ownership, reputation and length of ownership hypothesized to bear an impact on IPOs' aftermarket performance. Furthermore, also the better earnings quality associated with buyout involvement is studied as a driver.

The size of financial sponsors' ownership share can be seen as a driver of corporate performance. Sponsor that retains a significant amount of ownership for years after the (partial) IPO exit, can continue to employ the several benefits brought by the concentrated ownership and the buyout model (monitoring, operational and financial governance), that would reflect in better corporate performance, both operationally and stock-market-wise. Hence, the second hypothesis predicts that companies, in which buyout firms retain a significant ownership post-IPO fare better in the stock market:

H₂: Size of buyout-firm ownership post-IPO has a positive effect on stock's performance.

I also predict reputation to play a role in the performance of newly-listed stocks. Buyout-sponsors are assumed to have similar skill set to venture capitalists in selecting quality firms for investment and especially being able to deliver the more active governance over the investment period (Krishnan et al., 2011). Additionally, Brav and Gompers (1997) propose that more reputational venture capitalists have better access to high-quality underwriters that should alleviate the information asymmetry problem and result in better performance than non-backed offerings. These academic findings provide justification for the third hypothesis:

H₃: Buyout-firm reputation has a positive effect on stock's performance.

As Cao's (2011) studies on LBOs show, buyouts with shorter sponsor involvement face larger decreases in operating performance post-IPO than issues with longer duration. This is simply due to large restructurings taking time to accomplish via leveraging all the private equity value creations levers optimally. Cao (2011) also shows that buyout-backed IPOs are more rushed under favorable market conditions. This can be expected to result in worse stock-market performance due to companies being unable to meet the inflated expectations set during hot market period and hence not being able to justify their high initial pricing levels. Derived from these findings, I propose the following fourth hypothesis:

H₄: Length of buyout-firm involvement pre-IPO has a positive effect on stock's performance.

In line with Katz's (2009) findings on earnings quality, I predict better earnings quality to drive IPO stock's performance in the aftermarket. The rationale behind better earnings quality is driven by sponsors' tighter monitoring and reputational concerns, with the active involvement of PE sponsors leading in more conservative earnings management and more timely loss recognition. These are both indicators of better earnings quality, which in turn should result in fewer negative surprises after the IPO, and hence to better stock performance. The hypothesis regarding to earnings quality stands as follows:

H₅: Better earnings quality associated with buyout-backed IPOs has a positive effect on stock's performance.

5 Data and methodology

This section describes the specifications on how the sample is formed from different data sources, as well as what measures are taken to verify its quality. Additionally, the methodological choices needed to test the hypotheses accordingly are presented and justified in this section.

5.1 Sample selection

My thesis utilizes a sample of 2021 IPOs listed in three U.S.-based stock exchanges, namely American Stock Exchange (AMEX), New York Stock Exchange (NYSE) and Nasdaq, between April 1996 to December 2008. The time period is chosen as to allow the study of three-year aftermarket performance of the more recent IPOs, as well as taking into account Securities and Exchange Commission's EDGAR database limitations, containing IPO prospectuses starting from April 1996.

Sample is acquired from four main sources. SDC Platinum's event data forms the cornerstone of the IPO sample. Related stock market data items are obtained from The Center for Research in Security Prices (CRSP), while company-specific accounting data is retrieved from Compustat database. These data sources are complemented by companies' prospectus filings in Securities and Exchange Commission's EDGAR database. The whole sample selection process is illustrated in the table 2 below, with descriptions in following sections.

Table 2. Sample selection process

This table explains how the final sample for buyout-backed and non-backed IPOs has been formed via verifying IPOs as buyout-backed offerings, and taking data availability into account.

Sample selection criteria: Buyout-backed IPOs	No. of obs.	Source
Initial sample of buyout-backed IPOs implemented between April 1996 and December 2008 in AMEX, NYSE and NASDAQ	346	SDC Platinum / VentureXpert
Deduct 14 unit issues or Bancshares that are not comparable ownership-wise	332	EDGAR
Deduct 11 issues with no sign of major private equity involvement	321	EDGAR
Final BO-sample	321	

Sample selection criteria: Other IPOs	No. of obs.	Source
Initial sample of IPOs implemented between April 1996 and December 2008 in AMEX, NYSE and NASDAQ	4002	SDC Platinum / Global New Issues
Deduct 996 issues that appear as duplicate	3006	SDC Platinum
Deduct 510 issues with CRSP ticker missing	2496	CRSP
Deduct 475 issues with CRSP codes other than 10 or 11 to remove funds and trusts from the sample	2021	CRSP
Deduct the 321 issues that are included in the Buyout-backed sample	1700	SDC Platinum / VentureXpert
Final Other IPOs sample	1700	

5.1.1 Event data – buyout-backed IPOs

SDC Platinum's VentureXpert database provides a broad amount of data on American private equity industry. It offers specific listings of IPOs that have been backed by different kind of financial sponsors. In the context of this study, focus is to select all buyout-backed public companies that have been listed in Nasdaq, NYSE or AMEX between April 1st 1996 and December 31st 2008. Offer-specific data such as IPO dates, offer price, issuer CUSIP¹⁰ and SIC codes¹¹ were retrieved from SDC. Furthermore, in order to form certain owner-related variables, I also obtained the names of private equity firms/funds that had invested in the listing company, the PE firms' capital under management and the investment dates to the portfolio companies in the buyout-IPO sample. These specifications yield an initial sample of 346 issues that were backed by buyout sponsor.

This initial sample needs verification measures in order to be better representative of the private equity involvement. For the purposes of this study, buyout-backed IPO is defined as company where the financial sponsor(s) have a major ownership stake of more than 10 percent prior to offering, and at least one of the sponsors is engaging in buyout activities. The ownership stakes and key owners listed in prospectuses were examined to verify the magnitude and type of investment in terms of each IPO.

Firstly, from the SDC's Global New Issues database all IPOs with PE-backing ticker for the corresponding time period are studied to see if some relevant issues are missing from the

¹⁰ CUSIP (Committee on Uniform Security Identification Procedures) is a 9-character alphanumeric code which identifies a North American financial security

¹¹ SIC (Standard Industrial Classification) refers to four-digit coding used to classify industries that companies operate in

VentureXpert sample. 15 additional IPOs not contained in Venture Xpert data are flagged as PE-backed, but study of their IPO prospectuses show no sign of major private equity involvement. Secondly, offerings in the sample are then further studied by going through IPO prospectuses to verify the timing and nature of private equity investment. 11 issues in the sample are removed due to lack of private equity involvement. Also, unit issues and Bancshares are excluded on the basis of not being comparative in terms of their ownership dimension. After accounting for these changes, the final buyout-sample stands at 321 offerings.

5.1.2 Event data – other IPOs

To get a suitable benchmark against buyout-backed IPOs, SDC's Global New Issues database is utilized. All public and private common stock listings in Nasdaq, NYSE or AMEX are retrieved for the same time period, including all the same data items as above, with the exception of owner-specific fields that are utilized only for buyout-backed offerings. These specifications form an initial sample of 4002 IPOs. This is edited by first removing duplicate offerings and the ones missing a CRSP ticker needed to get the aftermarket performance data. Moreover, to provide a better fitting benchmark sample, closed-end funds and investment trusts are removed from the sample. After also deducting the offerings that are found in the buyout-backed sample, the other IPOs sample amounts to 1700 offerings.

The whole IPO sample by year is illustrated in Table 3. Overall listing activity appears highest around the tech bubble of 1999-2000, also in terms of average market capitalization of offerings. Coolest IPO periods then seem to sync with stock market crises, being after the tech bubble years, as well as credit crunch of 2008. However, for buyout-IPOs bubble period was relatively quiet in terms of issuing volume, whereas the activity peaked in the period of 2004-2006 with a total volume of 150 buyout-backed offerings. On average, buyout listings appear 26 percent larger in terms of market capitalization.

Table 3. Annual distribution of IPOs by number and average market value

The total sample consists of 1700 non-backed (NB) and 321 buyout-backed (BO) IPOs floated from April 1996 to Dec 2008. Average market value is the offer price multiplied by the number of shares outstanding right after the IPO.

	Number of IPOs			Average market value (\$m)		
	ALL	NB	BO	ALL	NB	BO
1996	295	289	6	211	205	529
1997	296	272	24	260	231	590
1998	169	153	16	405	355	888
1999	322	296	26	1,124	1176	526
2000	256	240	16	1,387	1395	1268
2001	52	41	11	1,388	1470	1086
2002	55	39	16	554	458	787
2003	53	32	21	695	386	1167
2004	145	104	41	685	689	675
2005	121	65	56	582	413	779
2006	121	73	48	700	528	961
2007	118	84	34	889	730	1282
2008	18	12	6	1,977	2564	803
Total	2021	1700	321	722	693	874

5.1.3 Stock market and accounting items

CRSP database offers historical stock market data for US-based companies, and is utilized in this research to provide data for comparing the performance of different IPOs. Daily share prices for 36 months after offering are retained for companies in both IPO samples. To allow value weighting of IPO returns, also market capitalization at time of each issue are retrieved.

Accounting data is needed to determine sources of out- or underperformance. Compustat is utilized in retrieving sales and EBITDA figures, total debt, total assets and book equity values on quarterly basis. Additionally, annual net operating assets are needed to study the impact of earnings quality. The main accounting, stock market and issue-specific data items are described in Table 4.

Table 4. Data items utilized in the study

This table describes the main data items and their respective sources that are utilized in this study for each IPO stock.

Data item	Specification	Source
Share price	in USD, daily time series	CRSP
Market capitalization	in million USD, at the time of listing	SDC
Book value of equity	in million USD, at the time of listing	Compustat
Net sales	in million USD, quarterly	Compustat
EBITDA	in million USD, quarterly	Compustat
Total assets	in million USD, quarterly	Compustat
Total debt	in million USD, quarterly	Compustat
Net operating assets ¹²	in million USD, annual	Compustat
PE ownership stake	in %, pre- and post-IPO	SEC / EDGAR
Date of PE investment	in date	SDC and SEC / EDGAR
Private equity firm fund size	in million USD	SDC VentureXpert

5.1.4 Other (benchmark) data

To allow comparison of returns against different benchmarks, I also obtain monthly values on S&P 500 and Nasdaq Composite indices. These are retained from CRSP. Additionally, the control firm sample (see 5.2.2) needs to be formed. CRSP database provides monthly returns and CUSIP and SIC codes for all American companies. Additionally, quarterly total asset values and price-to-book equity values for these companies are taken from Compustat to form the basis of matching sample companies with control firms.

5.2 Measurement of abnormal performance

Barber and Lyon (1997) study empirical power and specification of test statistics in the context of measuring long-term stock returns, and report that studies generally suffer from four issues: 1) measurement, 2) skewness, 3) new listing, and 4) rebalancing biases. Measurement bias is related to the choice of return calculation while skewness bias is an issue of choosing appropriate test statistics. These both are discussed in section 5.2.1. The other two biases are related to appropriate benchmarking, and are presented in 5.2.2.

¹² Net operating assets = [common equity + preferred stock – preferred dividends] + [current debt + long-term debt - preferred stock + preferred dividends] + [cash and equivalents + investments and advances] + minority interest

Overall, returns are calculated for periods of twelve, twenty-four and thirty-six months to find out possible differences in persistence of out- or underperformance among the IPO subsamples. Both equal- and value-weighted measures are used to offer more insight on relative success of larger listings in each of the studied samples. Value-weighting is based on market values at offer of each IPO.

5.2.1 Buy-and-hold returns

Measurement bias is associated with the usage of cumulative abnormal returns - since they ignore compounding, the estimates for long-run returns will be positively biased. Consequently, this problem can be easily solved by using buy-and-hold-returns to gain less biased test statistics.

Each IPO is calculated its specific buy-and-hold return by compounding its monthly returns in addition to the first fractional month of trading. The aftermarket performance of each IPO is then calculated by deducting the corresponding benchmark return over same time period. This measure then yields the buy-and-hold abnormal return for each offering, after which they are summed to get a portfolio level measure of abnormal returns. When a company is delisted from the portfolio, the next month's portfolio return is simply the average of remaining stocks. Equation 1 below presents the process of calculating buy-and-hold abnormal returns for each IPO sample:

$$BHAR = \frac{1}{N} \sum_{i=1}^N [(\prod_{t=1}^T (1 + r_{it})) - (\prod_{t=1}^T (1 + r_{bt}))], \quad (1)$$

where r_{it} and r_{bt} are the raw returns on IPO i and benchmark b at event month t .

Skewness bias arises from long-term stock returns being positively skewed. Lyon, Barber, and Tsai (1999) suggest mitigating this problem through employing bootstrapped skewness-adjusted t -statistic instead of the conventional one. Specifications for calculating this more advanced t -statistic are shown below in equation 2:

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

where

$$S = \frac{\overline{AR}_t}{\sigma(AR_t)}, \text{ and } \hat{\gamma} = \frac{\sum_{i=1}^n (AR_{it} - \overline{AR}_t)^3}{n\sigma(AR_t)^3},$$

where AR_{it} is the buy-and-hold abnormal return for IPO i at event month t , \overline{AR}_t is the sample mean and $\sigma(AR_t)$ the sample standard deviation of abnormal returns.

The null hypothesis is that the mean abnormal return in the corresponding IPO portfolio equals zero. Significantly positive t-statistic indicates that portfolio of stocks has improved abnormally better than its benchmark, and vice versa for negative t-statistic.

5.2.2 Benchmark portfolios

In this study abnormal buy-and-hold returns are calculated against following three benchmarks:

- 1) S&P 500 Index,
- 2) Nasdaq Composite Index and
- 3) control firms.

While not necessarily having many similarities as buyout-backed IPOs, S&P 500 Index provides a fine overall index to analyze these IPOs as an investment – in comparison to general stock market development. Nasdaq Composite is used as another benchmark due to it being more comprised of growth stocks that should be better comparable to IPO stocks.

However, these first two proposed benchmarks might differ quite strongly from the population of normal or buyout-backed IPOs, and hence not provide appropriate results as benchmarks. In fact, the IPOs might suffer from new listing and rebalancing bias. New listing bias is a problem in IPO event studies, since the newly-listed companies do not have similar history of past stock prices as the benchmark might have. Rebalancing bias arises from sample firms' returns being compounded without rebalancing while in case of indices usually monthly rebalancing occurs.

These issues can be mitigated by employing an approach called control firms, suggested by Barber and Lyon (1997). In control firms, the reference portfolio is compiled of similar stocks as in the studied population. This means that all sample firms are matched to a control firm that shares certain firm characteristics. Rebalancing issues disappear since the returns of both the sample and control firm are calculated without rebalancing measures. Since the focus of this study is to compare IPO performance both between different types of IPOs, and to other asset classes, the new listing bias is left unsolved on purpose.

Sample firms are matched to control firms on three characteristics. First condition is that control firm must share the same primary industry, as measured by four-digit SIC codes. Hence a shortlist of comparables is chosen from control firms whose first two digits of SIC code are same as for a given sample firm. Secondly, size matching is done by filtering shortlist of control companies that have total assets values between 70% and 130% of the sample firm. Finally, to also get “style-matching” control company is chosen such as having the closest price-to-book equity to the sample company.

5.2.3 Operating performance

Differences in operating performance between buyout- and non-backed IPO subsamples are studied for asset turnover (sales to total assets), operating margin (EBITDA to total sales) and leverage (total debt to total assets) for one year prior to offering to three years after the event. IPO event year has been left out of this comparison on purpose to allow for comparison of performance in a wholly private and public setting. Median differences in two sample setting can be studied via Mann–Whitney–Wilcoxon test (MWW) presented first by Mann and Whitney (1947). The Mann–Whitney–Wilcoxon is a non-parametric test for the null hypothesis of two populations being the same.

The observations in the whole sample are first made into single ranked series from smallest to largest performance indicator value, after which the ranks for each subsample are summed to form R_1 and R_2 . The MWW-test statistic U is given by

$$U_1 = R_1 - \frac{n_1(n_1+1)}{2}, \quad (3)$$

where n_1 is the sample size for sample 1 and R_1 is the sum of ranks in sample 1. This U -statistic is then standardized by deducting the sample mean sum of ranks and dividing by corresponding standard deviation to study the statistical significance of differences in subsample value rankings.

5.3 Drivers of (abnormal) performance

The stock market performance of buyout-backed IPOs can be driven by their initial valuation in comparison to investors' expectations, or the characteristics of these IPOs. The explanatory power of these drivers is evaluated in separate multivariate regressions, where dependent variable is the logarithm of equally-weighted twelve-month wealth relative. The wealth relatives are calculated by dividing the buy-and-hold returns of each IPO in samples with the corresponding returns of S&P 500 index. These regressions are initially employed jointly for all IPOs to get an overall picture on the relevancy of factors, and then separately for buyout-backed and non-backed subsamples.

In first set of regressions, the wealth relative is regressed by variables representing IPO characteristics at the time of offering:

$$WR_{12} = \alpha + \beta_1 FirstRet + \beta_2 MCAP + \beta_3 BP + \beta_4 Bubble + \beta_5 PEbacked \quad (4)$$

The second regression introduces the operative drivers, and stands as follows:

$$WR_{12} = \alpha + \beta_1 FirstRet + \beta_2 MCAP + \beta_3 BP + \beta_4 Bubble + \beta_5 PEbacked + \beta_6 ATO + \beta_7 LEV \quad (5)$$

The third regression type is applicable only for the subsample of buyout-backed IPOs:

$$WR_{12} = \alpha + \beta_1 FirstRet + \beta_2 MCAP + \beta_3 BP + \beta_4 Bubble + \beta_5 PEbacked + \beta_6 ATO + \beta_7 LEV + \beta_8 OS + \beta_9 REP + \beta_{10} Length + \beta_{11} GNOA \quad (6)$$

The explanatory variables and their expected impact on IPO stock's performance are summarized in Table 5. The first group of variables represent IPO characteristics at the time of offering and are utilized in regressions for the whole sample. First day return is calculated by dividing the first day closing price with the initial offer price, and represents the underpricing of an issue. High underpricing is expected to have a negative impact on stock's development due to the notion that the high price levels emerging after first, often optimistic trading day are unsustainable (Purnanandam and Swaminathan, 2004).

Market capitalization is used as a proxy for company size and due to identified issues (Ritter and Welch, 2002) in performance of small stocks, market capitalization is expected to reflect in positive aftermarket performance. Likewise, higher book-to-price ratio is predicted to impact positively on stock, taking into account the risks associated with new listings that are strongly based on the intangible (and hence have lower B/P ratios). Also, timing of issue is considered in Bubble period dummy for those that have been listed during the high investor sentiment between July 1999 and June 2000. With the inflated growth prospects associated with many of issues during the tech bubble time, such companies' difficulties in meeting the inflated targets should reflect negatively on stock price development.

Second set of variables for the whole sample include items of more operative nature. Asset turnover, i.e. sales to total assets, measures the operational efficiency of a given company. A better turnover ratio should result also in good share performance with company utilizing its assets more efficiently. Leverage's impact cannot be predicted as straightforwardly as for others. On the other hand the controlling effects of debt financing should result in good investment decisions, mitigating the free cash flow problem. However, high debt levels also might put companies under financial distress and restrict in pursuing growth.

Table 5. Explanatory variables used to explain IPOs' aftermarket performance

This table describes the main explanatory variables used to explain the aftermarket performance of each IPO. Also the impact that each variable is expected to have on stock's performance is specified.

Offering characteristics variables	Description	Exp. sign
First-day return (<i>FirstRet</i>)	Logarithm of the stock's first day return	-
Market capitalization (<i>MCAP</i>)	Logarithm of market capitalization at the time of the offer	+
Book-to-price (<i>BP</i>)	Ratio of book equity divided by market equity at the time of the offer	+
Bubble period dummy (<i>Bubble</i>)	Dummy for stocks issued during the tech bubble period (July 1999 – June 2000)	-
Operating characteristics variables	Description	Exp. sign
Asset turnover (<i>ATO</i>)	Ratio of sales divided by total assets at the fiscal year of the IPO	+
Leverage (<i>LEV</i>)	Ratio of total debt divided by total assets at the fiscal year of the IPO	+/-
Growth of net operating assets (<i>GNOA</i>)	Percentage change in net operating assets from the year before IPO	-
Buyout-specific variables	Description	Exp. sign
PE dummy (<i>PEbacked</i>)	Dummy for company being owned by a buyout firm	+
PE ownership after IPO (<i>OS</i>)	Proportion of shares held by the buyout firms after the IPO	+
PE firm reputation (<i>REP</i>)	Logarithm of buyout firm's assets under management (\$m)	+
Length of investment (<i>Length</i>)	Logarithm of the days that company was in buyout firm's portfolio before IPO	+

Additionally, since the focus is on the drivers of buyout-backed IPO performance, four variables are studied only for the subsample of buyout-backed IPOs. Firstly, as the second hypothesis suggests, the

size of buyout firm's ownership is expected to improve stock's performance due to concentrated owner continuing to engage actively in value creation also after the issue. Likewise, more reputable PE houses (hypothesis 3) are predicted to deliver better performance due to their potential abilities of winner-picking, better monitoring and access to higher quality underwriters. In a similar fashion to Cao and Lerner (2009) or Tykvova and Walz (2007), reputation is proxied by Private Equity firms' assets under management. Unfortunately this reputation measure needs to be estimated from latest figures of assets under management due to limitations of historical data on SDC database. Additionally, in line with fourth hypothesis, the length of buyout firm involvement in improving their portfolio company is one driver expected to spur better stock market performance.

Also, another operative metric used for buyout-backed IPOs is growth in net operating assets (NOA), reflecting on earnings quality of issuing company. Rapidly growing NOA might imply earnings manipulation prior to listing in order to spur investor demand, and should hence have a negative impact on stock's performance once the inflated expectations based on manipulated financial performance are not reached.

6 Results and analysis

This section presents and discusses the empirical results of this study. The buyout- and non-backed subsamples are first described on the basis of differences in key comparative statistics. Secondly, the aftermarket performance of each IPO group is analyzed over different time periods and against different benchmarks. Finally, the significance of various drivers are analyzed with multivariate cross-sectional regressions.

6.1 Comparative statistics

Table 6 shows the summary statistics for samples of non-backed and buyout-backed IPOs. Comparisons have been done by calculating the median values for each operational characteristic, and these are shown on the panel A of the table below. The buyout firms' focus on more mature, established companies is well illustrated in companies floated by them having market capitalization double the size of others at over 500 M\$. Likewise, their portfolio companies are almost ten-fold in terms of total assets and net sales in comparison to non-backed IPO companies.

Buyout-backed IPO companies appear also significantly more profitable at the time of listing with median EBITDA-margins at 14 percent in comparison to other IPOs 5.5 percent margins. Buyout-backed IPOs are also able to utilize their assets more efficiently to generate revenue with median asset turnover ratios around 80 percent. The often recognized characteristic of buyout companies utilizing aggressive leverage also holds for this sample. Whereas non-backed issuing companies have a debt ratio of 23 percent, for buyout-driven listings the comparable figure stands almost at 54 percent.

Panel B gives an overview of buyout-specific offer characteristics. Average buyout firm has invested in the listing company almost five years prior to offering. The early described feature of buyout firms willing to take majority share in their portfolio companies holds well for this sample. Average ownership stake of buyout sponsor(s) stands at 64 percent prior to offering. Also, sponsors' exit in IPO is often partial as confirmed by the median post-IPO ownership stake of 43 percent.

Table 6. Summary statistics for each IPO group

This table illustrates comparative statistics for the samples of 1700 non-backed (NB) and 321 buyout-backed (BO) issues. Operational figures are presented in panel A, whereas panel B contains metrics on involvement of buyout firms. Due to data availability the sample sizes differ for each operational measure.

Panel A. Operational characteristics

		NB	BO
Market capitalization (\$m)	Median	251	511
	No. obs.	(1700)	(321)
Total assets (\$m)	Median	32	329
	No. obs.	(1414)	(314)
Net sales (\$m)	Median	28	259
	No. obs.	(1397)	(303)
EBITDA margin (%)	Median	5.5 %	14.1 %
	No. obs.	(1323)	(295)
Asset turnover	Median	0.6	0.8
	No. obs.	(1301)	(288)
Total debt to total assets	Median	23.0 %	53.7 %
	No. obs.	(1185)	(300)
Price-to-book	Median	3.8	3.4
	No. obs.	(1485)	(316)

Panel B: Buyout involvement

Number of years of private equity group investment before IPO	Mean	N/A	4.8
	Median		3.2
	No. obs.		(321)
Private equity group ownership before IPO (%)	Mean	N/A	64.1 %
	Median		68.3 %
	No. obs.		(321)
Private equity group ownership after IPO (%)	Mean	N/A	42.7 %
	Median		42.6 %
	No. obs.		(321)

Summary statistics regarding first-day returns for the whole sample and two separate IPO groups are presented in Table 7 below. The average return between April 1996 and December 2008 stood rather high at 29.3% but the significantly lower median returns indicate large deviations within the sample returns. Furthermore, the booming effect of the internet-stock bubble is evident on studying these first-day returns, since the comparable average return for stock issued between summer 1999 and summer 2000 stood at 76%.

Table 7. First-day returns for IPO groups

This table show the equal-weighted first-day percentage returns for the whole sample of IPOs (ALL), as well as for non-backed (NB) and buyout-backed (BO) subsamples on AMEX, NYSE and Nasdaq between April 1996 and December 2008. Bubble period extends from July 1999 to June 2000.

	ALL	NB	BO
Average (%)	29.3 %	33.0 %	9.6 %
Median (%)	12.2 %	12.5 %	3.5 %
Normal period average (%)	19.8 %	22.0 %	9.6 %
Bubble period average (%)	76.0 %	80.8 %	8.7 %
Standard deviation (%)	60.5 %	62.8 %	40.5 %
Total number of issues	2,021	1,700	321

Buyout-backed IPOs show clear differences to non-backed issues in terms of first day returns, with average first-day returns below ten percent. The difference is especially striking in terms of offerings during the bubble period. Where buyout-backed issues provided similar returns as in normal period, the average return on non-backed issues' was at 80.8%. This and also the low number of buyout-backed IPOs as witnessed in table 3 might indicate PE houses not trying to capitalize on the hot market conditions in order to protect their much-needed reputation as witnessed by Bergström et al. (2006). Overall, the picture emerging from the marked differences in underpricing might reflect on lower risk associated with buyout- driven stock as well as the PE houses' quality stamp (Cao and Lerner, 2009).

6.2 Long-run aftermarket performance

The buy-and-hold abnormal returns (BHARs) for the whole IPO sample are presented in Table 8. Results have been reported for 12-, 24- and 36-month periods of each subsample, as well as the whole IPO sample using three different benchmarks: 1) S&P500 Index, 2) Nasdaq Composite Index and 3) Control firms, as described in section 5.2.2. Due to companies delisting, bankruptcies and M&A

activities, the amount of IPOs included in calculation decreases over time, with 78% of sample companies having available stock price data for the whole three years.

The results for the entire sample are in line with previous literature (Ritter, 1991, Loughran and Ritter, 1995, Carter, Dark and Singh, 1998) with negative BHARs for the whole 3-year period in comparison to the overall stock market proxy of S&P500 index. The underperformance appears especially significant for first 24 months, with IPOs trading at 10 percent below the S&P benchmark.

The results for the whole sample seem to be mostly driven by poor performance of non-backed issues. In comparison, the buyout-backed offerings show evidence of statistically significant outperformance during the first 12 trading months, supporting the findings of Levis (2011). However, this outperformance over the benchmark index does not persist for the whole period with buyout-offerings' BHARs being statistically indifferent from zero for two- and three-year periods. Still, they do outperform the non-backed offerings despite negative performance against the stock market benchmark, as documented also by Bergström et al. (2006).

In comparison to Nasdaq composite as benchmark, the underperformance phenomenon of all IPOs is more strongly evident. BHARs are statistically significant for all intervals and the underperformance is increasing over time, reaching -22 percent in year three. In line with S&P500 comparison, buyout-backed offerings outperform also Nasdaq for the first twelve months but for 24- and 36-month timeframes the drop in returns shows a significant underperformance.

Control firms benchmark is used in the study to provide a “fair” comparable from existing stocks to each listing company. With each control firm - IPO firm pair having similar characteristics in terms of industry, size and style, the comparison implicitly excludes the effects of company size or industry focus on the stock market performance. Against this benchmark the BHAR results for the sample appear very interesting in that the evidence for underperforming IPO stock disappears against control firms. On the contrary, especially non-backed offerings seem to enjoy superior aftermarket performance in the 2- and 3-year timeframe while buyout-backed offerings returns do not statistically differ from zero. It might be that the buyout-backed IPOs benefit in aftermarket also from their larger size and more stable cash flows (see sample characteristics in Table 6) – the benefit of which disappears when matching with roughly comparable companies.

Table 8. Buy-and-hold abnormal returns

This table shows the 12-, 24- and 36-month buy-and-hold abnormal returns in percentage terms against three alternative benchmarks: 1) S&P500 Index, 2) Nasdaq Composite Index and 3) Control firms. Returns have been calculated on both equal- and value weighted basis. Returns for all sample IPOs are portrayed in Panel A, while Panel B shows NB-sample results and Panel C for the BO-backed offerings. The bootstrapped skewness-adjusted *t*-statistics are reported in parentheses.

Months	Equal weighted			Value weighted		
	S&P500	NASDAQ	CONTROL	S&P500	NASDAQ	CONTROL
Panel A. All IPOs						
12	-3.01	-4.58*	-1.31	-3.58	-0.74	-15.21***
	(-1.19)	(-1.83)	(-0.40)	(-0.67)	(-0.16)	(-3.44)
24	-10.03**	-15.94***	11.54***	-12.66**	-6.37	-10.69*
	(-2.41)	(-3.59)	(3.12)	(-2.26)	(-1.45)	(-2.48)
36	-5.99	-22.32***	16.10***	-7.61	-5.66	-3.19
	(-1.03)	(-2.92)	(3.33)	(-1.38)	(-1.21)	(-0.71)
Panel B. Non-Buyout Backed IPOs						
12	-5.57*	-6.73**	-3.77	-5.84	-1.59	-19.13***
	(-1.86)	(-2.28)	(-1.00)	(-0.89)	(-0.29)	(-3.51)
24	-11.26**	-16.47***	14.05***	-13.75*	-3.93	-10.48
	(-2.30)	(-3.21)	(3.34)	(-2.00)	(-0.74)	(-2.00)
36	-6.73	-24.06***	19.25***	-8.57	-3.43	-1.93
	(-0.97)	(-2.71)	(3.44)	(-1.27)	(-0.61)	(-0.35)
Panel C. Buyout Backed IPOs						
12	10.35***	6.67*	12.60**	5.74	2.75	2.94
	(2.91)	(1.82)	(2.67)	(1.62)	(0.78)	(0.90)
24	-3.78	-13.22***	-2.41	-8.16*	-16.49***	-11.72**
	(-0.93)	(-3.00)	(-0.41)	(-2.08)	(-3.59)	(-2.73)
36	-2.45	-13.95**	-0.64	-3.78	-14.56**	-9.19
	(-0.46)	(-2.47)	(-0.09)	(-0.73)	(-2.54)	(-1.73)

*** Significant at the 0.01 level

** Significant at the 0.05 level

* Significant at the 0.10 level

Studying the value-weighted returns as shown on the right hand side of Table 8 provide more suggestions on the impact of size on the performance of IPO stock. The BHARs for buyout-backed IPOs do not show evidence of outperformance anymore, which implies that the largest issues have performed poorer than the smaller ones in that subsample. For the non-backed issues the value-weighting shows similar level of underperformance as for equal-weighted calculations, indicating that winners and losers are spread equally across all sizes within the sample.

Table 9 shows interesting patterns on how buy-and-hold abnormal returns have fluctuated across sample years between 1996 and 2008. For the whole IPO sample, years 1996-1997 and dotcom-bubble year of 2000 seem to have been poor for aftermarket development of stock performance. However, these difficulties have not always reflected on the buyout-backed offerings, which managed to outperform the benchmark in 1996 by 33% on average, and to match benchmark index's development in the troublesome tech bubble year of 2000. Consequently, buyout-backed offerings have underperformed the S&P500 index only three years out of thirteen. 2008 is one year with such below par performance, indicating that the buyout-backed IPOs have not managed to deliver in those distressed credit crunch years. However, the volume of such IPOs launched in 2007-2008 is very small so reliable conclusions on their performance during the financial crisis years cannot be drawn, except for the low volume indicating PE sponsors willingness to avoid listing during distressed market years. Overall, these findings reflect that buyout-offerings good performance is not due to a successful market timing of a few "hit" years but a rather continuous phenomenon.

Table 9. 12-month BHARs (S&P benchmark) by issue year

This table shows the division of buy-and-hold abnormal returns for all sample IPOs as well as non-backed (NB) and buyout-backed (BO) IPOs. The returns are calculated by compounding monthly returns for 12 months against the S&P500 as benchmark.

	Equal Weighted			Value Weighted		
	ALL	NB	BO	ALL	NB	BO
1996	-21 %	-22 %	33 %	-25 %	-27 %	15 %
1997	-18 %	-17 %	-30 %	-12 %	-11 %	-17 %
1998	5 %	4 %	17 %	42 %	42 %	39 %
1999	21 %	20 %	28 %	11 %	11 %	5 %
2000	-32 %	-34 %	0 %	-46 %	-48 %	-19 %
2001	4 %	-5 %	39 %	16 %	9 %	50 %
2002	16 %	18 %	11 %	8 %	8 %	8 %
2003	3 %	12 %	-10 %	2 %	19 %	-7 %
2004	14 %	10 %	24 %	11 %	9 %	17 %
2005	19 %	10 %	28 %	23 %	29 %	19 %
2006	11 %	18 %	0 %	28 %	58 %	3 %
2007	-4 %	-5 %	0 %	-4 %	-1 %	-8 %
2008	4 %	18 %	-21 %	20 %	26 %	-19 %

6.3 Drivers of aftermarket performance

Sample characteristics and BHAR results indicate that buyout-backed offerings are typically priced more prudently (lower underpricing), are significantly larger (in terms of revenue, market capitalization and assets), more profitable, and less growth driven (lower P/B ratio). Furthermore, they seem to outperform their counterparts in the aftermarket, especially during the first 12 months. To better understand the causes of this aftermarket performance, Table 10 illustrates the median operating performance from one year prior to issue to three years after the issue. Operating performance is studied in terms of asset turnover, operating margin and leverage, and the sample differences are evaluated using Mann–Whitney–Wilcoxon test statistic as explained in section 5.2.3.

Consistent with observations in previous literature (Jain and Kini, 1994), the operating performance of non-backed offerings seems to deteriorate quite heavily after IPO. In this study the decreased performance is attributable to of asset turnover, whereas their profitability stays roughly on same level. However, as findings by Mikkelsen, Partch and Shah (1997) support, the drop in performance

is severe only for the first year post-IPO, after which return to pre-IPO levels starts to happen at a modest pace.

Table 10. Operating performance before and after IPO

Table reports median asset turnover, operating margin and leverage ratios for each non-backed (NB) and buyout-backed (BO) IPO for one year before and three years after the offering. Due to data availability buyout-backed sample consists of 300 IPOs and non-backed sample of 1329 IPOs. Mann–Whitney–Wilcoxon test (MWW) values test for median differences across two IPO subsamples.

	t – 1	t + 1	t + 2	t + 3
Panel A: Asset Turnover (Sales to Total Assets), %				
NB	97.1	61.2	65.9	70.4
BO	87.3	78.2	86.2	89.7
MWW	196946	153180***	128709***	106321***
Panel B: Operating Margin (EBITDA to Sales), %				
NB	5.5	6.9	5.4	6.2
BO	14.1	15.5	14.2	14.6
MWW	119900***	113920***	100443***	82157***
Panel C: Leverage (Total Debt to Total Assets), %				
NB	23.0	7.5	9.9	13.5
BO	53.7	34.8	34.9	35.0
MWW	104880***	75885***	69694***	57796***

*** Significant at the 0.01 level
 ** Significant at the 0.05 level
 * Significant at the 0.10 level

In line with research by Holthausen and Larcker (1996), buyout-backed IPOs suffer a similar drop to non-backed ones but not of same magnitude. However, they show the ability to lift the asset turnover ratios above pre-listing level quite rapidly. This pattern is also witnessed in leverage ratios – both groups naturally experience an influx of equity at the IPO but the buyout-backed ones continue to keep their balance sheets rather debt-laden to enjoy the controlling benefits of debt financing.

Key observation in the table is however the statistically significant difference in performance levels – the buyout-backed IPOs are able to generate more sales on their asset base, and do it more profitably. This persistence in operating performance might well explain the differences in stock market performance between the two samples. Whereas investors might be positively surprised by the

buyout-backed companies' ability to continue and even improve their good performance in the public market, the decreasing performance levels of non-backed companies contradicts with their higher initial valuations and results in poorer aftermarket stock development.

In addition to the persistence of good operating performance, the positive aftermarket performance of buyout-backed IPOs can be driven by typical characteristics of such IPOs and their initial valuations versus investor expectations. Table 11 reports the regression results for the whole IPO sample as well as non-backed and buyout-backed subsamples. The dependent variable is the natural logarithm of an equally-weighted 12-month wealth relative versus the S&P500 benchmark, calculated by dividing IPO-specific buy-and-hold returns with S&P500 returns for the same period. Different regressions are based on grouping of independent variables' type. First regressions for each sample (1, 3 and 5 in table below) account for offering characteristics at the time of offer, i.e. the first-day return, market capitalization, book-to-price and dotcom-bubble dummy. Second set of regressions (2, 4 and 6) contains variables of more operative nature: asset turnover and leverage for the first year after the IPO event. The seventh regression applies only for buyout-backed offerings, and contains variables that reflect not on the IPO per se, but rather on type of their majority owner and its actions around the IPO event.

The first and second columns show a significantly positive effect on the Private Equity dummy variable, reflecting on the outperformance of buyout-backed offerings in the aftermarket as illustrated earlier in Section 6.2. For the first-day return, the coefficient stands negative and statistically significant across all regressions. This implies that the rather optimistic initial price levels after first trading day appear untenable and result in aftermarket underperformance for IPOs.

Impact of market capitalization on aftermarket performance is positive across all regressions, illustrating that larger issues have done better for both non-backed and buyout-backed offerings. Similarly, high book-to-price ratio has a significant positive effect on stock's performance for non-backed IPOs, for buyout-backed ones the positive relation of B/P ratio does not hold that strongly. This is consistent with the findings by Ritter and Welch (2002), who have shown that smaller and more growth-driven companies (low book-to-price), such as typical IPOs, underperform against larger and more stable comparables. Dotcom-bubble's impact on stock performance is as expected, with the dummy variable having negative and statistically significant impact across all regressions.

Table 11. Multivariate cross-sectional regressions of 12-month aftermarket performance

This table reports the results for 7 separate multivariate regressions for all IPOs (ALL), non-backed issues (NB) and buyout-backed issues (BO) specifically. The dependent variable is the natural logarithm of a wealth relative with the S&P500 benchmark. The independent variables have been explained thoroughly in section 5.3. The number of observations varies across regressions due to data availability reasons. The *t*-statistics are reported in parentheses.

	ALL		NB		BO		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
First-day return	-0.084** (-2.57)	-0.101*** (-2.88)	-0.121*** (-3.08)	-0.150*** (-3.47)	-0.198*** (-3.69)	-0.223*** (-4.16)	-0.244*** (-4.80)
Market capitalization	0.025*** (2.82)	0.024** (2.49)	0.033*** (3.28)	0.031*** (2.92)	0.094*** (4.52)	0.105*** (4.96)	0.130*** (6.19)
Book-to-price	0.044** (2.25)	0.050** (2.45)	0.045** (2.14)	0.051** (2.30)	0.072 (1.31)	0.049 (0.87)	0.035 (0.66)
Bubble period dummy	-0.110*** (-4.27)	-0.137*** (-4.93)	-0.113*** (-3.95)	-0.134*** (-4.31)	-0.222*** (-3.69)	-0.236*** (-3.74)	-0.206*** (-3.41)
Asset turnover		0.024 (1.26)		0.020 (0.94)		0.022 (0.61)	0.040 (1.14)
Leverage		0.022*** (4.21)		0.019*** (3.17)		0.019* (1.86)	0.019* (1.92)
PE ownership after IPO							0.018 (0.27)
Length of investment							0.067*** (4.20)
PE firm reputation							0.023** (2.27)
Growth of net operating assets							-0.073* (-1.89)
PE dummy	0.049* (1.95)	0.073*** (2.80)					
Intercept	0.478*** (9.62)	0.400*** (7.29)	0.446*** (8.20)	0.381*** (6.26)	0.096 (0.73)	-0.018 (-0.13)	-0.476** (-2.46)
R ²	0.04	0.06	0.04	0.05	0.14	0.17	0.24
No. of observations	(1508)	(1268)	(1230)	(1007)	(278)	(261)	(261)

*** Significant at the 0.01 level

** Significant at the 0.05 level

* Significant at the 0.10 level

Of the operative variables, the asset turnover ratio reported in regressions 2, 4, 6 and 7 does not seem to explain IPOs' performance strongly. The better the company can generate sales on their asset base has a positive effect on share price development but the results are not significant on 10 percent level. Leverage on the other hand appears as a significant driver for positive aftermarket performance across both IPO groups. This finding is aligned with benefits of debt financing in mitigating the free cash flow problem as suggested by Jensen (1986), and provides support regarding the LBO model being a key value generation driver for buyout-backed offerings.

Of the private equity –specific variables, the stake of major owner immediately after the offering does not appear significant as a performance driver. It might be that PE houses continue their active, value-creating ownership after IPO regardless the amount of their ownership share, since they still often continue to have a major interest in the post-IPO performance of their investment due to lock-up agreements and reputational concerns. The length of PE investment has a significant positive impact on the performance of buyout-backed IPOs. The finding that PE houses who take time to prepare their investments ready for stock listing enjoy better performance than more rapidly spun over companies is in line with Cao's (2011) findings in the LBO setting.

Reputation of the main private equity investor also bears significance in aftermarket performance. This might be due to their ability to deliver on different parts of PE value chain, from winner picking to active ownership and issue-specific factors like high-quality underwriters. The earnings quality proxy (growth in net operating assets) appears also of statistical significance in the regression with a negative coefficient, being consistent with Katz's (2009) studies on earnings quality in private equity environment. The variable can be interpreted as a case of manipulating the growing net operating assets to lift earnings for the IPO, which is likely to result in poorer operating and consequently stock market performance when targets based on manipulated financials cannot be met.

7 Discussion and conclusions

My thesis studies the aftermarket performance of non-backed and buyout-backed IPOs to provide insight regarding private equity's involvement in the setting of initial public offerings. The topic is of interest due mixed academic evidence regarding whether buyout- or venture capital -backed IPOs manage to outperform non-backed IPOs and even the overall stock market. For measurement of outperformance, I leverage the buy-and-hold-abnormal returns methodology suggested by Barber and Lyon (1997) and utilized in similar studies by Cao and Lerner (2009) and Levis (2011) among others. The buy-and-hold-abnormal returns are compared against three differing benchmarks to give more insight on the performance differences.

Second focus area is to gain better understanding on the drivers of stock market performance for initial public offerings. Current evidence on factors such as relationship between leverage and stock market performance appears two-fold, and my study gives more insight on the matter. Additionally, several buyout-specific drivers, namely private equity owners' reputation, length of investment and size of ownership stake are analyzed via multivariate cross-sectional regressions on the wealth relative of a given IPO stock.

The main findings of my research are discussed in this section in light of previous evidence on the field. I also suggest interesting and/or controversial topics around buyout-backed offerings that should be further studied to gain evidence on the drivers of such stocks' performance.

7.1 Outperformance of buyout-backed offerings

The main findings of my study are summarized in Table 12, aligned with the five hypotheses presented in section 4. I find strong evidence on buyout-backed offerings outperforming both the non-backed offerings as well as the overall stock market benchmark of S&P 500 in the first twelve months of trading, supporting previous work by Levis (2011, United Kingdom), Bergström et al. (2006, France and United Kingdom) and Cao and Lerner (2009, United States). However, the persistence of buyout offerings' outperformance over the stock market does not hold for longer time periods, contrasting with findings of Levis (2011).

Despite buyout-backed offerings inability to generate abnormal returns over overall stock market in the longer term, I find evidence that they do generate superior returns towards the non-backed offerings in a similar fashion to findings by Bergström et al. (2006). This result is consistent over all time periods, and also against Nasdaq Composite as the benchmark. Against the third benchmark, the industry-, size- and style-matched control firms the results appear most interesting. Buyout-IPOs

continue to outperform strongly during first twelve months but for 24- and 36-month periods they are significantly outperformed by the non-backed offerings. These findings shed light on the previously documented issues regarding the typical small and growth-driven IPOs (Ritter and Welch, 2002), with the benefits associated with larger and more stable IPOs disappearing for the buyout sample via control firms' matching.

To conclude, the overall pattern from the buy-and-hold-abnormal returns shows consistently buyout-backed IPOs to outperform benchmarks and non-backed issues over the first trading year, with stock's relative performance dropping in subsequent years. This pattern is in line with findings by Cao and Lerner (2009), who document RLBOs to sharply outperform the market in the first, fourth, and fifth year after going public, whereas performance for second and third year appears more ambiguous. It might be that the more conservatively priced buyout-offerings surprise the stock market with robust operational performance, exceeding the expectations set by initial pricing during first year. In subsequent years the buyout firms are more flexible in terms of exiting the investment after expiration of lockup periods, which might cause the performance to drop during second and third year of trading. This phenomenon is also supported by the evidence on the profitability of buyout-backed IPOs peaking in first year after issue.

Table 12. Summary of key findings

Hypothesis		Empirical evidence	Conclusion
H1	Buyout-backed IPOs experience superior aftermarket performance in comparison to non-backed IPOs	Buyout-backed IPOs outperform the benchmark with 10.4 % BHAR in comparison to non-backed -5.6 % BHAR over first 12 months. Does not hold against all benchmarks or all time periods.	Further research required to verify longer-term relation.
H2	Size of buyout-firm ownership after an IPO has a positive effect on stock's performance	Regressions show that PE sponsor(s) ownership share's effect on stock's performance is not statistically different from zero.	Rejected
H3	Buyout-firm reputation has a positive effect on stock's performance	Results of the regression show the reputation proxy of assets under management to have statistically significant positive relation to stock's performance.	Accepted
H4	Length of buyout-firm involvement pre-IPO has a positive effect on stock's performance	Results of the regression show the length of buyout involvement to drive stock's performance positively with statistical significance.	Accepted
H5	Better earnings quality has a positive effect on stock's performance	Earnings quality proxy of growth in net operating assets is associated with statistically significant negative impact on stock's performance.	Accepted

7.2. Drivers of performance

In testing the drivers of stock market performance for IPOs, I find significant results consistent with academic evidence across all IPO samples. Level of underpricing emerges with a significant negative coefficient, reflecting that the rather optimistic initial price levels after first trading day appear untenable, as proposed earlier in work by Purnanandam and Swaminathan (2004). For the buyout sample the coefficient on underpricing appears strongest, indicating that the dynamics around the price setting process are a key driver in post-IPO performance. Market capitalization and book-to-price yield results in line with work of Ritter and Welch (2002), implying outperformance for larger and more cash flow stable offerings. However, in buyout sample the B/P ratio does not appear as a significant driver, which might indicate that PE sponsors are able to deliver despite the nature of the portfolio company being leaned towards growth or value.

Of most interest are the buyout-specific variables relating to my main research hypotheses. I find strong evidence for the acceptance of reputation hypothesis, supporting claims by Krishnan et al. (2011), in which sponsors with better reputation engage in more active corporate governance also after the IPO and can turn this activity into better long-term performance. In addition, reputational players' connections to high quality underwriters (Brav and Gompers, 1997) and debtholders, as well as ability to pick winners and deliver improved operational performance via all private equity value creation levers are other possible explanations to this finding. This contrasts with study by Levis (2011), who reports no significance for the reputation in his United Kingdom -based sample. This might be driven by the more mature American private equity industry showing greater differences between best-of-the-business PE sponsors and others.

Regression analysis shows that IPOs associated with longer private equity involvement do better than more quickly listed companies. This maturity of the issue has been shown to be significant in work by Cao (2011) but contrasts again with the UK-related findings of Levis (2011). These differing findings might indicate structural differences between these markets: U.S.-based samples might contain larger restructurings that take more time to prepare for listing, or they might be more eager to push IPOs quickly to the market during hot periods. I also find the earnings quality measure to be a significant driver for aftermarket performance, supporting the work of Katz (2009). With the tighter monitoring employed by private equity firms to protect their reputation at the market, the management can be expected to have less leeway to manage earnings upwards, resulting in more realistic forecasts and consequently the ability to meet or exceed the targets and valuations levels set by these targets.

Contrasting with work by Levis (2011), I find no evidence for the size of buyout sponsors' ownership share after IPO to bear an impact on stock price development, rejecting the second hypothesis of my study. Explanation for this could be that the PE houses continue their active, value-creating ownership after IPO regardless the amount of their ownership share, since they often continue to have a major interest in the post-IPO performance of their investment due to lock-up agreements and reputational concerns. Consequently, the size of the ownership share might not matter as long as it does not disperse too much but rather than the company can employ the benefits of concentrated ownership as proposed by Holthausen and Larcker (1996).

7.3. Avenues for further research

To conclude, I have shown buyout-backed IPOs to outperform their non-backed peers over one, two and three years of aftermarket performance, depending on the benchmark used. The outperformance seems to be attributable to the role of private equity sponsors in the listing process via smaller underpricing levels and more realistic valuations achieved through better earnings quality. Additionally, I show that longer involvement and better owner reputation leads to better stock market performance due to private equity sponsors' ability to utilize their active, controlling ownership in operational improvements, and continue to do so after the listing.

As my study has provided insight on the relevance of different drivers on IPOs' aftermarket performance, an interesting next step would be more thorough understanding of the given drivers. Hence future research could focus on the challenging aspect of analyzing the extent of private equity sponsors' involvement and the consequences of their connections along the different PE-related value drivers. Such understanding might be impossible to come by via using the traditional empirical approaches of data analysis. Complementing the data with interviewing institutional investors, private equity partners and investment banks would provide valuable insight on top of the traditional data, especially on matters like underpricing and the importance of reputation.

Research focus should also be put on better understanding the impact of concentrated ownership after the IPO event in private equity setting. As Levis (2011) shows this driver to be positive and significant for the post-IPO share price development, my analysis illustrates no significance for the matter. Understanding the boundaries of concentrated versus dispersed ownership in support of private equity value creation would be of great interest to reflect on when the agency cost –mitigating benefits are lost.

Furthermore, as this study focuses solely on offers that have gone public, future research in this area could study the whole private equity exit process more thoroughly, analyzing the outcome of their

investments in more general fashion. Interviews, as mentioned earlier could provide an interesting dataset on understanding the relevant company characteristics and market circumstances, in which IPO is chosen as the exit channel over a sale to a financial or strategic buyer.

8 References

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