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The Reputational Effect of Venture Capitalists on the post-IPO long-term Operating Performance of Portfolio Companies -
An empirical analysis of U.S. VC-backed IPOs between 2003 and 2006

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Daniel Stapelfeldt
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Abstract

This master thesis examines the reputational effects of lead Venture Capital firms on the post-IPO long-term operating performance of their portfolio companies. The thesis is based on the "Grandstanding Hypothesis" by Gompers (1996) to draw inferences on performance differences between portfolio companies backed by reputable and less reputable Venture Capital firms. Operating performance is measured upon eight different performance measures over a time horizon of up to three years after the IPO. To distinguish between reputable and less reputable VC firms, a hand-collected sample of 143 IPOs between 2003 and 2006 is decomposed in two subsets at the average age of the lead VC firms at their portfolio companies' IPO. The empirical analysis finds no significant and overall outperformance of portfolio companies backed by reputable VC firms, instead portfolio companies backed by less reputable VC firms exhibit almost similar performances on the investigated performance measures. These results contradict existing empirical investigations on a similar research topic.

Keywords: Venture Capital; Initial Public Offering; Reputation

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adj.	Adjusted
AR	Abnormal Return
AT	Assets Total
BHR	Buy-and-Hold Return
CAR	Cumulative Abnormal Return
CEO	Chief Executive Officer
CF	Cash Flow
CRSP	Center for Research Security Prices
CSHO	Common Shares Outstanding
EBITDA	Earnings Before Interest, Taxes, Depreciation, Amortization
GDP	Gross Domestic Product
GP	General Partners
IP	Initial Offering Price
IPO	Initial Public Offering
IQR	Inter Quartile Range
IRR	Internal Rate of Return
LP	Limited Partners
M&A	Mergers & Acquisitions
MLOTT	Money Left on the Table
NI	Net Income
OLS	Ordinary Least Squared
PC	Closing Bid Price at IPO
PFC	Portfolio Company
PME	Public Market Equivalent
PRCC	Closing Bid Price at the end of the year
PSTK	Book Value of Preferred Stock
R&D	Research and Development
ROA	Return on Assets
S&P 500	Standard & Poor's 500
SEQ	Stockholders' Equity
SIC	Standard Industrial Classification
STDEVIATION	Standard Deviation

TQ	Tobin's Q
TVPI	Total Value To Paid In Capital
TXDITC	Balance Sheet Deferred Taxes and Investment Tax Credit
U.S.	United States
UK	United Kingdom
UP	Underpricing
VC	Venture Capital
VCs	Venture Capitalists
VOL	Volume
WR	Wealth Relative
WRDS	Wharton Research Data Services

CHAPTER 1: INTRODUCTION

1.1 Motivation and Problem Statement

The importance of Venture Capital (VC) as a source of funding for new enterprises has grown enormously in the U.S. since the 1980s. Especially in the time period between 1990 and 2000 Venture Capital-backed initial public offerings (IPOs) reached considerable amounts but dramatically decreased after the turn of the millennium. The sudden downturn was due to the crash of the dot.com bubble, thus IPOs backed by venture capitalists have become infrequent up to the present day in the U.S compared to the 1990s.

As VC gained more importance, the variety of literature began to grow simultaneously, albeit most of existing literature is concentrated in the early years of the 21th century. One field of literature focuses on the significance of reputation in the VC industry and addresses the post-IPO performance differences of Venture Capital-backed and non-Venture Capital-backed firms. However, literature investigating the VC firms' reputational effects on post-IPO performance of portfolio companies that are backed by reputable and less reputable Venture Capital firms is scarce. Since VC firms need to recapitalize themselves periodically for the setup of a follow-on fund, reputation and signaling play a central role in this industry. Gompers (1996) is one of the first who analyzed comprehensively the reputational effect of VC firms on their portfolio companies and called it "The Grandstanding Hypothesis". This hypothesis predicts that especially young and less reputable VC firms rush their portfolio companies to an IPO in order to quickly enhance their reputation and standing in the industry, signal credibility and thereby benefitting from an alleviated access to investors' capital for follow-on funds. On the downside, precipitous IPOs are costly for Venture Capitalists. As a result, portfolio companies are underpriced at the IPO date, have experienced less monitoring by the VC firm and their equity stakes in the portfolio companies are considerably smaller compared to those held by reputable VC firms.

This raises the question whether portfolio companies also suffer from the above-mentioned consequences of a rapid IPO exit in terms of worse operating performance in the long-term. In other words, do portfolio companies backed by less reputable VC firms exhibit worse post-IPO operating performance than firms backed by reputable VC firms? Is the greater underpricing simply due to greater uncertainty around the IPO or do start-

ups backed by less reputable VC firms face considerable performance issues and cannot match their counterparts in the long-run?

To draw overall inferences, this master thesis applies an empirical analysis based on the calculation of several empirically verified performance measures and conducts a regression framework to determine whether the VC firm's reputational effect and other factors positively impact a portfolio company's post-IPO operating performance. The general assumption of this thesis is that portfolio companies backed by the less experienced VC firms perform considerably worse than firms backed by reputable VC investors. To the best of the author's knowledge, this thesis is the only empirical investigation that applies eight different indicators including financial ratios and stock returns over a three-year time horizon to evaluate a portfolio company's post-IPO performance.

1.2 Outline

This master thesis is divided into six chapters which can further be split into a theoretical and an empirical part. Chapters 2 and 3 provide the theoretical background, whereas chapters 4 and 5 largely deal with the empirical analysis. Generally, this thesis is structured as follows:

Chapter 1 provides background information on the motivation for the selection of the topic and showcases the structure of this thesis.

In chapter 2, a comprehensive overview of the Venture Capital life cycle and the entire investment process is presented. The chapter starts by stating the importance of Venture Capital for the U.S. economy and continues with the description of a common Venture Capital fund structure. In the following, the Venture Capital investment process is presented, beginning with the initial screening and due diligence of start-ups' business plans and closing with empirical evidence on VC funds' returns and performance persistence. Interim steps such as the syndication, staging and monitoring of investments as well as common contractual provisions and the IPO as the most effective exit strategy are further elucidated.

Chapter 3 provides existing empirical evidence on the effect of reputation in the Venture Capital industry. The paper "Grandstanding in the Venture Capital Industry" by Gompers (1996) plays a central role and is discussed in greater detail since it serves as a basis for the thesis' main considerations.

Chapter 4 showcases the applied methodology for the empirical part. Apart from justifying the sample's choice and the determination of the lead Venture Capital firm, the division of the sample to account for the VC firm's reputation as well as the indicators to measure the portfolio companies' post-IPO operating performance are presented.

In chapter 5, the results of the empirical investigation are provided. The chapter kicks off with descriptive and inferential statistics on the VC firms and their portfolio companies consequently linking it to existing empirical evidence. Subsequently, results of the regression analysis are provided and interpreted. To verify the results, a robustness test using two additional reputation proxies is conducted.

This thesis closes with chapter 6 summarizing the main findings and alleging suggestions for future research on this topic.

CHAPTER 2: THE VENTURE CAPITAL INVESTMENT PROCESS

To fully understand the complex rationale of Venture Capital funding, a closer look at the whole Venture Capital life cycle with all its different steps is inevitable. To put it simply, the life cycle starts with raising money for a VC fund with a predetermined life time, continues with using the proceeds to invest in promising portfolio companies which are constantly made more valuable through monitoring services and at a final stage transacted through various forms thus the VCs leave providing investors with high returns. The cycle renews itself with VCs raising additional money for a follow-on fund (Gompers and Lerner (2001)). It is hard to distinguish exactly between each of the different steps because they often overlap and are linked with previous or subsequent steps. In this chapter, the thesis at hand aims to provide a comprehensive overview about the most important interim stages within the Venture Capital life cycle. At first, the importance of the Venture Capital industry is elucidated on the basis of industry data. Subsequently, the VC life cycle is presented starting with a general description of a VC fund's organizational fund structure as well as important interim steps such as screening, syndication, staging, monitoring and established contractual provisions. Finally, the IPO as one potential but most promising exit strategy is presented also referring to the performance and returns of VC funds. All steps are discussed with reference to a large variety of existing empirical investigations.

2.1 The Importance of the Venture Capital industry

The Venture Capital industry has evolved as an important branch of the U.S. economy in the last decades. First recordings on Venture Capital deals date back to the early 20th century, however it predominantly gained importance and contributed to a large extent to the competitive strength of the U.S. economy since the 1990s. Several empirical studies have investigated the importance and impact of VC financing on the economy (see e.g. Kortum and Lerner (1998); Hellmann and Puri (2000); Gompers and Lerner (2001) and The National Venture Capital Association (2009) and (2011)).

According to a yearly report published by The National Venture Capital Association (2011), the presence of Venture Capital mainly affects the employment sector, industry-specific revenues and the creation of new industry segments. By financing young start-

ups, VCs not only help entrepreneurs to turn innovative ideas and scientific advances into new products and services but also drive U.S. job creation and foster the economic growth. Hellmann and Puri (2000) find supporting evidence and conclude from their empirical investigation that the presence of VC firms allows start-ups to bring their products faster to the market thus fostering their competitive position.

In the period between 2008-2010 venture-backed companies even outperformed the total U.S. economy in terms of employment and revenue growth.[1] As of 2010, almost 11.9 million venture-backed jobs were registered in the U.S. which is a total of 11% of the U.S. Private Sector Employment (total: 107.3 million jobs). Figure 1 depicts that the share of VC-backed jobs steadily increased since the millennium as well as the total number of VC-backed jobs with one exception in 2010. Even in times of a recession (during the financial crisis of 2008) VC-backed firms experienced an employment decline as little as 2%, whereas the whole economy suffered from an employment downturn of 2.6%.

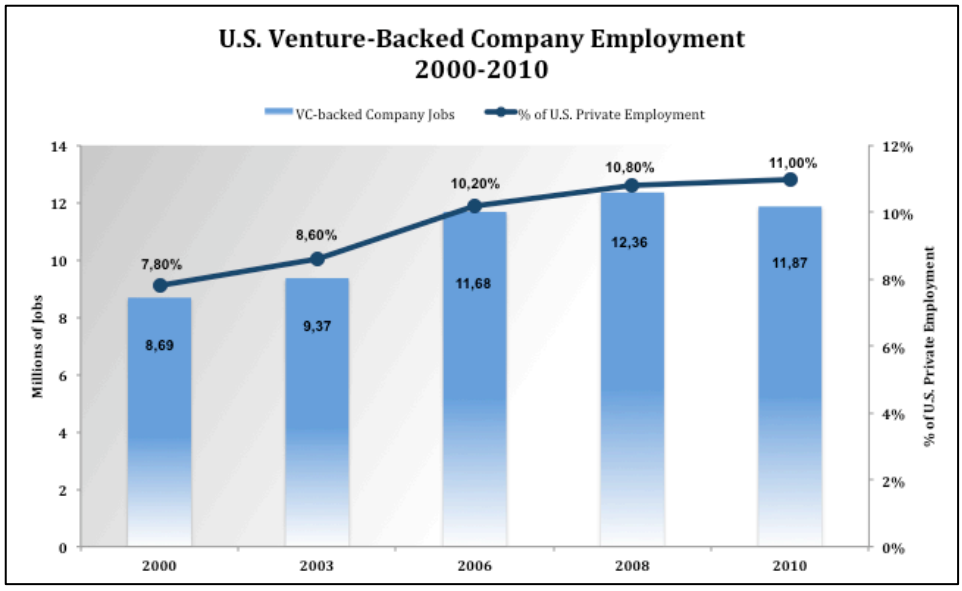


FIGURE 1: U.S. VC-BACKED COMPANY EMPLOYMENT FROM 2000-2010[2]

[1] Between 2008-2010 employment decreased by 2.0% for VC-backed companies in comparison to a decline of 3.1% for the total U.S. private employment. In terms of revenue growth, VC-backed firms outperformed the U.S. economy by 3.1% (1.6% of revenue growth for VC-backed firms versus -1.5% for the whole U.S.).

[2] Data for figure 1 is retrieved from The National Venture Capital Association (2011).

The same impressive history becomes obvious when shifting the focus to revenues generated by VC-backed portfolio companies. In 2010, the companies in question have realized sales of almost $3.1 trillion equaling 10% of the total U.S. sales ($30 trillion) and 21% of the U.S. GDP.

Presenting the history of U.S. VC-backed companies' revenues, figure 2 shows a similar pattern as the one on employment. Since the year 2000, a steady ascending slope is displayed until 2010 with a simultaneous increase of revenues generated by VC-backed firms in relation to the U.S. GDP.

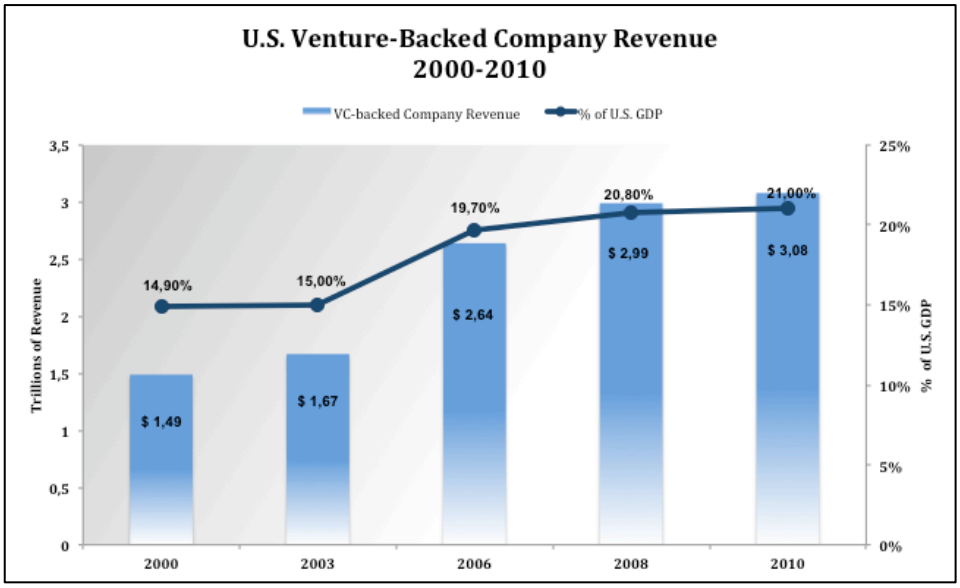


FIGURE 2: REVENUES OF U.S. VC-BACKED COMPANIES FROM 2000-2010[3]

The VC industry also plays a crucial role in funding new industry branches. According to The National Venture Capital Association (2011) more than 4,800 companies have been funded in the health care branch and a number exceeding 17,000 firms in the field of information technologies. The industry sectors range from biotechnology to clean technologies including pollution control, alternative energy solutions, energy storage and ways to use energy more efficiently. More than 900 companies received VC funding with respect to clean technologies. The extension of clean technologies is an important recent endeavor of the U.S economy. In 2008, $4.1 billion were solely invested by VCs in this industry segment making it the fastest growing sector among all industries. These measures ensure the profound development of start-ups to promise the prospective

[3] Data for figure 2 is retrieved from The National Venture Capital Association (2011).

continuance of green jobs, innovations in climate enhancing technologies and important sustainability issues in the U.S. (The National Venture Capital Association (2009)).

In California, VC activity is highest among all states in the U.S. More than 2.8 million people work for VC-backed companies there, generating revenues of $800 million. Over time, VCs have invested approximately $456 billion[4] since the early 1970s and allowed popular and recently highly successful large-scale employers such as Google, Cisco, Amazon, Apple, Microsoft, Starbucks, FedEx, Intel and Facebook to realize their innovative business ideas, thus strengthening the U.S. economy by high job and revenue creation (The National Venture Capital Association (2009)).

It is stated that one third of the companies going public in the U.S. have received VC financing and further empirical results suggest that the presence of Venture Capital has a substantial impact on innovation in the U.S. economy (Sahlman (1990) and Kortum and Lerner (1998)).

2.2 Venture Capital Fund Structure

Venture Capital funds are usually structured as non-tradable partnerships that last for eight to ten years and in which investors are not entitled to change their capital allocation. The investors' capital contribution is a one-time decision and takes place at the time the fund is raised. The funds are organized as self-liquidating partnerships so that its termination after its predefined lifetime imposes the fund managers to a healthy discipline. In other words, managers do not grant poorly performing start-ups additional capital infusions, thus great VC funding may be a sign of high quality portfolio companies (Nahata 2008) .The predetermined end of a fund's life forces VCs to liquidate their investments and distribute the proceeds to the investors at a certain point of time. Hence, VCs have the need to recapitalize themselves periodically in form of follow-on funds to remain an active position in the industry. VC firms usually run several overlapping funds at the same time. Each new fund starts about three to six years after the previous fund was launched. A portfolio of two to three funds guarantees the VC firm

[4] The year 2000 experienced with $99.2 billion by far the highest amount of VC Dollars invested since the 1970s which can be explained by the industry boom in the field of information technologies. Since 2001, VC investments per year fluctuate between $18.9 billion (2003) and $30.4 billion (2007). It becomes obvious that VC investments have smoothed over time.

a continuous operating without quitting its business to acquire new capital from investors (Gompers (1996)).

Over 80% of Venture Capital funds are organized as limited partnerships, where the VC firm serves as the general partner (GP). As figure 3 shows, the limited partners (LP), i.e. the investors of the VC fund, consist largely of wealthy individuals, institutional investors as well as private and public pension funds.

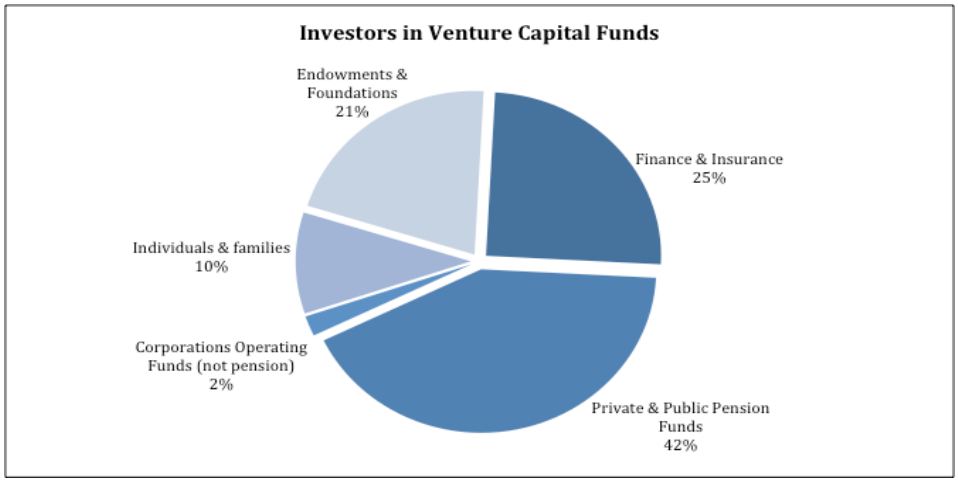


FIGURE 3: INVESTORS IN VENTURE CAPITAL FUNDS[5]

During the VC fund's life cycle, the LPs are constantly informed about the current status of a certain project or the activity on new investments, however they do not possess an active role for participating in policy decisions or in day-to-day operations of the fund (Gompers (1995) in Gompers (1996)).The LPs provide the fund with the required amount of capital that is raised in the period before the fund is launched. After the closing of the fund, the GPs start investing in encouraging start-up companies and promise to return the proceeds back to the LPs after the fund terminates. In case of a capital exhaustion, the GPs usually attempt to obtain further capital commitments for follow-on funds (Kaplan and Schoar (2005)). When investigating the size of 577 VC funds, Kaplan and Schoar (2005) estimated an average fund size of $102.9 million, whereas the average size of e.g. buyout funds is more than four times larger.

The GPs in the limited partnership are compensated on the one hand by an annual management fee and on the other hand by a share of the profit realized through successfully transacted portfolio companies, also known as carried interest. Sahlman

[5] Data retrieved from The National Venture Capital Association (2007).

(1990) concludes that the management fee is widely contingent on the capital committed. Only a few funds use the estimated value of the portfolio as a benchmark to settle the management fee. Generally, increasing the base management fee by the rate of consumer price inflation on a yearly basis is a common approach of fund managers. Over 50% of the funds surveyed by Venture Economics database charge an annual fee of 2.5% of the committed capital though the fee typically varies between 2-3%. The carried interest however accounts for the largest fraction of the GPs compensation. Sahlman (1990) reports carried interest rates of 20% on the realized fund gains for almost 90% of the funds in question (see also Gompers and Lerner (1997)). The remaining funds charge interest rates ranging between 15-30%. Carried interest is skimmed from the gains that the fund realizes. GPs are often entitled to their profit share without restriction and before the LPs are paid off, however some funds follow a different approach. Usually GPs cannot liquidate their entire shares directly at the IPO since lock-up provisions of up to 180 days restrain them from an immediate exit. It is widely recognized that reputable VC firms with impressive track records report higher carried interest rates on fund gains than young and inexperienced VCs. Figure 4 graphically presents the organizational structure of a VC fund previously described.

The fund managers invest a part of the fund's committed capital into start-up companies and receive common equity in exchange. Common equity is analogous to the rationale of a call option where the holder has a claim to the firm's cash flows after all other claimants, e.g. debt holders are paid off. Equity holders, i.e. the LPs, have an unlimited gain potential but cannot lose more than their initial investment (Cumming, Fleming, and Schwienbacher (2006)).

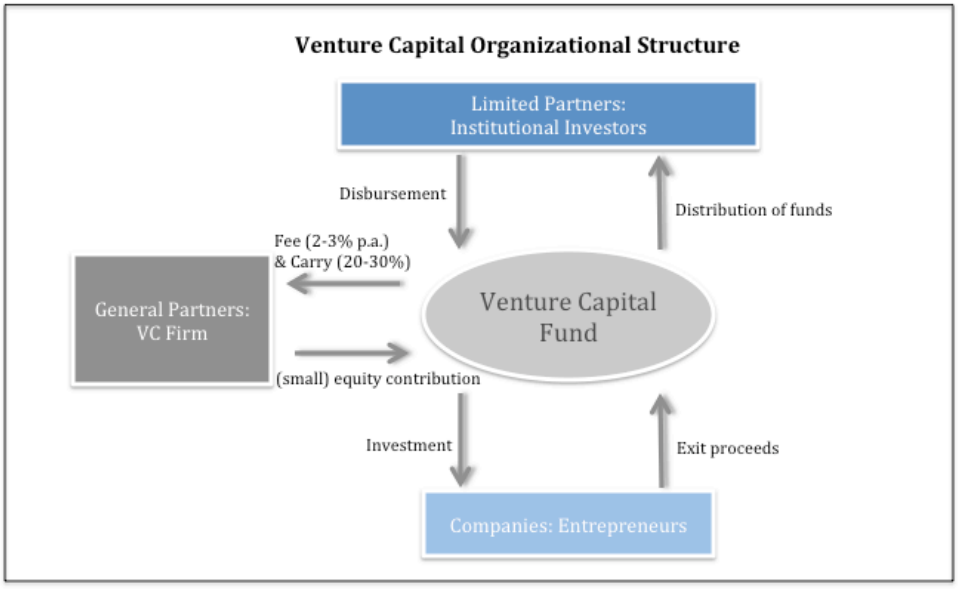


FIGURE 4: THE ORGANIZATIONAL STRUCTURE OF A VENTURE CAPITAL DEAL[6]

Several factors drive the demand for VC funds. Gompers et al. (1998) mention macroeconomic factors like the expected return on alternative investments and the general health of the economy. In a prosperous growing economy, entrepreneurs have incentives to start new businesses thus driving the need for VC funding. In contrast to that, rising interest rates cause the reverse effect and lower the attractiveness of VC funds since investors might not receive an adequate compensation for their venturesome investment compared to a less risky investment.

2.3 Screening and Due Diligence of VC Investments

Before VCs arrive at the decision to fund a start-up company with a promising business idea and the closing of the contract, they spend a significant amount of time and effort to screen, evaluate and analyze the potential investment (Kaplan and Strömberg (2001)). New enterprises often face difficulties to raise money from banks or other financial institutions because they exhibit great uncertainty about future earnings and the ability to meet their interest expanses. Venture Capitalists often appear as a last resort to provide the required capital hence start-up companies regularly court for VC funding. Every year a large VC firm receives up to 1,000 requests and business plans and screens hundreds of investments before committing itself to provide funding. Ultimately, a VC

[6] Based on Da Rin, Hellmann, and Puri (2012)

firm invests in only a few companies (Sahlman (1990) and (Barry 1994)). When choosing an investment VC firms usually tend to concentrate on a marked-off set of industries where they consider the potential of growth prospects and value additivity for the portfolio company to be the greatest as a result of their monitoring services (Jain and Kini (1995)).

In advance of an extensive due diligence on the portfolio companies' business plan and their financial situation, VCs undertake some initial considerations on the spectrum of which investments to fund in general.[7] According to Kaplan and Strömberg (2000) who investigated 42 investments in portfolio companies, VC firms at first consider whether the investment opportunity matches their overall investment strategy. Further, VCs are mostly attracted to a start-up's product or technology, its business model, the firm's competitive position in its markets segment and a high probability of the product's or technology's customer adaption. It is noteworthy, that VCs already consider the likelihood of selling their equity stake in the future portfolio company at a favorable price in the market after the expiration date of the VC fund before the actual investment has taken place.[8] Start-ups that show a high demand of future monitoring and a steady involvement of the VCs' managers in the day-to-day business are less likely to be funded. The screening and due diligence is determined by a closer investigation of the management team, the start-up's business concept, the amount of capital required to fund the operations, the existing contracts as well as the market size and the prevailing conditions (The National Venture Capital Association (2007), Kaplan and Strömberg (2001)). Although financial aspects do play a role in the VCs' evaluation process, explicit earnings and sales forecasts are not frequently employed. In contrast, VCs put high emphasis on the analysis of a start-up's competitors, the market attractiveness and the customer adaption of the product (Kaplan and Strömberg (2000)). The start-up's management team is a crucial risk factor and the VCs' uncertainty about its performance and future behavior is greatest among all other aspects. Kaplan and Strömberg (2001) conclude that management risk is present in more than 60% of the potential investments in question. VCs are concerned about the management's or founder's

[7] Although the majority of VC investments is undertaken in the information technologies industry, some VCs tend to focus predominantly on start-up's affiliated with e.g. healthcare products or clean technologies.

[8] Kaplan and Strömberg (2000) estimate that for 21% of the investments under investigation, a favorable exit opportunity plays a crucial role in selecting the future portfolio company.

incentives who might show a lack of focus and refuses to disclose important information on the firm's performance fostering asymmetric information. In some cases, the VCs also identify the need to complete the existing management team with some own, more experienced and better skilled executives to guarantee the focus on the start-up's continuous development and the reduction of information asymmetry. VC firms often transfer the associated risks with new start-up's into specific contractual provisions to protect themselves against any unforeseen difficulties (Kaplan and Strömberg (2004)).

It is a common approach of VC firms to syndicate their investments with other VC investors. After the evaluation of an investment VCs usually set up an investment analysis or memorandum containing extensive descriptions of the investment opportunity. The final decision to invest, as well as any further post-investment considerations are usually based on this memorandum which serves as a guideline throughout the whole investment process.[9] The memorandum is also used to inform other syndicated VC investors about the potential investment (Kaplan and Strömberg (2000)). The syndication of investments also offers a variety of benefits for a VC firm. Using the memorandum set up by another VC firm increases the information content, enhances the selection process and may be decisive for the final commitment of capital (Casamatta and Haritchabalet (2007)).[10] In an ideal world, the initial screening and due diligence lead to a successful exit of the portfolio company via trade sale or merger being equipped with a carefully selected team of managers and executives, substantially negotiated contract provisions as well as endowed with a product that exhibits great growth potential and high acceptance by customers (Jain and Kini (1995)).

It is believed that superior screening and selection abilities of VCs have an impact on the post investment performance of their portfolio companies. Since VC firms make huge efforts to undertake due diligences on their investments which provides them with valuable information, they are privileged to pick out only the most promising ventures. Hence, the opportunity to fund only high quality start-ups is assumed to be a reason for

[9] Almost 80% of the VC partnerships considered by Kaplan and Strömberg (2000) set up an investment memorandum.

[10] Further benefits and adverse impacts of syndication are described more in detail in section 2.4.

the outperformance of VC-backed firms compared to non VC-backed firms over time (Brown (2005)).[11]

2.4 The Syndication of VC Investments

Syndication is a widely used approach throughout various industries. Especially banks tend to engage in co-operations with other financial institutions when granting loans for not being the sole lender. Ljungqvist, Marston, and Wilhelm (2007) conclude that co-management among banks is often practiced on the basis of previously established strong ties. Syndicated investments are also typical for the Venture Capital industry since VCs exhibit the tendency to involve several other VC firms in their investment decisions rather than investing alone (Lerner (1994)). These syndicates have similar structures as e.g. joint-ventures in which one party brings in other partners for various reasons (Brander, Amit, and Antweiler (2002)). VCs are often closely bound in a large network of lawyers, accountants, investment banks and other VC firms. Tian (2011) provides some definitions for VC syndication. Generally speaking, the syndication of a VC investment can be understood as a co-operation of at least two VC firms for the exchange of capital and equity stakes in a portfolio company. In the course of time, two more specific definitions have manifested. In case a group of two or more VCs invests in a start-up firm but funds are provided from only one VC investor in each round for all of the rounds, the portfolio company is nevertheless classified as an individual-backed company. In contrast to that, a less rigorous definition states that an investment in an entrepreneurial firm is considered as syndicated if simply two or more VC firms are involved in the whole financing process.[12] The latter definition is verified by Brander, Amit, and Antweiler (2002) who consistently consider the involvement of more than one VC firm in an investment as a syndication.

Existing literature provides a large variety of motivations and benefits for the syndication of VC investments. Lerner (1994) mentions that VCs should engage in co-operations especially with well-established VC firms when there is a high likelihood of future reciprocity. Sah and Stiglitz (1986) attribute higher capabilities of gathering,

[11] The reputational effect of the VCs' experience and whether their superior screening or monitoring abilities determine the advantageous performance of VC-backed firm over non VC-backed firms is discussed in chapter 3.1.3.

[12] This definition is also applied in the course of the empirical investigation in this thesis.

absorbing and processing information to a group of investors rather than individuals which results in the selection of better investments. In addition, different investors have different industry and location-specific expertise. Sharing this knowledge with other VCs fosters the expansion of a VC's spatial radius and offers new investment opportunities to diversify its portfolio (Sorenson and Stuart (1999)). Portfolio companies that are backed by several VCs also benefit by an increase in value which is added through an improved deal flow among the investors, the increased likelihood for a VC firm to get in contact with further strategic alliance partners and the chances to secure follow-on funding for the entrepreneurial firm (Ljungqvist, Hochberg, and Lu (2005)). Further value creation is realized from the syndicate's members' heterogeneous skills, information and industry expertise thus a broad variety of inputs is achieved for the portfolio companies.

Another important benefit of syndicated investments is its contribution to the VCs' ability to diversify its investment portfolio (see Casamatta and Haritchabalet (2007)). Spreading the invested capital over several different start-up companies allows a VC firm to diversify its risk associated with the investments and to expand the portfolio radius. A VC firm is not only able to invest in a variety of firms but also to enter investments at different development stages (Tian[a] (2011)).The initial screening and evaluation of a potential investment by more than one VC firm is another tool to minimize the VCs' risk since even after an extensive due diligence the start-up's prospects might still be unclear so that a further evaluation by other VCs can contribute to a more effective selection of projects or continuation decisions (Brander, Amit, and Antweiler (2002)).

The joint evaluation is of particular importance as stated by Sorenson and Stuart (1999) to overcome information asymmetries since the entrepreneur typically knows more about the investment opportunity and may try to window dress the new venture.

The diversification of its portfolio and the reduction of overall risks are also the main assumptions of the syndication of investments proposed in the risk-sharing hypothesis of Lerner (1994).

Brander, Amit, and Antweiler (2002) assume that a lack of financial resources may encourage VCs to enter collaborations with other VCs. However, they conclude that factors such as improving the bargaining power with the founder are more likely to

drive syndication in contrast to Casamatta and Haritchabalet (2007) who consider large deals to be syndicated more likely.

The results on the effect of syndication are ambiguous. Stand-alone investments realized average returns of 15-20% whereas syndicated investments exhibit mean returns ranging from 35% to 39% thus syndicated investments clearly outperform non syndicated ones (Brander, Amit, and Antweiler (2002)) .This is in line with results by Ljungqvist, Hochberg, and Lu (2005) who infer that a VCs' network positively impacts its fund performance due to high-quality collaborations. Casamatta and Haritchabalet (2007) arrive at a contrary conclusion. On the basis of their selection hypothesis they argue that rates of returns should be higher for stand-alone investments because a complementary evaluation of an investment by another VC is only needed for marginal investments. Investment opportunities that initially turn out to be good can be realized without a second opinion.

It is worth mentioning that especially inexperienced VC firms favor the formation of syndicated investments because their evaluation of the project is not accurate enough to gain a comprehensive overview about the entire investment. Hence, they try to form syndicates with more experienced VCs whenever this is optimal to do so. Contrary to that, experienced VCs are more reluctant to form syndicates due to the danger of suffering from competition thus they will either forgo the investment or seek to form syndicates with equally experienced investors (Casamatta and Haritchabalet (2007)).

2.5 Staging in Venture Capital investments

In contrast to entering in a stock-purchase agreement where the price and the timing are predetermined, VCs usually tend to invest at several different stages in their portfolio companies. For this reason, staging can be defined as a stepwise disbursement of VC firms to their portfolio companies. The amount of capital provided at each round is just sufficient to take the start-up company to the next higher development stage where a further infusion of capital is required to continue operations. As the VC-backed firm increases in size over time, the amount of capital provided at each stage presumably increases continuously (see Sahlman (1990) and Kaplan and Strömberg (2002)).

It is unlikely for VC firms to provide all the capital that the start-up requires to accomplish its business plan upfront, thus the money is spread over several

development stages instead (Sahlman (1990)). Existing literature differentiates between two different approaches of step-wise financing: milestone financing and round financing. Inducing capital round after round, i.e. ex post staging, each new tranche undergoes separate negotiations at the time the start-ups demand new money for further process. Financing a start-up on the basis of milestones, also known as ex ante staging, requires an exact predetermination of contractual contingencies such as the amount of revenues, the number of patents filed, etc. under which the firm is entitled to receive new capital. Gompers and Lerner (1997) refer to several covenants that determine the approach how a VC firm finances its portfolio company. Since the amount of money that a VC firm can provide to one start-up in its portfolio is stipulated to narrow excessive spending on unprofitable firms, the selection between milestone and round financing demands a close scrutiny. Hence, the amount of capital that a portfolio firm requires over its life cycle may be the deciding factor for the form of financing.

One of the main reasons for VCs to apply stage financing is to maintain its flexibility in making decisions. By committing capital step-wise, VCs remain control over the decision to shut down operations completely and to refuse further financing if the portfolio company performs inappropriate (see also Kaplan and Strömberg (2000)). This covenant is crucial because it is likely that founders continue investing in unprofitable projects as long as the VCs provide capital.[13] A VC firm withholding capital commitments also signals the critical status of the portfolio company in question to other capital providers. On the contrary, if the firm exhibits an outstanding performance, the VCs reserve themselves the right to invest more capital.

Generally, staging is an accepted procedure by the founders since they benefit from retaining a significantly greater stake in the company as if receiving all the required capital in advance. Further, founders are usually optimistic of their own capabilities to meet the predetermined goals that trigger the additional provision of money (Sahlman (1990)). Moreover, Kaplan and Strömberg (2000) name two important risk factors that cause VCs to stage their investments: uncertainty about the market size and the management in place.

Existing literature provides various benefits of staged investments. Supplying the start-up with capital step-by-step and making it contingent on several performance indicators

[13]This view is also consistent with findings by Gompers (1995).

reduces the hold-up problem that VCs are exposed to. If a VC firm starts investing into a portfolio company, the founder can hold up the VC firm by the risk to leave his venture for various reasons. The staging approach allows the VC firm to reduce the hold up problem because the amount of capital provided is just sufficient until the next development stage. Hence, the gradual build-up of human capital incentives the founder not to leave the start-up (Neher (1999) in Tian[a] (2011)). In the course of time, VCs are able to learn more about the firm they invest in because the achievement of certain contracted goals discloses information about the start-up. Therefore, VCs can use stage financing as a substitute for intensive monitoring of the portfolio company.[14] Tian[a] (2011) suggests that the higher the monitoring costs, the larger the number of financing rounds and the shorter the time gap between each round.

In contrast to the benefits of staging stated above, Wang and Zhou (2004) also address certain disadvantages for the VC firm. First and foremost, staging is costly and demands a lot of effort and time because prior to each new capital infusion, the VC firm has to negotiate and write the contracts. In addition to that, staging incentivizes the entrepreneur to window-dress, i.e. to artificially boost earnings and enhance the start-up's performance to meet the specified goal at the last moment, thereby unlocking the next capital infusion by the VC firm.

Empirical results by Tian[a] (2011) suggest that staging has a positive impact on a portfolio companies' operating performance in the year of going public. The results are obtained by making the performance of the portfolio companies contingent on the distance of the entrepreneurial firm to the VC firm, i.e. the further the distance, the greater the monitoring costs. Therefore, a smaller number of financing rounds will impact the firms' performance in a positive way when the costs to monitor the start-up is less. A greater distance between the VC firm and the portfolio company results in larger number of rounds, a smaller capital infusion per round and a shorter time gap between the stages.

2.6 Contractual Agreements between Entrepreneurs and VC firms

Venture Capital deals are commonly structured as limited partnerships which invest in promising start-up firms. Hence, the VC firm enters in contracts with both outside

[14] A detailed description of monitoring services is available in section 2.7.

investors providing the required capital and the entrepreneurial firm the VCs invest in. According to Sahlman (1990) contracts between VC firms and the entrepreneurs contain three important characteristics, notably: (1) providing and staging the committed capital and preserving the right to abandon the investment, (2) compensation systems that are contingent on the creation of value and (3) preserving means to force the management to distribute investment proceeds. These tailor-made and complex contracts spell out the rights and obligations to each group to fit the specific needs of various situations (see Sahlman (1990) and Bengtsson (2009)).

A key feature in the detailed elaboration of the contracts is the VCs' right to allocate separately cash flow rights (hereinafter CF rights), voting rights, board rights, liquidation rights and other control rights. The rights are allocated in a way that if the performance of the portfolio company is weak, the VCs obtain full control. On the contrary, when the performance improves, the entrepreneur is allocated more control rights. These rights are generally made contingent on observable indicators of financial and non-financial performance (Kaplan and Strömberg (2001)). In case of an increasing uncertainty of either the start-up or the founder, VCs may increase the pay performance sensitivity by making the entrepreneur's cash flow compensation increasingly convex in performance. This is chiefly achieved through compensation being more explicitly contingent on performance, more time vesting as well as fewer liquidation CF rights (Kaplan and Strömberg (2002)).

One of the most important rights in these contracts are CF rights which are not trivial to measure since they are either dependent on the firm's performance or on remaining with the firm. CF rights can be defined as the fraction of the portfolio company's equity value that different investors, i.e. the VCs in the syndicated investment and the management have a claim to. With reference to a study conducted by Kaplan and Strömberg (2002) VCs control almost 50% of the CF rights, whereas founders are only entitled to 30% and others to 20%, respectively which indicates that entrepreneurs give up a large fraction of their ownership when entering into VC contracts.

Further, board and voting rights are crucial features to control the portfolio company and to enhance decision-making. General tasks of the board managers are the hiring and evaluation of top executives as well as taking part in the advisory and resolution of firm-wide decisions and strategies. Actions such as the sale of assets, subsequent financings

or the decision on acquisitions are by contrast often subject to the voting rights of the firm's shareholders. Results by Kaplan and Strömberg (2002) reveal that VCs possess in 25% of the companies in question the majority of the board seats, whereas the founders do so in only 14% of the cases. When shifting the focus to voting rights which are commonly state-contingent, the VCs hold the majority in 41% of the sample investments of first VC rounds.

VCs typically include further rights, e.g. optional redemption rights, exit rights and rights to mitigate agency problems. Exit and redemption rights entitle the VC firm to sell back shares, to sell shares in an acquisition or to force other shareholders to sell shares on acquisition (Bengtsson (2009)). As already described in section 2.4, management risk imposes the VC firm with great uncertainty. To overcome this uncertainty, contractual provisions such as a higher fraction of committed capital being withheld in case certain goals are not met or simply providing the VCs with a higher degree of control are integrated in the contracts. The same techniques are employed to mitigate the hold-up problem, i.e. the entrepreneur can hold-up the VCs by imposing it with the threat to leave the venture. By including non-compete and vesting provisions, the VCs ensure that an ultimate departure of the founder becomes very expensive (Kaplan and Strömberg (2001)).

As mentioned in the beginning of this section, rights can be contingent on financial and non-financial performance, e.g. actions, dividend payments, continued employment, future security offerings, etc. Kaplan and Strömberg (2002) find 17% of the investments being contingent on financial performance, 9% on non-financial performance and 11% on actions, respectively. Furthermore, additional funding may also be contingent on subsequent performance. Contingencies can also be made, e.g. on the EBIT or on the firm's net worth. If these two indicators fall below a predetermined threshold the VC firm obtains additional voting control power from the entrepreneur.

The results clearly depict that contractual provisions between a VC firm and an entrepreneur can be very restrictive. Jain and Kini (1995) assume that only entrepreneurs who are confident in meeting the contracted goals and anticipate significant benefits from an affiliation to VC funding will embark on these provisions. Coincidently, solely VC firms that exhibit a track record of success and are associated with a great reputation can achieve entrepreneurs to agree to their restrictive conditions. However, entrepreneurs are potentially given the possibility to relax certain

provisions in renegotiations. In about one third of investments considered by Kaplan and Strömberg (2002) contractual rights from a previous financing round are negotiated and get part of the new contract. The two most commonly renegotiated provisions are the automatic conversion price which is typically increased as well as the VCs' liquidation claim, i.e. the change in dividends or participation.

2.7 Monitoring and Value Adding Services

As previously described, VC firms carefully time their investments step-by-step and make payments contingent on a variety of contractual provisions. VCs do however provide more than just money. In the course of the investment process, VCs continuously add value to their portfolio companies by screening, monitoring and decision-support functions (Jain and Kini (2000)). VC firms are usually specialized on a few industry sectors which is why they are able to offer superior assistance in financial and strategic planning as well as operational decision making (Barry (1994)). Although VCs try to mitigate agency problems and asymmetric information by fastidiously negotiated contracts, every possible conflict is impossible to cover. In other words, the founder's private benefits from certain projects may be imperfectly correlated with the shareholders' interests. Hence, the VCs typically play a crucial role in the operations of their portfolio companies to check the project's status periodically and maintain the possibility to withdraw from the investment (Sahlman (1990) and Gompers (1995)).

However, extensive monitoring is costly. According to Gompers (1995) monitoring costs also include the opportunity cost of generating returns for both the VCs and the entrepreneur. Writing and reading reports, setting up contracts as well as carefully evaluating the entrepreneur's activities can amount to substantial costs since the entrepreneur and the VCs have to spend a considerable amount of time and resources. In addition, monitoring stage-financing activities requires the negotiation of new contracts and the payment of lawyers that need to be added to the monitoring costs. Kaplan and Strömberg (2001) also refer to the expenses associated with the VCs' monitoring activities and state that in approximately 20% of the investments in question, VCs are concerned about the amount of time spent on supervising the investment. Besides spending time on monitoring the portfolio company, VCs must

allocate time to meetings with bankers and accountants as well as screening new start-ups for future funding (Sahlman (1990)).

VCs demand regular updates on a monthly basis of the portfolio company's operations and performance. They also tend to periodically review their investments by directly visiting them. Empirical findings state that in the course of the financing process, a lead VC visits the entrepreneur on average once a month for four to five hours, whereas non-lead VCs undertake a personal inspection only once a quarter for two to three hours. Although VCs usually hold board seats in the start-up, they try not to get too involved in the firm's day-to-day operations (Gorman and Sahlman (1989) cited in Gompers (1995)).

Apart from reviewing and evaluating their investments continuously, VCs provide further services that contribute to an increase in the portfolio companies' value and may enhance their performance. Dushnitsky and Lenox (2005) mention that especially young ventures lack complementary capabilities in marketing, distribution and manufacturing, i.e. the expertise and infrastructure to develop the product properly. An affiliation with a VC firm is beneficial to the entrepreneur for the following reasons: it enhances the venture's reputation and among other things leads to improvements in its R&D and distribution operations. Furthermore, VCs play an important role in attracting further investors such as banks and other VCs. They professionalize the start-up by developing its human capital, introduce the entrepreneur to their network of customers and suppliers and excel in establishing relationships between their portfolio company and the VCs' closely tied investment bankers, auditors and lawyers which provide value enhancing services to the firm (Nahata (2008)) .As already mentioned in sections 2.4 and 2.6, management risk is considered as one of the greatest uncertainties when investing into a start-up. For this reason, VCs take an active role in scrutinizing management actions, professionalizing the management and the set up of incentive compensation schemes (Chemmanur, Krishnan and Nandy (2011)). A VCs' interventions in the composition of the portfolio company's management may even reach the point at which the VCs replace managers by own executives, e.g. in case the start-up is heading for disaster (Lerner (1995)). Kaplan and Strömberg (2001) find VCs playing a role in shaping the management team of their portfolio companies in 14% before providing capital and in 50% of the sample the VC firm explicitly expects to play after investing.

Various empirical literature address the above-mentioned services and monitoring activities that VCs provide to their portfolio companies and investigate its influence on several performance indicators. A study by Kortum and Lerner (1998) comes to the result that the presence of Venture Capital is responsible to approximately 15% of U.S. industrial innovations. Hellmann and Puri (2000) estimate a positive impact of Venture Capital participation in start-ups based on a significant reduction in the time to bring a product to the market.

The impact of a VCs' value adding services becomes even more distinct when evaluating a portfolio company's performance after the exit of the VCs, which is usually subsequent to the end of the lock-up period. Kraus and Burghof (2003) assume that portfolio companies get hard hit when VCs leave the investment resulting in an increase in the post-IPO underperformance. Consist with this prediction, Field and Hanka (2001) find a statistically significant three-day abnormal return of -1.5% and a 40% increase in trading volume around the unlock day for their sample. They moreover point out that these effects are roughly three times larger for VC-backed firms than for non-VC-backed ones.[15] To overcome the underperformance problem, (Kraus and Burghof (2003) advice VCs to sell their equity stakes rather to institutions that exhibit similar specializations in monitoring than selling directly over the stock exchange.

These findings suggest that the role VCs play in supervising the start-ups, shaping the management team and introducing the entrepreneurs to their network of professionals impinges upon the performance and development of the portfolio company which is supported by the following citation: "It is far more important whose money you get than how much you get or how much you pay for it" (Bygrave (1992) p.208 cited in Hsu (2004)).[16]

[15] For similar results supportive to these findings please also refer to Brav and Gompers (1999).

[16] Against this background, empirical literature often raise the question whether superior monitoring and value adding services lead indeed to the outperformance of VC-backed firms over non VC-backed ones or if its is owed to their abilities to select more promising and high-quality ventures so that the investment will in any case turn out as a success. Shu et al. (2010) conclude that although VCs have outstanding capabilities in identifying quality firms their long-run performance would not be guaranteed without the continuous involvement and monitoring services provided by the VC firm. This is consistent with results by Chemmanur, Krishnan, and Nandy (2011) who find evidence that both screening and monitoring positively contribute to improving firm efficiency.

2.8 The Initial Public Offering as an Exit Strategy

It is usually common for start-up firms that they do not generate profits at all or at least enough to adequately compensate their investors in form of paying dividends or other means. Hence, the assessment of a potential exit strategy is of paramount importance of a VC firm to generate positive returns on its investment (see Giot and Schwienbacher (2007) and Schwienbacher (2008)).

A huge scale of literature investigates the IPO as an exit of VC firms (see e.g. Meggison and Weiss (1991), Jain and Kini (1994), Gompers (1996), Brav and Gompers (1997) and Lee and Wahal (2004)).

Cumming, Fleming, and Schwienbacher (2006) name the main five different exit strategies that VCs usually follow:

(1) VCs take their portfolio company public in an *IPO* thus the shares are listed on a public stock exchange;

(2) the portfolio company is acquired or merged in an *acquisition or trade sale* to a larger firm and the VCs as well as the entrepreneur sell their stakes to the acquirer;

(3) in a *secondary sale* the VCs sell their portfolio company's stake to another firm or fund in contrast to the entrepreneur who keeps his stake;

(4) in a *buyback*, the entrepreneur purchases the stake held by the VC firm thus gaining back total control over the firm;

(5) a *write off* or *liquidation* in which the investors withdraw from the investment usually realizing little or zero profit.

The two most common approaches for VCs to exit their investment is to take the portfolio company public by an IPO or sell it to another firm, i.e. trade sale (Schwienbacher (2008)). Schwienbacher (2005) studies the differences in European and U.S. Venture Capital exits and shows that IPOs are more frequently used in the U.S. to exit the investments (29.9% of the portfolio companies in question were transacted by an IPO until 2001 versus 25.3% for the European market). On the contrary, trade-sales and acquisition are not only the dominant way to exit investments in Europe but also show a higher fraction compared to trade-sales in the U.S. market (38.4% of trade-sales in Europe compared to 30.3% in the U.S.)

In this section, the focus is set on the exit through an initial public offering. This is on the one hand due to the empirical analysis conducted in chapters 4 and 5 which

concentrates entirely on the IPOs of VC-backed portfolio companies and, on the other hand due to IPOs being typically the most profitable exit opportunity that offer the greatest benefits for the VCs, the entrepreneur and the limited partners in terms of reputation and compensation (Gompers and Lerner (2001)).

However, the VCs and the investors usually do not sell their shares immediately after the portfolio company has gone public. Special agreements, also knows as "lock-ups" prohibits the insiders to sell their shares for a predefined period of time. These lock-ups are frequently employed to mitigate the adverse selection problem at the IPO date, hence firms faced with a greater adverse selection problems typically exhibit lengthy lock-up agreements (Brav and Gompers (1999)).

An initial public offering can be considered as one of the most considerable events in a firm's history. Besides the satisfaction of immediate capital requirements, an IPO also provides the portfolio company with the opportunity for further subsequent public offerings of equity and other corporate securities. Apart from that, going public enables the firm to gain access to the capital market and also might positively impact its product market performance (Chemmanur, He, and Nandy (2009)).

Although IPOs are the most profitable way to exit an investment, the total number of IPOs as well as the fraction of VC-backed ones experienced a tremendous decline in the U.S. after the dot-com bubble around the millennium (see figure 5). However, the share of VC-backed IPOs is relatively constant reaching a maximum of 63% and a minimum of 26% with one exception in 2005 were the share dropped to only 3%. Recent observations reveal that since 2011 every second IPO in the U.S. is affiliated with Venture Capital financing.

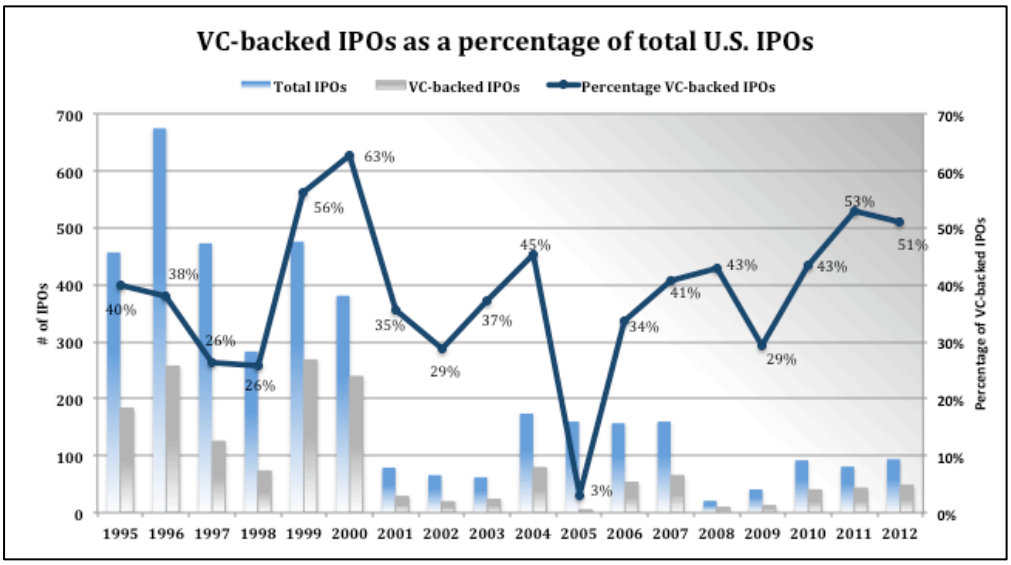


FIGURE 5: VENTURE CAPITAL-BACKED IPOS AS A FRACTION OF TOTAL U.S. IPOS FROM 1995-2012[17]

Several empirical investigations have estimated superior performance of VC-backed IPOs over non-VC-backed ones (see e.g. Brav and Gompers (1997) or Jain and Kini (1995)). In addition, the reputation of a VC firm also positively impacts the post-IPO performance of a portfolio companies as can be derived from various examples investigated by existing literature (Ivanov et al. (2008) or Nahata (2008))[18]

Ritter (2013) estimates the returns for VC-backed and non-VC-backed IPOs and finds considerable differences. The average first-day return for VC-backed IPOs between 1980 and 2010 is more than twice as high as for non-VC-backed ones (27.9% compared to 12.6%). With respect to the three-year buy-and-hold return, VC-backed IPOs also outperform firms not receiving VC financing. VC-backed IPOs reveal an average return over three years of 23.2% (market adjusted: -12.5%), whereas non-VC-backed firms only provide investors with 19.5% over a three-year time horizon.

2.9 Fund returns and Performance Persistence

A large number of empirical literature investigates the performance of VC funds and their portfolio companies (see e.g. Guler (2007), Kaplan and Schoar (2005), Cochrane (2005)), but still little is known about capital flows, returns and their interrelation. This is mainly due to limited disclosure requirements for Venture Capital firms since this

[17] The figure is based on IPO data gathered by Ritter (2013).

[18] More information on the VCs' reputational effect on post-IPO performance is provided in chapter 3.

asset class belongs to field of private equity investments (Kaplan and Schoar (2005)). The returns of VC investments might differ from returns of e.g. common stocks even if betas or other industry characteristics are held constant. Cochrane (2005) mentions several reasons for the performance differences. First of all, investments in a Venture Capital fund are a one-time commitment that are not tradable and cannot be reversed.[19] Due to the investment's great inflexibility and illiquidity, investors might require higher returns. Second, VC funds usually have a threshold value for the required initial investment which an investor has to exceed to participate in the fund. The initial investment often represents a sizeable fraction of an investor's wealth. This further amplifies the investor's expectation of high returns after the fund's termination.

In the course of evaluating the performance of VC funds, empirical literature employs a huge set of performance indicators. Kaplan and Schoar (2005) and Harris, Jenkinson, and Kaplan (2013) estimate fund performance by comparing an investment in a VC fund to an investment in the S&P 500 index. To make results comparable, they calculate the public market equivalent (henceforth PME) on the basis of fund cash flows to indicate an out- or underperformance of the VC fund against the S&P500.[20] Further performance measures are the internal rate of return (hereinafter IRR) which is most often applied in empirical research (see Kaplan and Schoar (2005), Guler (2007), Lerner, Schoar, and Wongsunwai (2007), Ljungqvist and Richardson (2003), Smith, Pedace, and Sathe (2010) and McKenzie and Janeway (2011)), the cumulative total value to paid-in capital (TVPI) and the distributed total value to paid-in capital (DPI) (see Kaplan and Schoar (2005) and Smith, Pedace, and Sathe (2010)).

The results on VC fund performance are ambiguous among several different empirical investigations. A comprehensive paper by Kaplan and Schoar (2005) analyzes the performance of VC funds utilizing several performance measures. They find evidence that VC fund returns based on a capital weighted basis are on the one hand higher than the returns of the S&P 500 but on the other hand lower when applying an equal-weighted basis.[21] An estimated PME ratio of 0.96 for VC funds between 1980 and 2001 indicates a slightly worse performance than the market index on an equal-weighted

[19] See also chapter 2.2

[20] A PME greater 1 indicates that the VC fund outperformed the market index and vice versa.

[21] However, VC fund returns are always higher than the S&P 500 return when estimating the performance gross of fees.

basis but a distinctly superior performance when weighting the funds by size (PME of 1.21). A research paper conducted by Harris, Jenkinson, and Kaplan (2013) comes to the conclusion that VC funds have underperformed the market by about 5% since the millennium.

The analysis of VC fund performance on the basis of the IRR clearly depicts that some empirical studies measure insanely high returns, others show a relative moderate or even poor performance. McKenzie and Janeway (2011) find that VC funds might exhibit high IRRs of up to 20% in times of capital shortage and boom periods but on the contrary, the IRR decreases to skinny 4% when market conditions are unfavorable. Smith, Pedace, and Sathe (2010) estimate IRRs for a matched sample of 1,285 U.S. VC funds and come to the result that IRRs are highly skewed. The simple average IRR is 13.7% and is supposed to be below the common perception of a VC fund's return. However, for the top 10% of the sample funds the IRR is 39.2% or even higher. This average IRR is more or less consistent to the average IRR estimated by Kaplan and Schoar (2005) which is 17% for a sample of 746 VC funds. It is noteworthy that again results are highly skewed, i.e. some funds perform poorly, other exhibit an extremely high performance. The results obtained by Josh Lerner, Schoar, and Wongsunwai (2007) are even more extreme. They find the worst fund returning -94% and the best one realizing an IRR in excess of 500% with an average IRR of moderate 6.7%.

Results by Cochrane (2005) and Ljungqvist and Richardson (2003) coincide with those previously mentioned. Cochrane (2005) estimates returns applying a market model in logs and reports a market beta of 1.7 and an arithmetic alpha of 0.32. The returns also exhibit some high degree of volatility. Accordingly, Ljungqvist and Richardson (2003) investigate the performance of 19 VC funds and find an average weighted portfolio beta of 1.12 and general excess returns of private equity funds with a magnitude of 5-8% p.a. compared to the public equity market.

Interestingly, the largest proportions of VC gains are realized after the IPO of the portfolio company. VC firms usually continue to hold their stakes in the portfolio company after it went public. On average, VCs hold about 34% of the firm's equity prior to the IPO and only sell approximately 6.6% at the IPO date (Barry et al. (1990) cited in Jain and Kini (1995) p. 595).

However, the sentiment of empirical literature concerning the overall performance of VC funds seems quite pessimistic (see e.g. Lerner (2011)). Although VC funds exhibited

superior performance compared to other public equities in the 1990s, the opposite seems to be prevailing in the 2000s (Harris, Jenkinson, and Kaplan (2013)). Due to the recently poor performance, low returns are considered to be inappropriate given the high riskiness and uncertainty of this particular asset class (Achleitner, Engel, and Reiner (2013)). Figure 6 provides and overview about the exit of almost 12,000 VC investments and shows that almost every fifth investment fails and only 14% of all investments considered between 1991 and 2000 make it to an IPO.

A potential reason for the high volatility of VC funds as well as the recently noticed poor performance is the overreaction of investors to potential investment opportunities. Hence, too much capital is invested in relatively unattractive investments leading to moderate returns (Achleitner, Engel, and Reiner (2013)). Consistent to that, Lerner (2002) refers to an overfunding of particular sectors that may negatively impact venture capital funds' effectiveness.

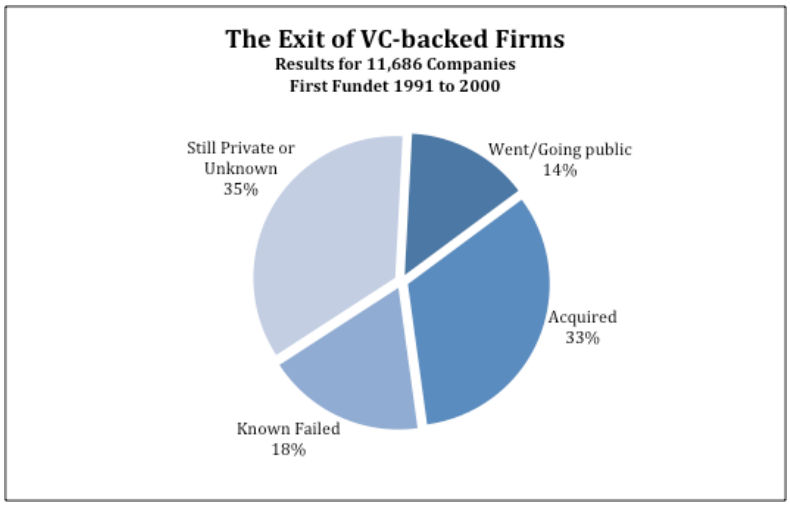


FIGURE 6: THE EXIT ROUTES OF VC-BACKED FIRMS BETWEEN 1991 AND 2000

Although market conditions play a crucial role in determining the performance of a VC fund several studies emphasizing on the VC funds' performance persistence and its determinants name additional reasons. Achleitner, Engel, and Reiner (2013) and Smith, Pedace, and Sathe (2010) consider the VC's prior experience, reputation, abilities to syndicate and skills to select and monitor their investments as the foundation of superior investment performance. Moreover, Kaplan and Schoar (2005) find evidence that if a VC's fund outperformed the industry once, a follow-on fund set up by the same

VC is likely to sustain this high performance level. [22] In addition they suggest a concave relation between the fund size and its performance. Although large funds are associated with high PMEs, the size negatively impacts the performance if the fund becomes too large. This might also explain why the top performing funds grew proportionally slower compared to funds that exhibit poorer performance levels.

[22] Kaplan and Schoar (2005) estimate that a fund with 1% higher performance in the previous fund is associated with an increase of 0.54% in the current fund.

Chapter 3: Reputational Effects and the Grandstanding Hypothesis

3.1 Reputation in the Venture Capital Industry

In the following the importance of reputation and its benefits for VC firms as well as for its portfolio companies is elucidated. Reputation not only influences the VC fund's and portfolio company's performance but also plays a crucial role in the screening and monitoring process.

3.1.1 The Importance and Benefits of Reputation

Reputation is of particular importance in the financial industry and its effects and benefits have been examined by various empirical studies (see e.g. Gompers (1996), Hsu (2004), Nahata (2008), Meggison and Weiss (1991), Shu et al. (2010) and Ivanov et al. (2008)). According to Rindova, Williamson, and Petkova (2005), reputation is understood as an intangible asset that stands for a firm's activities and outputs on the basis of public recognition. Reputation also serves as a proxy for a firm's unobservable capabilities and its quality providing an indication of future performance. It is generally based upon the observable history of track records, past performance indicators or prior experiences and serves as an important trait in many financial sectors, such as commercial- and investment banking and the insurance business (Ivanov et al. (2008)).

Especially in the Venture Capital industry reputation is an invaluable asset. VC firms, investors and portfolio companies can benefit for various reasons. Reputation may also serve as a sign of a VC's credibility which is important for portfolio companies since they are heavily depended on VC advisory and financing to properly continue their operations (Cumming (2012)). During the Venture Capital life cycle, raising money periodically in overlapping funds is indispensable for a VC firm not to terminate its business. Therefore it continuously faces the challenge to convince investors of its abilities to screen promising and high-quality start-up companies for selling or taking them public in the future. Hence, VC firms can primarily build up a reputation by exiting a portfolio company through an IPO, which is moreover the most effective signal to enhance the VCs' visibility in the industry (Nahata (2008) and Lee and Wahal (2004)). For Venture Capital firms as for most financial intermediaries, building up and steadily enhancing its reputation is a crucial feature that is of particular importance and grants

several benefits. First and foremost, VCs have the need to maintain an advantageous reputation for being an active and visible long-term player in its industry and the whole financial markets due to its continuous necessity to acquire new funds (Nahata (2008)). A good reputation may help to get easier access to potential investors and to keep existing or foster new connections to third parties, such as investment banks, auditors and lawyers (Sahlman (1990)) .A VC firm's reputation is also a helpful proxy for investors to ease the selection of promising VC funds and to draw inferences about the unobservable quality of a VC firm. Portfolio companies can benefit from a VC firm's reputation due to a transfer of information and a simplified search when considering which VC firm to contact for financial support. Nevertheless, sustainable reputations take a long time to develop and especially young companies cannot exhibit impressive track records of successful IPOs or other substantive action to alleviate asymmetric information and investors' concerns (Rindova, Williamson, and Petkova (2005)).

VC firms have considerable advantages when affiliated with a good reputation. Hsu (2004) for example shows that reputable VCs realize more favorable deal terms compared to less reputable VCs so that they can acquire equity stakes of promising start-ups at a significant discount of up to 14%. Entrepreneurs explicitly accept a lower valuation of their enterprise to benefit from an engagement with a reputable VC. Not only do reputable VCs profit from inferior capital expenditures when acquiring equity stakes, but also from higher chargeable management fees. The costs and the size of fundraising are determined by reputational effects of the VC firms, thus reputable VCs can set up larger funds at a lower costs and have less incentive compensation (Gompers and Lerner (1999)). Evidence by Gompers (1996) and Lee and Wahal (2004) reveal that reputable VC firms are in favor of easier access to new capital for follow-on funds and are able to raise more capital. Further benefits mentioned by Sahlman (1994) are high fund returns that are realized with low capital expenses which can directly be associated with several fund characteristics such as age and prior performance.

Besides the reputational benefits for VC firms, existing literature also mentions various advantages for the supported start-up companies. A portfolio company backed by a reputable VC firm has a higher probability of exiting successfully, can access public markets faster and has a superior asset productivity at the time of the IPO (Nahata (2008)). Continuous monitoring and value adding services provided by reputable VC firms during the whole investment process cause the entrepreneur's remaining stake to

be more valuable ex post although the initial stake which the founder had to give up to receive financing from a reputable VC is usually more (Hsu (2004)). Cumming (2012) further mentions that portfolio companies affiliated with reputable VCs can benefit from their greater network, implicit VC guarantees on borrowings, greater credibility with customers and an enhanced likelihood of forming strategic alliances with other established firms.

3.1.2 Indicators to Measure Reputation

Existing literature on VC firms' reputational effects on their portfolio companies proposes a large variety of attempts to capture and measure reputation adequately. To provide an overview about existing reputation proxies, the ones explicitly applied in financial research are subsequently listed and the proxies used most often are described in further detail to moreover assess their eligibility as well as referring to some shortcomings.

As previously described, reputation is an invaluable but intangible asset in the financial industry that raised literature's attention to evaluate its influence on performance and other actions. In the course of time, several reputation proxies have been developed and employed but there is still little consensus which proxy mirrors a firm's reputation most accurate. To capture reputational effects, existing literature tends to apply more than one reputation proxy at the same time to overcome associated disadvantages and to test for robustness of the results. Besides the *IPO frequency*, Ivanov et al. (2008) utilize *Capital under Management* and the *Total Investment* made by a VC. The two latter proxies are also investigated by Gompers and Lerner (1999) as well as by Sørensen (2007) who additionally focus on the *Number of Financing Rounds*. Kaplan and Schoar (2005) use a different approach and differentiate VCs upon *past fund returns*.[23]

Capital under Management provides information about the size of a VC firm's fund and the money available for investment. Lee and Pollock (2011) admit that VC firms cannot exist if they are unable to raise investment capital and investors will be unwilling to provide a VC firm with large sums of money if the VC firm has not performed properly or was unable to provide investors with acceptable returns. Hence, *Capital under*

[23] A detailed overview about a large variety of reputation measures applied in existing literature can be found in Cumming (2012).

Management seems on the one hand a suitable way to measure the VCs' reputation. This is further supported by prior research of Lee and Wahal (2004) showing that a VC's past performance is correlated with its ability to raise follow-on funds and that fund size influences a VC's recognition in the industry, i.e. more reputable VCs are able to raise larger sums of money. Chemmanur, Krishnan, and Nandy (2011) also justify the use of *Capital under Management* since reputation is predominately based on past success and VCs will only be able to raise larger follow-on funds if previous funds have performed properly, thus this proxy accurately captures the VCs' reputation. On the other hand, VC firms with similar reputations sometimes raise smaller funds and are also capable of demonstrating strong performance. Raising smaller funds diminishes the VCs' pressure to make large investments and reduces the number of partners to syndicate and monitor the investments (Lee and Pollock (2011)).

The *VC Market Share* is another popular reputation proxy applied by several empirical investigations (see e.g. Nahata (2008), Ivanov et al. (2008), Chemmanur, Krishnan, and Nandy (2011) and Shu et al. (2010)). Generally, the *VC Market Share* is a ratio consisting of the VC firm's number of transacted IPOs in relation to the size of all venture-backed IPOs in the market for a predefined observation window. Among several studies, this proxy turns out to be a reliable predictor of a VC's reputation. Nahata (2008) concludes that a VC's reputation based on the estimation of its market share significantly influences a portfolio company's asset productivity at the IPO and further remains a significantly positive determinant of firm performance throughout his entire investigation. In addition, the *VC Market Share* effectively captures the screening and monitoring expertise of a VC firm. The precision and sustainability can further be recognized regarding a study conducted by Shu et al. (2010) who find the *VC Market Share* being most significant in explaining initial returns of portfolio companies. However, using the *VC Market Share* to proxy reputational effects is not uncontroversial since this proxy fails to account for the investment timing. VC firms focusing on early stage investments rather provide moderate amounts of capital, whereas later-stage investments usually contain large sums of money. Hence, the *VC Market Share* takes less note of successful VC firms that intervene at an early stage of a portfolio company's life cycle.

Various empirical studies also use the *IPO Market Share* as a measure of a VC firm's reputation. According to Ivanov et al. (2008) and Shu et al. (2010) it is defined as the

VC's dollar market share of its venture-backed IPOs in a previous and defined time period reflecting once again that an IPO is a VC's most profitable way to exit its portfolio companies. Besides the use of several different reputation proxies, Ivanov et al. (2008) and Krishnan et al. (2011) find the *IPO Market Share* to be the only reputation proxy that consistently reveals positive and significant associations with the applied long-run performance indicators as well as other less conventional performance measures. It is further positively and significantly related to the probability of future IPOs.

A popular approach to measure VC reputation is estimating its age at the IPO date of the portfolio company in question. A very well known study using *VC Age* as an indicator of reputation is conducted by Gompers (1996) which also serves as a fundament for this thesis. Further studies using this indicator are e.g. Lee and Wahal (2004), Ivanov et al. (2008), Krishnan et al. (2011), Shu et al. (2010) as well as Dimovski and Brooks (2006). The latter, however, estimates *VC Age* by counting the number of days since the VC's first-ever investment instead of taking the VC's date of incorporation. Existing literature using *VC Age* conjectures that the longer a VC firm exists and operates in its business, the more knowledge and expertise it has accumulated, thus its experience is superior to VCs having operated for a shorter period of time. Furthermore, the longer a VC firm is present in its industry, the better is its network, its monitoring, value-adding and selection abilities (Yap (2009)). Ivanov et al. (2008) support the aforementioned by adding that the greater a VC firm's age, the less likely it has previously made any serious mistakes, thus it can be assumed that the VC firm is a successful competitor associated with a strong reputation. An old VC firm may also indicate a successful resistance against any vicissitudes of the industry so that a high reputation rank can be assigned. Consistent with Rindova, Williamson, and Petkova (2005), Gompers (1996) admits that reputations can only be established over a long time thus the age of a VC firm can effectively capture reputational effects. Lee and Wahal (2004) find supportive evidence and show that the age of a VC firm has a positive effect on raising larger amounts of capital and on generating revenues. In addition, Krishnan et al. (2011) confirm a positive and significant relation of *VC Age* on the survival of the portfolio company in question.[24]

Although applied in several empirical investigations, VC Age as a proxy of reputation is far from being a perfect measure. Gompers (1996) criticizes that experienced partners

[24] Further supportive results concerning VC Age as a reputation proxy are presented in chapter 5.2.2.

sometimes quit in order to start new VC firms, hence differences between old and new VC firms become blurry and no longer distinctive. Additionally, Sørensen (2007) hints at the missing distinction of VC Age between active and inactive investors. The age of a VC further fails to account for VC's performance level. VC firms may be able to survive for a long time in its industry without showing any remarkable performance or track records or might simply exist for other reasons. Hence, these firms would falsely be attributed with a strong reputation which distorts the reputation proxy. Conversely, especially young firms may show surprisingly strong capabilities without being assigned with a proper reputation (Fund et al. (2008) in Lee and Pollock (2011)).

Despite several shortcomings of *VC Age* it is nonetheless applied in several studies. Since gathering data to estimate reputation proxies for firms operating in the private equity industry is challenging and often unsuccessful, the age of a VC firm is relatively easy to determine as it is usually listed in databases or on the firms' webpage. Data for the above mentioned VC reputation proxies was not available unless the age of a VC firm, thus this reputation proxy is applied in this thesis to capture its effects on the post-IPO operational performance of the portfolio company in question.

3.1.3 Reputational Effects on Screening, Monitoring and operational Performance

The affiliation with a reputable VC firm might be costly for a portfolio company but may be worthwhile since prior studies document superior performance when the latter are in favor of reputable VC backing. Nahata (2008) applies a variety of different reputation proxies to capture their effects on performance and reports that firms backed by reputable VCs realize higher asset productivity ratios at their IPOs and are slightly less underpriced. A reason why portfolio companies backed by reputable VCs are able to show superior performance is due to their higher probability of exiting the deal successfully and through enhanced and accelerated access to capital markets. Further supportive results are found by Ivanov et al. (2008). The reputation proxies applied in their study show a positive and significant influence on the long-term operating performance of portfolio companies, setting the focus on the return on assets. It is estimated that a one standard deviation change in the VC reputation proxy causes a 31% change in the ROA of the portfolio company. The same holds for the long-run market-to-book ratio, although results turn out to be weaker (15% change for one standard

deviation increase in the reputation proxy). Despite the positive reputational effects on the previously described performance measures, Ivanov et al. (2008) find further evidence that the affiliation with a reputable VC firm enhances the long-run listing survival and leads to superior post-IPO three-year cumulative abnormal stock returns on the basis of Fama-French regressions. The outperformance of portfolio companies backed by reputable VCs is also visible when investigating the R&D spending ratio. A high level of R&D expenditures reflects high future growth potentials. Shu et al. (2010) reveal a positive impact of the applied reputation proxies not only on the aforementioned ratio but also on the market-to-book ratio and the return on assets. The results are moreover significant in the estimation period of up to three years after the IPO, thus showing a sustainable long-run performance.[25]

The empirical results presented above clearly depict an outperformance of portfolio companies backed by reputable VCs irrespective of the applied reputation proxy. This, however, raises the question if a VC firm's reputation simply alleviates access to more promising investment opportunities, i.e. start-up's that are originally better performing than others or if a VC's reputation indeed reflects its superior screening and monitoring abilities to pick potential winners and to provide valuable services throughout the investment process. Several reasons contradict the theory that reputable VCs exhibit superior skills in selecting better start-ups. The majority of VC investments does not yield promising results and rather ends in failures. Only a manageable amount of portfolio companies exit via IPO, thus high VC fund returns are solely gained through a small percentage of successful exits. Lee and Pollock (2011) conclude that these experiences are not substantially different among VCs with high and low reputations. A strong VC reputation itself may also be no meaningful indicator for their quality of monitoring and adding value to their portfolio companies. As mentioned earlier reputations can be established due to several reasons and VC firms might be falsely attributed with a superior reputation although past fund performance proves the opposite. Some VCs face a lack of requisite expertise to undertake early-stage

[25] Various empirical studies focus on a VCs' reputational effects on the operating performance of its portfolio companies. Generally, the performance measure mentioned above which are also applied in this thesis are tested in most studies. For the sake of brevity, a comprehensive overview about the results of further studies cannot be displayed. Hence, interested readers may refer to supportive investigations by Cumming (2012), Lee and Pollock (2011), Wang, Wang, and Lu (2002) and Krishnan et al. (2011).

investments. Its high reputation in the industry may however enable it to obtain this expertise externally. Their strong reputation can also ease the attraction of better quality start-ups which circumvents their missing know-how (Dimovski and Brooks (2006)).

In contrast to that, numerous empirical studies provide evidence that the reputation of a VC firm positively impacts the value creation in a portfolio company. In addition, VCs associated with strong reputations perform better in screening promising ventures. Ivanov et al. (2008) find that superior both screening and monitoring abilities are attributable to reputable VCs which results in superior post-IPO performance of their portfolio companies. The ability to select high-quality ventures can have two different explanations: a VC firm has either better investment opportunities or is more successful in selecting among those.

As has been proven, portfolio companies backed by reputable VCs outperform firms backed by less reputable VCs in terms of operating performance after issuing. Nahata (2008) concludes that superior performance indicators may also provide a signal of advanced monitoring thus reputable VCs are capable of creating more value to their portfolio companies. Additionally, he finds evidence for superior screening abilities of reputable VCs when adjusting the relation between performance and reputation for VC investment selectivity. This result reveals that reputable VCs not only add incremental value but also select superior VC investments. The previous results coincide with Krishnan et al. (2011) and Shu et al. (2010) in terms of reputable VCs being associated with superior monitoring abilities and value adding services so that their portfolio companies will continue to be more profitable well beyond a time horizon of three years subsequent to their IPO. Shu et al. (2010) further report an endogeneity problem that arises when estimating the effect of a VCs reputation on the portfolio companies' performance. They conjecture that superior performance may solely be driven by VCs' selectivity abilities rather than monitoring. High-quality start-ups maintain their quality and performance momentum irrespective of a VCs value adding services during the investment process. Nevertheless, Shu et al. (2010) conclude that picking winners right away does not compensate for the monitoring role that VCs could play. Although reputable VC firms might be capable of identifying high-quality firms with prospering growth potential that finally make it to an IPO, the long-run post-IPO success of these

companies would not be guaranteed if VC firms would stay out of adding continuous value to its portfolio companies.

To sum up these findings, previous empirical studies find evidence that reputable VC firms have strong abilities to select and screen potential winner start-ups. Naturally, these companies can rely on their certain quality momentum to achieve a successful IPO. Showing strong and superior performance compared to portfolio companies backed by less reputable VCs is, however, a merit of continuous monitoring that reputable VCs provide benefitting from their spanning network of professionals and their prior experience.

3.2 The Grandstanding Hypothesis

The Grandstanding Hypothesis was developed by Gompers (1996) and serves as a basis for a large variety of empirical investigations on determining reputational effects on performance (see e.g. Bessler and Seim (2011), Lee and Wahal (2004), Gompers and Lerner (2001), Hsu (2009) and Wang, Wang, and Lu (2002)).

Venture Capital deals are organized in limited partnerships raising and pooling money into VC funds in order to invest in promising and prospering start-up firms. These funds typically have finite lifetimes from seven up to ten years. The financed start-up firm is either taken public in an IPO or otherwise sold in a trade sale or M&A transaction, hence the investment is liquidated and the money is returned to the investors. A VC firm has a continuous demand for new capital which is raised in overlapping follow-on funds, thus it must periodically recapitalize itself in order to stay in business (Gompers 1996). Especially for young and inexperienced VCs raising additional capital is challenging and showing their abilities to potential investors is indispensable to establish a reputation promptly. When providing a VC firm with capital, the main decision variable for investors is the quality and track record of the VC fund's managers, hence managers have a strong incentive to signal their superior abilities of selecting attractive investments and exiting them successfully to provide investors with adequate returns. As already described, taking portfolio companies public via IPO is the most effective and reputation enhancing way to reveal the fund managers' financing skills since returns and public awareness evoked by acquisitions are usually inferior (Gill and Walz (2012)). In this context, especially young VCs try to be recognized and establish a reputation in

the industry quickly by rushing their immature portfolio companies to an IPO, thereby incurring several costs such as underpricing. Gompers (1996) describes this action as "grandstanding", i.e. the VCs take actions to convince outside investors of their otherwise unobservable capabilities of performing successful VC deals in order to attract new capital for follow-on funds. Gompers (1996) verifies this hypothesis by stating that cross-sectional, additional fundraising is a minor concern for older and more established VCs because their reputations have been built up over years and their performance has bee evaluated by investors sufficiently.[26] The marginal reputational benefit of an IPO is much higher for young VC firms since and additional IPO for a mature VC firm would not considerably affect the investors' beliefs concerning an established VC firm's reputation. Hence, the grandstanding hypothesis predicts that a stronger relation between bringing companies public and the ability to raise funds is stronger for young VC firms.

Gompers (1996) examines the age of the VC firm at the IPO date of its portfolio company as the determinant of its reputation and conjectures that if young VCs grandstand, they will take younger companies public than their established counterparts. As a result, he provides evidence, based on a sample of 433 IPOs between 1978 and 1987, that young VC firms grandstand by initiating IPOs of younger and less established portfolio companies in a shorter period of time.[27] Taking premature companies public at an early stage, young VCs incur the cost of underpricing and a reduced equity stake in their investments. Furthermore, several actions of young VCs distinctly differ compared to old and established VCs: young VC firms raise follow-on funds closer to the IPO, they serve on the board of directors 14 months less and the companies they back are almost two years younger. Shorter board representation is primarily regarded as the reason for the greater underpricing and smaller equity stakes held by young VC firms. Greater underpricing is also enforced due to a higher degree of asymmetric information and greater uncertainty around the IPO, i.e. especially for young portfolio companies less

[26] Gompers (1996) provides the example of Greylock Management Company, a prestigious and old VC firm which was able to collect more than USD $175 mil. in only a few months. The original target was even lower with only USD $150mil. He reports that the entirety of investors were all former Greylock investors, thus showing that established and reputable VC firms find it less complex to quickly raise large amount of capital.

[27] The average age of a portfolio company backed by a young VC firms is 56 months (median of 42 months), whereas companies financed by established VCs are on average 80 months old (median 64 months).

information is available for investors to judge their future prospects (see also Franzke (2001), Ritter (1987) and (1998).[28] In his study, underpricing for companies backed by young VCs is on average 13.6% compared to 7.3% for IPOs undertaken by mature VCs.
Gompers (1996) provides further support concerning an established VC's alleviated access to new capital. A young VC's follow-on fund has an average size of USD 77.5 mil. which is more than USD 40 mil. less than follow-on funds of old VC firms (average: USD 120.4 mil). This also coincides with the offering size of the IPOs backed by both company types.
All descriptive statistics as well as regression results are consistent with the predictions made under the grandstanding hypothesis. Further research supports these findings. Hsu (2009) finds evidence for experienced VCs with longer incubation periods earning more patents, have a higher probability of surviving and exhibit superior industry-adjusted operating performance. Lee and Wahal (2004) shed further light on the willingness of young VC firms to incur costs such as underpricing to rush their portfolio companies public so that public awareness of their financing skills is raised.

Gompers' (1996) grandstanding hypothesis serves as groundwork for this thesis. Not only many similarities to his methodology are applied but also his suggestion to further verify these findings of the poorly performing portfolio companies backed by less reputable and inexperienced VC firms in the long-run, making his investigation very valuable for this thesis.[29]

[28] Further empirical evidence and explanations on the reasons and consequences for underpricing are presented in chapter 4.4.1.
[29] The methodology of this thesis is described in detail in the next chapter.

Chapter 4: Methodology, Data Set and Performance Measures

4.1 The Data Set

This IPO sample set comprises hand-collected U.S. IPOs between 2003 and 2006. The portfolio companies are identified by screening Dow Jones Venture Source database for portfolio companies receiving their next round of financing between January 1st, 2003 and December 31st, 2006. This inconvenient way for browsing the database is owed to a missing search function for IPOs in a particular time period. For this sample a time frame of four years is chosen due to the following reasons: it is assumed that the smaller the time lag between the different IPOs of the portfolio companies, the better the possibility of achieving comparable performance evaluations since the influence of macroeconomic shocks is alleviated. A second reason is its chronological position, namely right between the financial crisis of the millennium evoked by the dot.com bubble and the real estate crisis in the United States starting in August 2007. Although firms going public in 2006 might be exposed to the financial crisis of 2007/2008 when evaluating their 3-year operating performance, an extended time period (e.g. include IPOs already initiated in 1999) for the sample would have caused even more overlaps with other external market shocks or downturns.

Following the above-mentioned methodology of screening the database in use, 143 venture-backed IPOs of portfolios are identified between August 12th, 2003 and December 20th, 2006. Subsequently, these firms were matched to the Firm Database of Initial Public Offerings (IPOs) from June 1996 through 2010 composed by to retrieve data for each portfolio company about its location, number of employees, number of financing rounds, ticker symbol, stock exchange listed, shares offered in the IPO, the initial share price, the total offer size and the 4-digit SIC.

The determination of the lead investor, which is described in section 4.2, is also undertaken using data available from Dow Jones Venture Source database. Alongside the year of incorporation, the country of origin, the main industry focus and the number of portfolio companies publicly held, the asset value of the lead Venture Capital firm is one

out of five characteristics that are collected for the investor.[30] This results in a total of 110 lead Venture Capital firms considered in this sample.

4.2 Determination of the Lead Investor

The syndication of investments in portfolio companies is a common approach by Venture Capital firms rather than investing alone. Hence, several different Venture Capital firms are involved in the financing process. To enable a comparison among the portfolio companies in terms of the investor's reputational effect, the determination of a lead investor is inevitable. According to Nahata (2008), the lead Venture Capital firm is defined as one of the first investors in the new enterprise and, moreover, takes on an outstanding role regarding the origination of the deal. The lead investor takes on a central role in the course of the whole investment process. It is considered to be not only the most active investor but also helps in professionalizing and monitoring the company, expanding the company's network and the acquisition of follow-on VC firms for subsequent syndicated investments. The lead investor is also actively involved in the company's decision making and is present through board service (Gompers (1996)).

Existing literature offers a large variety of approaches to determine a lead investor that is moreover regarded as a representative investor for the investment in the portfolio company. Barry et al. (1990) classify the lead investor as the one holding the largest stake in the pre-IPO firm plus at least one board set. In addition to that, they also regard the first Venture Capital firm providing funds to the start-up as the lead. This approach is carried over in many supporting research papers. Lee and Wahal (2004) use two different subsamples to test different lead investor definitions. Besides, following the methodology of Barry et al. (1990), they consider the oldest Venture Capital firm and the one contributing the largest total investment across all financing rounds as the lead investor.[31] In determining the lead investor, Gompers (1996) follows a different approach. He assigns the lead status to VC firms that have been on the board of the portfolio company the longest. If two or more investors have the same board duration, he designates the largest equity holder as the lead. Nahata (2008) puts his focus on the investment timing and the amount invested in the new enterprise. He considers a VC

[30] A comprehensive overview and description about all variables employed in this thesis is made available in the Appendix 2.

[31] Meggison and Weiss (1991) and Ivanov et al. (2008) proceed in the same way.

firm as the lead investor if it is involved in the first financing round and has made the largest total investment in the company across all financing rounds. The latter is rather used than the largest cumulative investment since later funding rounds usually involve greater amounts due to higher company valuations. Hence, a VC firm only participating in the last round may infuse a large amount of money and would accordingly be classified as the lead investor which would not be meaningful.

On the basis of this theoretical background, the lead investor in this thesis is determined on several assumptions and the methodology of a decision tree is applied[32]. It is assumed that participating in the first financing round is a key requirement in order to be assigned as the lead investor. Since all considered portfolio companies in this sample have achieved to go public between 2003 and 2006, the initial screening of these firms seems to be an important interim step on the way to the IPO. Therefore, if a VC firm is listed as an investor in the seed stage, it is assumed that it was already able to identify appropriately and analyze the strengths and future development of the start-up at a very early stage. A further requirement for a VC firm to be classified as the lead investor is its proceeding participation to at least one more financing round. This reveals that the VC firm is confident in its initial screening and potential analysis. If two or more VC firms are involved in the seed stage and in an equal number of subsequent financing rounds, the oldest VC firm is considered as the lead investor which is consistent to Lee and Wahal (2004). If parity among the criteria is still prevailing, the amount of assets held by the VC firm is the crucial element in determining the lead investor. The decision tree showcases that timing of the investment, i.e. early involvement, is the key criterion, followed by the number of participation rounds, the age of the VC firm and the amount of assets held as a last part of the four step decision-making process.

In case that an investor's involvement is only in the first stage but in no subsequent financing event or in addition, only individual investors contributed in the beginning, the VC firm participating in most financing rounds is regarded as the lead. If two or more investors show equal characteristics, the methodology described above is applied.

Although this classification of the lead investor is not perfect since it is contingent upon many assumptions and the lack of data that would ease its determination, it seems to be the most appropriate approach being consistent with existing literature and based on

[32] The decision tree is made available in the Appendix 3.

the data availability at Dow Jones Venture Source database. On the groundwork of the methodology described above, 110 lead investors investing in 143 investee companies are identified. The disparity in numbers simply occurs because some Venture Capital firms served as lead investors in more than one portfolio company.

4.3 Sample Division

Having identified the lead Venture Capital firm for each portfolio company, a metric signifying the reputation of the lead VC has to be identified to measure the impact of the reputation effect on the long-term operating performance for the publicly held portfolio companies. Following Gompers (1996), Sørensen (2007), Lee and Wahal (2004) and Ivanov et al. (2008) the age of the lead venture capital firm at the IPO date of the portfolio company serves as a proxy for reputation. Therefore the sample of 143 portfolio companies is decomposed into firms backed by less reputable and reputable lead Venture Capital firms. The sample is divided at a threshold defined by the median age of 21of the lead VC firms at the time of the portfolio companies' IPO. This ensures that the amount of observations for less reputable and reputable VC firms is almost equal: 75 out of 143 (52.4%) portfolio companies are backed by less reputable lead VC firms, whereby 68 out of 143 (47.6%) start-ups are financed by reputable Venture Capital firms, respectively. The applied approach is consistent with Wang, Wang, and Lu (2002) using the median age as a cutoff. An alternative approach to set the reputation boundaries is to split the sample at the mean. In this sample the average age of the lead VC firms at the IPO date is 25.57 years. Since applying the mean as a threshold would reduce the number of experienced VC firms to only 45 and simultaneously increase the number of less experienced ones to 98, equaling a balance of 68.5% less experienced and only 31.5% of experienced VC firms, it is therefore considered as less appropriate. In addition to that, the median is preferred because of being robust against extreme values.

Gompers (1996) however reports the division of his sample into two groups separated at the VC age of 6 without going further into detail. Setting the threshold at the age of 6 is not suitable for this sample since the number of less experienced VC firms would be reduced to an insufficient amount of 8 Venture Capital firms.

Nevertheless, using the age of the VC firm at IPO is an imperfect measure of reputation since an increase or decrease around the median by just one year may cause a VC firm to be classified as either less reputable or reputable. In other words, a VC firm being 20 years old at its portfolio company's IPO is viewed as less reputable, whereas a 21-year old venture capitalist at the start-up's IPO is considered as reputable. However, due to the lack of data availability more reliable and less sensitive reputation proxies such as *number of previously backed IPOs*, *capital under management* or *VC market share* could not be estimated[33]. Instead, the age of the VC firm at the IPO could easily be gathered from Dow Jones Venture Source database and is moreover a reputation proxy verified and tested by existing literature.

4.4 Performance Metrics and Research Hypotheses

In the following a comprehensive overview of all metrics to evaluate the short- and long-term operating performance of the venture-backed investee companies will be presented. While describing and explaining the performance indicators with reference to previous empirical findings, the research hypotheses[34] tested in this thesis will be postulated and justified on the basis of existing literature.

4.4.1 Underpricing at the IPO date

Underpricing[35] is a well-documented phenomenon spread all over the world when the performance of IPOs is evaluated. It is defined by estimating the spread between the closing bid- and the initial share price in relation to the initial share price.

Engelen and van Essen (2010) state that shares at the IPO are on average offered at a lower price than what the market actually thinks the shares are worth. Therefore underpricing can be regarded as a cost that companies have to bear when undertaking an IPO (Ritter (1987)). A crucial factor that drives underpricing is great ex ante uncertainty with respect to the true value of the company when going public. In

[33] To test alternative reputation proxies, a reputation index as well as a the percentage of publicly held portfolio companies by the lead venture capital firm are used serving as a robustness test.

[34] A comprising overview about all research hypotheses tested in this thesis is made available in the Appendix 4.

[35] In this thesis the term "underpricing" is synonymously used with the term initial return.

addition, Ritter (1987) and (1998) describes an important rationale for underpricing called the "winner's curse". At the time of the IPO, information asymmetry occurs when investors have differential information about the intrinsic value of the company, thus informed traders impose an adverse selection cost on uninformed traders. Since the number of shares in an IPO is usually fixed, informed investors submit a greater amount of purchase orders for underpriced offers compared to overpriced ones, thus uninformed investors face a disproportionately large fraction of overpriced offers and a small fraction of underpriced offers, respectively. This situation is also known as quantity rationing.

Hence, the more uncertainty is prevailing around the IPO, the greater the underpricing. Brav and Gompers (1999) suggest that especially firms that are younger at the IPO date, have low book-to market ratios, few tangible assets or are not in charge of top tier underwriters thus being exposed to greater underpricing.

Existing literature recommends that involving Venture Capital firms in the IPO is a way to mitigate the asymmetric information conflict since their participation in the development of the portfolio company provides a signal of superior certification and quality. Thus, the incorporation of VC firms results in lower initial returns and enhanced long-term post-IPO performance of the investee firms compared to non venture-backed initial public offerings (see Meggison and Weiss (1991) and Brav and Gompers (1997)). Moreover, Franzke (2001) suggests that due to the extensive monitoring activities of Venture Capital firms on their portfolio companies in the pre-IPO period, this control benefit might be honored by the market, thus reducing the ex ante uncertainty for potential investors and resulting in moderate underpricing compared to non venture-backed IPOs. Nevertheless, the empirical evidence concerning the benefits of the involvement of VC firms in IPOs is ambiguous. Meggison and Weiss (1991) compare venture-backed and non venture-backed IPOs in a time period of 1983 till 1987. They find evidence that the inclusion of VC firms has two important effects on the costs of going public: it significantly lowers underpricing and the underwriter compensation. They also argue that high quality underwriters and VC certification are able to reduce uncertainty. In contrast to this, there are numerous studies revealing contrasting results. A study conducted by Smart and Zutter (2003) depicts that companies backed by Venture Capital firms and underwritten by high-quality banks experience greater

underpricing at IPO than their counterparts. This result is supported by Francis and Hasan (2001) who estimate regression results indicating higher pre-market underpricing for Venture Capital-backed IPOs. Higher initial returns are observed since underwriters tend to deliberately underprice the offering in order to diminish costs evoked by after-market stabilization. Furthermore, Franzke (2001) finds evidence that especially the involvement of prestigious Venture Capital firms lead to greater underpricing. It is worth mentioning that these results were estimated in times bullish market conditions in 2001 at the Neuer Markt in Germany. Regarding the U.S. market, Gompers (1996) shows less underpricing for portfolio companies backed by reputable VC firms (7.3%) in comparison to firms backed by less reputable investors (13.6%).

Notwithstanding the ambiguous results presented above, the initial return varies heavily across countries and firms. Besides various firm characteristics, Doukas and Gonenc (2005) find evidence that the underpricing at IPO is contingent on the reputation of the Venture Capital firm and the underwriter rank. Furthermore, the recent stock market performance as well as the equity issuing activity, i.e. the differentiation between hot and cold market environments can influence the initial return.

Based ion the empirical evidence previously mentioned a hypothesis with respect to underpricing of the portfolio companies at the IPO in this thesis cannot intuitively be postulated since the results are inconclusive and heavily dependent on various external factors such as market conditions and timing of the IPO. Nevertheless, it seems suitable to assume that the inclusion of reputable or experienced investors alleviates underpricing since ex ante uncertainty is lowered. Although this thesis focuses on the long-term post-IPO performance, the portfolio companies' underpricing is in a first step estimated to draw conclusions about the level of uncertainty but mainly in order to find similarities to make comparisons to Gompers (1996).

Since this master thesis partly applies the methodology used by Gompers (1996) , the following is hypothesized:

H1: *The IPO issuers financed by reputable Venture Capital firms experience lower underpricing at the IPO date than issuer firms backed by less reputable investors.*

H1a: *The older the lead Venture Capital firm, the lower the underpricing at the IPO.*

Underpricing of the portfolio companies at the time of the IPO is calculated in order to draw inferences from the reputational effect of the corresponding VC firms about the initial return. The following formula is used to determine the initial return:

$$UP_{i,t} = \left(\frac{PC_{i,t} - IP_{i,t}}{IP_{i,t}} \right) \times 100 \qquad (1)$$

where $UP_{i,t}$ is the initial return of company (i) at the time of the IPO (t). $PC_{i,t}$ is the closing bid price of company (i) at the end of the first trading day at the IPO date. $IP_{i,t}$ is the initial offering price of company (i)'s shares. To make underpricing among the different firms comparable, it is customary to estimate the difference of the closing bid price and the initial share price in relation to the initial share price of the company multiplied with 100 to get a proportional return. Initial share prices are retrieved from the Firm Database of Initial Public Offerings (IPOs) from June 1996 through 2010 by Kenney and Patton (2013) and The Center for Research Security Prices (CRSP) at WRDS. Missing initial share prices and closing bid prices are supplemented by direct inspection of the share's recorded performance at Yahoo Finance or Google Finance.

4.4.2 Money left on the table

The going public process for a company is always accompanied with several costs. These can be decomposed in direct and indirect costs. Besides, underwriter commissions such as printing, legal and auditing expenses direct costs of going public also include other out-of-pocket costs. However, the indirect costs of an IPO are not negligible and may represent a large proportion of the overall costs. The indirect costs are also known as underpricing or 'money left on the table' (Ritter (1987)). It is estimated by calculating the spread between the closing bid and the initial share price of the firm at the IPO date multiplied by the number of shares sold. Dimovski and Brooks (2006) define this value as the amount of capital that is left by pre-owners of the company to the subscribers for the benefits that the listing may bring. It is also known as a wealth transfer from the existing shareholders to the new shareholders of the company. Loughran and Ritter (2002) figured out that during 1990-1998, more than $27 billion were left on the table by firms going public in the United States. Their results moreover reveal that the

average amount of money left on the table is only $9.1 million (median $2.3 million), thus the most money left is assigned to a minority of IPOs. It is reasonable to assume that high initial returns/ high underpricing is associated with a high amount of money left on the table which is caused by imperfect information and agency costs among firms, intermediates and investors as well as investors ex ante over-optimism in bullish markets (Su et al. (2011)).

Since the amount of money left on the table is partly contingent on the initial return of the IPO issuer, it can be conjectured on the basis of existing literature that the amount of money left of portfolio companies backed by reputable VC investors is less than the amount left by firms with less reputable VC firm involvement. Hence, the following hypothesis is tested in this thesis:

H2*: The amount of money left on the table is less for portfolio companies backed by reputable Venture Capital firms compared to IPO issuers backed by less reputable Venture Capital firms.*

H2a: *The older the lead Venture Capital firm at the IPO date, the less money is left on the table.*

The amount of capital left on the table ($MLOTT_{i,t}$) at the IPO is calculated as follows:

$$MLOTT_{i,t} = (PC_{i,t} - IP_{i,t}) \times VOL_{i,t} \quad (2)$$

where $PC_{i,t}$ is the closing bid price of company (i) at the IPO date and $IP_{i,t}$ stands for company (i)'s initial share price. The number of shares sold at the IPO is defined by $VOL_{i,t}$. Data are gathered from the IPO database of Kenney and Patton (2013) and supplemented by data retrieved at CRSP in case of missing values.

4.4.3 Tobin's Q

The market-to-book ratio is a common financial ratio employed in academic research to evaluate the performance of companies (see e.g. Loderer and Martin (1997) and Wilbon (2003). This ratio is preferentially used instead of stock prices since it accounts also for

the firm's assets and may overcome the misleading performance measured by absolute stock prices at the time of the IPO (Wilbon (2003)). The market-to-book ratio also known as the Tobin's Q is defined as the market value of outstanding financial claims in relation to the current replacement costs of the firm's assets (Tobin (1969)). It is believed that firms with a ratio greater than 1 use scarce resources more effectively than firms with a ratio below 1 (Wilbon (2003)). According to Rindermann (2003) and Baker and Wurgler (2002) Tobin's Q is moreover applied to draw a picture of the company's future investment opportunities and as an indicator of its intangible value. As a result, the higher the Tobin's Q, the higher the investors' valuation concerning the future growth prospects of the company. However, extreme values may also depict unrealistic optimism by investors and over-valuation in an industry, thus fostering inefficient investment decisions and leading to poor performance.

Dushnitsky and Lenox (2006) find evidence that contemporaneous Venture Capital investments have a positive impact on the future value of the Tobin's Q. These findings are supported by Jain and Kini (1995) showing that the market-to-book ratio of VC-backed firms is significantly higher throughout a four-year time frame. Portfolio companies backed by VC firms intuitively show high growth opportunities. This is often related to the excellent screening abilities of VC firms to pick out firms exhibiting solely excellent future prospects as well as the investee companies' affiliation to fast growing and high-tech industries. Therefore it is assumed that the inclusion of a reputable VC firm has an even stronger impact on the Tobin's Q in contrast to portfolio companies backed by less reputable investors. This is because reputable investors are supposed to be more experienced and have better screening and monitoring abilities, thus increasing the value of the company and making it more attractive to other potential investors. Hence, the following hypothesis is postulated:

H3: *Portfolio companies backed by reputable investors have a higher Tobin's Q compared to portfolio companies backed by less reputable Venture Capital firms.*

H3a: *The higher the age of the lead Venture Capital firm at the IPO of its portfolio company, the higher is the portfolio company's Tobin's Q.*

The estimation of the market-to-book value signifying the Tobin's Q follows the approach by Ivanov et al. (2008). Therefore the book value of the firm's equity is calculated as the sum of the stockholders' equity, balance sheet deferred taxes and investment tax credit minus the book value of preferred stock. The market value is defined as the number of shares outstanding multiplied by the closing bid stock price.

$$Tobin's\_Q_{i,t} = \frac{SEQ_{i,t} + TXDITC_{i,t} - PSTK_{i,t}}{CSHO_{i,t} \times PRCC_{i,t}} \quad (3)$$

All data is retrieved from COMPUSTAT using annually data. To check the estimated market value on consistency the item MKVALT is additionally gathered from COMPUSTAT. All abbreviations used in the formula stated above are the corresponding item names listed on COMPUSTAT. $SEQ_{i,t}$ stands for the stockholders' equity at the end of each observed year. The balance sheet deferred taxes and investment tax credit is defined by $TXDITC_{i,t}$. $PSTK_{i,t}$ represents the book value of preferred stock in total at the end of each observation year. As mentioned above, the market value is computed by the number of common shares outstanding ($CSHO_{i,t}$) and the closing bid price at the end of the year ($PRCC_{i,t}$).

4.4.4 Industry-adjusted Return on Assets

The fourth long-term operating performance measure employed in this thesis is the industry-adjusted Return on Assets (ROA). Numerous empirical studies (see e.g. Brown (2005), Jain and Kini (1994), Field and Karpoff (2002)) make use of this profitability ratio to evaluate firm performance and efficiency. In particular, the return on assets provides investors with information on the management's managerial abilities and the return generated by each unit of assets invested. In other words, the return on assets is a key measure in evaluating the efficiency of asset utilization and the profitability per dollar of assets (Yap (2009)). It is defined as the net income of a company divided by its total assets. Although this ratio is widely used in the empirical analysis of performance, research also demonstrates that the ROA might be a misleading performance tool since it is prone to manipulation. Teoh, Welch, and Wong (1998) and Burgstahler and Eames (2006) reveal that firms in the time around the IPO try to exploit legitimate accounting

choices and take actions to upward earnings management to enhance their operating performance artificially and attract investors. Financial ratios, such as the ROA can indeed be negative for young and risky firms since their net income is usually negative in the first years. [36]

The fact that young firms often report negative earnings, especially in their early years, explains their negative ROA-ratios. Tian[a] (2011) shows evidence by evaluating different profitability ratios for syndicated Venture Capital deals. Estimated on a three year basis and with respect to the full sample, syndicated deals display continuously negative return on assets ranging from -2.56% to -5.22%. This result is supported by Jain and Kini (1994) even though they do not distinguish between venture-backed and non venture-backed IPOs. Industry-adjusted returns on assets vary between -3.58% in the year prior to the IPO and up to -10.53% in the second year after going public. They explain this tremendous downturn by increased agency costs since management ownership is reduced and the effect of window-dressing which is caused by managers poshing up accounting numbers prior to the IPO. A research paper conducted by Brown (2005) furthermore depicts a difference in ROA for venture-backed and non venture-backed IPOs. The average and median return on assets is lower for venture-backed portfolio companies, however this difference is not statistically significant.

Since academic research on firm performance measured by ROA and being contingent on the age of the lead venture capital firm as a proxy for reputation is very limited, postulating a research hypothesis seems not intuitive. Nevertheless it is assumed that the inclusion of reputable VC firms serves as a benefit regarding firm performance in contrast to firms backed by less reputable investors. Due to the monitoring abilities of reputable investors it is believed that firm performance will be enhanced.

H4: *Firm performance measured by industry-adjusted ROA is on average higher for portfolio companies backed by reputable investors in contrast to firms backed by less reputable VC firms.*

[36] To overcome problems associated with the inflation of assets due to the initial public offering, this thesis applies the profit margin defined by EBITDA/Sales of a portfolio company on a three-year average basis. The methodology is described in section 4.4.5.

H4a: *The age of the Venture Capital firm has a positive impact on post-IPO operating performance measured by the industry-adjusted ROA.*

The return on assets is calculated dividing the net income by the total asset value at 3 different points of time. The ROA is estimated at the end of the first full year after the IPO (t_1) as well as at the end of the second (t_2) and the third (t_3) year. In addition, a three-year average is also calculated taking the average of t_1, t_2 and t_3. To make the ROA comparable across firms and different industries, the industry average ROA is deducted from the company's ROA (see e.g. Yap (2009)). However, this thesis uses the mean rather than using the median which is frequently proposed and applied in other studies. As data for the portfolio companies' affiliated industry were unavailable, the average industry ROA is estimated by constructing industry portfolios from the S&P500 and Nasdaq 100 Composite Index based on the 2-digit SIC Code. As a result, 25 portfolios are set up, each as a proxy for one industry. The ROA is estimated using the following formula:

$$industry\_adj.\_ROA_{i,t} = \left(\frac{NI_{i,t}}{AT_{i,t}}\right) - industry\_ROA \qquad (4)$$

where $NI_{i,t}$ is the net income of company (i) at the end of the considered year. The company's total assets is defined as $AT_{i,t}$ and is also retrieved for the particular observation year. Data is gathered entirely from COMPUSTAT using annual data.

4.4.5 EBITDA/Sales and EBITDA/Assets

Besides the industry-adjusted return on assets described above, EBITDA/Assets - another accounting profitability ratio- is added to check the results obtained for the ROA on consistency since this ratio is also based on value of a firm's total assets. Moreover, the financial ratio EBITDA/Sales is incorporated as a measure of performance in the empirical analysis to overcome the problems of asset-based ratios as described in the previous section. These two performance proxies are also used by Tian (2011) to compare the post IPO operating performance of Venture Capital-backed firms. He reports positive values for both ratios, however syndicated VC deals underperform in

comparison to their non-syndicated counterparts. In addition to that, Ahmand-Zaluki (2008) makes use of similar ratios but takes the operating income instead of EBITDA as the numerator. Since academic research suggests that firms backed by more reputable VC firms on average perform better than their counterparty backed by less reputable VC firms, this also holds with respect to the financial ratios described in this subsection. Therefore, the following hypothesis is postulated and tested in this thesis:

H5: *The profit margin of companies backed by reputable VC firms is superior on a three-year average basis compared to portfolio companies backed by less reputable VC firms.*

H5a: *The return on assets based on EBITDA is higher for portfolio companies backed by reputable VC firms on a three-year post-IPO average basis compared to portfolio companies backed by less reputable investors.*

H5b: *The age of the lead VC at the IPO has a positive impact on the portfolio company's profit margin and the ROA based on EBITDA.*

The two ratios are calculated as follows:

$$\Pr ofit\_margin_{i,t} = \frac{EBITDA_{i,t}}{Sale_{i,t}} \quad (5)$$

$$EBITDA\_ROA_{i,t} = \frac{EBITDA_{i,t}}{AT_{i,t}} \quad (6)$$

Data to estimate these ratios are available at COMPUSTAT. $EBITDA_{i,t}$ is defined as the earnings before interest, taxes, depreciation and amortization for company (i) at time (t), whereas $Sale_{i,t}$ is the corresponding COMPUSTAT item as a deputy of total sales. The firm's total assets are retrieved under the item $AT_{i,t}$ already used in previous calculations. These two profitability ratios are estimated based on a three-year average

including values for the first complete year after the IPO until the end of the third post-IPO year.

4.4.6 Stock returns and Wealth Relatives

The last two indicators to measure the differences in post-IPO operating performance of portfolio companies backed by less reputable and reputable VC firms are stock returns estimated at three different points of post-IPO time and Wealth Relatives which compare the buy-and-hold return (BHR) of a stock to a benchmark's BHR. This approach is widely employed in empirical research (see e.g. Ritter (1991), Brav and Gompers (1997), Ber, Yafeh, and Bank Yisrael (2003), Loughran and Ritter (1995) and Bessler and Seim (2011)).

However, existing literature focuses predominantly on the comparison of venture-backed versus non venture-backed firms which exacerbate inferences on the reputation effect of VC firms when matching only venture-backed IPOs. Nevertheless, this thesis attempts to use prior research on IPOs in order to draw meaningful conclusions concerning the investigated topic.

Loughran and Ritter (1995) analyze the five-year post-IPO performance of firms going public between 1970 and 1990 and find out that investors only gain an average annual return of 5 percent instead of 12 percent when investing in non-issuing firms. This substantial underperformance may be explained by misevaluation and excessive ex ante optimism, hence issuing firms cannot sustain their high expectations in the market. In addition to that, Brav and Gompers (1997) replicate the results described above but set the focus on a comparison of venture and non venture-backed IPOs and conclude that portfolio companies with VC affiliation significantly outperform non venture-backed firms. Moreover, they reveal that especially small, low book-to-market firms show underperformance caused by unexpected market shocks and investor sentiment since in small IPOs individual investors usually hold large stakes. Regarding their results on stock performance, they estimate returns of 44.6% over five years for VC-backed IPOs while non venture-backed IPOs perform worse, providing investors with returns of only 22.5%.

The outperformance of VC-backed IPOs is further supported by Bessler and Seim (2011) considering IPOs in Europe between 1996 and 2001. Their empirical findings provide

evidence that investors can generate positive returns by investing in companies financed by Venture Capital firms in the long- and short-run since initial returns, those in the year subsequent to the IPO and even three-year post IPO returns remain positive. Interestingly, returns decline but remain positive at the expiration of the lock-up period when Venture Capital firms are allowed to exit the investment.

Another study conducted by Ber, Yafeh, and Bank Yisrael (2003) investigates the performance of VC-backed and other IPOs of Israeli companies in the 1990s and shows contrary results. When comparing cumulative abnormal returns of the two different categories against the Nasdaq Index, no significant difference is found between venture and non venture-backed IPOs. However, it becomes obvious that both IPO types underperform the benchmark in the observed time interval.[37]

H6: *Portfolio companies backed by reputable VC firms portfolio companies backed by less reputable VC firms in the first, second and third year after the IPO with respect to BHR.*

H6a: *The older the lead VC firm at the IPO, the higher the portfolio company's one-, two-, and three-year BHRs.*

Besides considering stock returns to measure post-IPO performance, Ritter (1991), Loughran and Ritter (1995) as well as Kraus and Burghof (2003) compute wealth relatives to alleviate the comparison of different buy-and-hold returns against a benchmark index.

Loughran and Ritter (1995) report overall three-year wealth relatives of 0.80, thus IPOs between 1970 and 1990 underperformed their benchmark. When extending the observation window to five years, wealth relatives decline to only 0.70. This is consistent with earlier studies conducted by Ritter (1991) and Brav and Gompers (1997) showing long-run underperformance of IPOs. Further evidence is found regarding the performance of venture-backed IPOs on Germany's Neuer Markt (Kraus and Burghof (2003)). Stocks of companies that went public between 1997-2002 lost 34% over 50 trading weeks. In addition to that, wealth relatives declined from 0.86 after

[37] For similar results please also refer to research by Wang, Wang, and Lu (2002).

two years of observation to 0.67 after 50 weeks in comparison to the Nasdaq Composite Index.

The empirical findings described above clearly show that firms perform worse when compared to a benchmark after going public. Hence, the same phenomenon is assumed to be observable when comparing VC-backed IPOs with affiliation to Venture Capital firms of different reputation. However, since some IPOs were undertaken in 2004 when favorable economic conditions until the beginning of the financial crisis in 2007 were present, it is conjectured that these firms showed considerably superior performance than firms going public in 2006. Moreover, it is assumed that companies undertaking their IPO in 2006 show negative long-term operating performance especially with regard to two- and three-year stock returns due to dramatic market downturns.[38] Furthermore, it is investigated if the age of the lead Venture Capital firm influences the portfolio company's performance against a benchmark.

H7: *Wealth Relatives for portfolio companies backed by reputable investors are on average significantly higher than those of firms backed by less reputable investors.*

H7a: *The age of the lead Venture Capital firm at the IPO has a positive impact on the portfolio company's Wealth Relatives*

In this study returns are calculated on a monthly basis for the first, second and third year after the IPO making use of the following formula, where $P_{i,t1}$ is the share price at the end of each month and $P_{i,t0}$ stands of the share price at the beginning of the month for company (i).

$$R_{i,t} = \frac{P_{i,t1} - P_{i,t0}}{P_{i,t0}} \qquad (7)$$

To compare the returns of the portfolio companies against a benchmark, abnormal returns (AR) are estimated for each month based on the company's return described above. This methodology is identical to the performance evaluation undertaken by

[38] Between April 2006 and April 2009 the S&P500 index lost approximately 45% of its value, whereas the Nasdaq 100 Composite index declined about 24.2% in the same time, respectively.

Doukas and Gonenc (2005). The abnormal return for each company and month over the benchmark is calculated as follows:

$$AR_{i,t} = R_{i,t} - R_{m,t} \tag{8}$$

where $R_{i,t}$ is the company's return and $R_{m,t}$ the return of the benchmark. This thesis follows the approach of Brav and Gompers (1997) and uses the S&P500 and the Nasdaq 100 Composite Index as a benchmark.

The cumulative abnormal return (CAR) over a time period of T months is defined as the sum of all abnormal returns of a stock for each company (i) and is calculated with the below-mentioned formula:

$$CAR_{i,t} = \sum_{t=1}^{T} AR_{i,t} \tag{9}$$

Negative cumulative abnormal returns show underperformance of the stock against its benchmark. However, due to high volatility among the stock returns of the portfolio companies considered, the results of the CAR estimation should be taken with caution since extreme fluctuations in returns of sometimes far more than 100% bias the results enormously.

To evaluate the stock performance of each company over a time period of one, two and three years after going public, buy-and-hold returns are estimated on the basis of monthly stock returns using the following product functions:

$$BHR_{i,t} = \prod_{t=1}^{T}\left(1 + R_{i,t}\right) - 1 \tag{10}$$

$$BHR_{m,t} = \prod_{t=1}^{T}\left(1 + R_{m,t}\right) - 1 \tag{11}$$

The BHRs are calculated for each portfolio company contingent on data availability of the two benchmark indices. Hence, $R_{i,t}$ is the monthly stock return of company (i) and $R_{m,t}$ stands for the return of each index at the same time interval.

An alternative ratio to measure a company's stock performance over a predefined timeframe against a benchmark is known as the Wealth Relative (WR) of a stock. The WR is defined as the BHR of a stock in relation to the BHR of the benchmark index. A ratio is greater than one indicates an outperformance of the company's stock against the benchmark and vice versa. A WR of exactly one shows that the stock and the index provided an investor with the same return over the observation window. Wealth Relatives are estimates as follows:

$$WR_{i,t} = \frac{\prod_{t=1}^{T} 1 + R_{i,t}}{\prod_{t=1}^{T} 1 + R_{m,t}} \qquad (12)$$

In contrast to the BHR of the different stocks, the WRs are estimated for a maximum of 36 months or the maximum number of months of data availability, i.e. no distinction between first, second and third year post-IPO performance is made.[39]

Data for all performance ratios are retrieved from CRSP. Missing data are supplemented making use of the databases available at Yahoo Finance and Google Finance as well as for checking the data on consistency.

[39] This approach is also used by Brav and Gompers (1997) when estimating returns over a 5 year period for venture and non venture-backed IPOs.

Chapter 5: Empirical Analysis

5.1 Univariate Analysis, Descriptive and Inferential Statistics

In the following sections the results of the univariate analysis as well as descriptive and inferential statistics are presented. As a first step, characteristics of the selected portfolio companies and their corresponding lead investors are presented. The post-IPO operating performance analysis is subsequently shown using descriptive and inferential statistics with respect to the performance metrics explained in chapter 4.4.

5.1.1 Characteristics Portfolio Companies

The entire sample of portfolio companies is composed of 143 firms with an IPO date between 2003and 2006.[40] Table 1 provides an overview about various firm characteristics for the entire sample. As data for some firm specific variables are not reported by Dow Jones Venture Source, the number of observations is correspondingly less.

On average every portfolio company experiences 5.76 financing rounds until its IPO. Interestingly, 15 out of 143 portfolio companies received only 2 financing rounds, whereas the IPO itself is also considered as a financing round. Hence, the capital that has already been provided at the seed stage must have been a considerable amount.

Descriptive Statistics Portfolio Companies									
full sample	# financing rounds till IPO	Employees	IPO Year	Age at IPO (in years)	CEO stake (in %)	founder stake (in %)	Shares Offered	Initial Share Price (in US $)	Offer Size (in US $)
MEAN	5,76	415	2005	9.56	7.60	13.21	7,730,881	12.40	111,190,773
MEDIAN	6	146	2005	7.00	3.80	8.80	5,857,224	11.50	66,000,000
MODE	6	134	2006	7.00	2.70	2.20	6,000,000	7.00	35,000,000
QUARTIL 25%	4	75	2004	5.00	2.48	3.70	4,700,000	8.00	42,000,000
QUARTIL 75%	7	310	2006	9.50	8.41	18.20	7,300,000	15.00	99,575,000
QUARTIL EXKL. 25%	4	75	2004	5.00	2.43	3.69	4,700,000	8.00	42,000,000
QUARTIL EXKL. 75%	7	313	2006	10.00	8.42	18.42	7,500,000	15.00	100,750,000
MIN	2	17	2003	2.00	1.00	1.30	2,100,000	5.50	12,600,000
MAX	16	7700	2006	76.00	57.20	63.50	70,600,000	85.00	1,666,429,420
STDEVIATION	2.42	951	0.88	9.25	10.31	13.74	7,917,798	7.56	185,717,769
# of observations	143	143	143	143	120	89	143	143	143

TABLE 1: DESCRIPTIVE STATISTICS ON THE FULL SAMPLE OF VC-BACKED PORTFOLIO COMPANIES[41]

[40] Only 3 companies were identified that have gone public in 2003. Due to this small number year-based descriptive statistics are never reported.

[41] Year-based descriptive statistics for portfolio companies are made available in the Appendices 5,6 and 7.

Regarding the number of employees at the time of the IPO it becomes obvious that some firms with a large number of employees markedly bias the mean. Although the portfolio companies considered have an average number of 415 employees, the median amounts to only 146 employees. A swift look on the maximum number clears the picture since at least for one company 7,700 employees are reported.

At the time of the IPO the founder and the CEO of the company which is in many cases not the same person, often hold a considerable stake. The data reveals that the stake of the founder is larger than the stake held by the CEO. This is true for the mean and the median. The initial share price in this sample is on average set at $12.40 with a median initial price of $11.50. These relatively moderate prices might be an indicator for attracting new investors since high initial prices might deter investors from buying the stock.[42]

Taking a closer look at the offer size of the IPOs the results look similar to those on the employees. Several IPOs with extreme large offer sizes bias the mean so that the median displays a more meaningful picture. Google Inc. performed the largest IPO in this sample with an offer size of more than $1.6 billion.

The average year of incorporation[43] of the sample's companies is 1995 with a median year of 1998. Portfolio companies are on average 9.56 years old when they go public.[44] The median age when going public is 7.00 years and is a more reasonable proxy because some companies with considerable high ages at their IPO seem to distort the mean upwards

The following two tables provide an overview about the various firm characteristics for portfolio companies backed by less reputable and reputable venture capitalists. The p-values for testing the mean on significance are shown in table 4. It can be concluded that the two firm types differ only significantly in terms of employees and their age at the IPO date being significant at the 5% and 10% level, respectively. Furthermore, the

[42] The average initial share price of all IPOs listed in the IPO database of Kenney and Patton (2013) is $13.24 with a median initial share price of $13.00. These values are close to the estimated mean and median for the sample used in this thesis. Therefore it can be concluded that the VC-backed IPOs considered here do not significantly differ from other IPOs in terms of the initial share price. The same is true with regard to the offer size oft he IPOs.

[43] This result is not reported in tables. Data for the year of incorporation is retrieved from Kenney and Patton (2013).

[44] The age of the portfolio company is determined by retrieving its year of incorporation and then estimating its difference until the IPO year.

variables *# financing rounds* and *Offer Size* are very close to the 10% significance level. The averages of all other variables, except the *IPO year* and *Shares Offered* (0.16 and 0.14, respectively) are far from being significantly different from each other. Nevertheless, some inferences can be drawn from those inferential statistics: portfolio companies financed by reputable investors seem to have fewer employees and receive on average one more round of capital infusion. Since new capital commitments by VCs are often contingent on intermediate goals that investee companies have to achieve, a higher number of financing rounds could be a sign for reputable VCs following a more cautious strategy when it comes to the infusion of new money. The more milestones are set, the more information will be revealed to an investor. And since investors reasonably base their investments on information, an additional infusion of capital could signalize an investor's confidence in growth opportunities and future earnings of the firm she invests in (Sahlman (1990)).

Descriptive Statistics of Portfolio Companies with less reputable VC-backing									
less reputable	# financing rounds till IPO	Employees	IPO Year	Age at IPO (in years)	CEO stake (in %)	founder stake (in %)	Shares Offered	Initial Share Price (in US $)	Offer Size (in US $)
MEAN	5.45	560.84	2004.88	10.75	7.74	13.47	8,634,300	12.81	134,354,375
MEDIAN	5	142	2005	7.00	3.60	7.45	6,000,000	11.00	65,000,000
QUARTIL EXKL. 25%	4	73	2004	5.00	2.37	3.32	5,000,000	8.00	40,799,990
QUARTIL EXKL. 75%	7	330	2006	10.00	8.53	19.21	7,950,000	16.00	120,191,160
MIN	2	17	2003	2.00	1.00	1.30	2,400,000	6.00	19,200,000
MAX	11	7700	2006	76.00	57.20	63.50	70,600,000	85.00	1,666,429,420
STDEVIATION	2	1266.40	0.85	11.87	10.64	15.45	9,814,853	9.68	239,731,312
# of observations	75	75	75	75	59	44	75	75	75

TABLE 2: DESCRIPTIVE STATISTICS FOR PORTFOLIO COMPANIES BACKED BY LESS REPUTBLE VC FIRMS

Descriptive Statistics of Portfolio Companies with reputable VC-backing									
reputable	# financing rounds till IPO	Employees	IPO Year	Age at IPO (in years)	CEO stake (in %)	founder stake (in %)	Shares Offered	Initial Share Price (in US $)	Offer Size (in US $)
MEAN	6.10	251.87	2005.09	8.25	7.45	12.96	6,734,464	11.94	85,642,684
MEDIAN	6	150	2005	7.00	3.90	10.00	5,650,000	12.00	68,650,000
QUARTIL EXKL. 25%	4	78	2004	5.00	2.45	4.42	4,500,000	9.00	42,125,000
QUARTIL EXKL. 75%	7	271	2006	9.00	8.42	17.80	6,537,500	15.00	93,437,500
MIN	2	17	2003	2.00	1.00	1.60	2,100,000	5.50	12,600,000
MAX	16	1416	2006	30.00	55.17	55.17	31,250,000	25.00	560,500,000
STDEVIATION	2.41	284.53	0.91	4.74	10.07	12.02	4,954,948	4.16	91,443,472
# of observations	68	67	68	68	61	45	68	68	68

TABLE 3: DESCRIPTIVE STATISTICS FOR PORTFOLIO COMPANIES BACKED BY REPUTABLE VC FIRMS

In this thesis, the results concerning the offer size of the IPOs and the age at the IPO date however differ from findings made my Gompers (1996). This is of particular importance since this thesis is closely related to his methodology, thus a comparison of the results is of great interest.

He finds a significant difference in the offer size of firms backed by experienced and less experienced VC firms.[45] In addition, he reports that firms backed by reputable VC firms are significantly older at their IPO compared to firms backed less reputable VC firms supporting his grandstanding hypothesis. This phenomenon is not found regarding the data used in this thesis. Firms backed by reputable VCs are significantly younger (mean: 8.25 years, median: 7.00 years) compared to firms backed by less reputable VCs (mean: 10.75 years, median: 7.00 years). The difference is significant at the 10% level.[46] Although the absolute values estimated for the age of the portfolio companies more or less coincide with findings from Gompers (1996), the significance tests do not support his findings and the grandstanding hypothesis.

Significance Tests for Characteristics of Portfolio Companies		
p-values	less reputable vs. reputable	#
# financing rounds	0.11	143
Employees	0.04**	142
IPO Year	0.16	143
Age at IPO	0.09*	143
CEO stake	0.88	120
Founder Stake	0.86	89
Shares Offered	0.14	143
Initial Share Price	0.48	143
Offer Size	0.11	143

*,**, and *** denote coefficient estimates for significance of no difference in means of portfolio companies backed by reputable reputable VC firms 10%, 5% and 1% levels respectively.

TABLE 4: SIGNIFICANCE TESTS ON MEANS FOR CHARACTERISTICS OF PORTFOLIO COMPANIES BACKED BY LESS REPUTABLE AND REPUTABLE VC FIRMS

5.1.2 Characteristics of lead Venture Capital Firms

Following the methodology of determining the lead investor described in chapter 4.2., the sample is composed of 110 individual lead venture capitalists backing 143 portfolio companies. 26 Venture Capital firms are identified twice or more as a lead investor. The VC firms that appeared more than once in the sample are still treated as individual observations since the presence of a lead investor is required for every IPO in my

[45] Average and median values are significantly higher for firms with reputable VC affiliation ($ 21.8 mil versus $16.1 mil for averages and $16.8 mil versus $11.5 mil for median values. Although, the average offer size of firms backed by less reputable VC firms is much higher in this sample, the difference can be explained by the large IPO of Google Inc. which drives the calculations. Taking only median values into account, only a small delta is observed. Anyhow, this fining is contrary to Gompers' (1996) results irrespective of the statistical technique used.

[46] Although averages might be biased by extreme values and medians are identical, the results do not change when adjusting the data for outliers.

sample. The data reveals that the average year of incorporation is 1979 with a median of 1984, thus VC firms are on average 33.58 years old with respect to the current year 2013. Moreover, the average year of the lead investor at the time of the IPO is 25.56 years for the entire sample (median age is 21).

Descriptive Statistics Venture Capital Firms					
full sample	year founded	Age (from today)	Age (at IPO) Year	Assets (in mil US $)	% of PFC publicly held
MEAN	1979	33.58	25.56	4,889.83	18.78%
MEDIAN	1984	29	21	1,550	18.28%
MODE	1985	28	23	4,000	12.50%
QUARTIL 25%	1977	21	21	475	12.50%
QUARTIL 75%	1992	36	28	3,400	24.62%
QUARTIL EXKL. 25%	1976	21	12	425	12.50%
QUARTIL EXKL. 75%	1992	37	28	3,400	24.62%
MIN	1796	10	3	26	3.57%
MAX	2003	217	210	159,000	43.86%
STDEVIATION	27	27.34	27.52	15137.33	8.62%
# of observations	143	143	143	136	143

TABLE 5: DESCRIPTIVE STATISTICS ON THE FULL SAMPLE OF VC FIRMS

The median, as previously described, is applied as the threshold to divide the sample into less reputable and reputable Venture Capital firms as it is robust to extreme values. Regarding the amount of assets held by each VC firm, the utilization of the median again seems likely to be a more meaningful since the mean ($4,889.83 mil.) is distorted by extreme high and low asset values.

Primary Industry Focus of Venture Capital Firms (full sample)				
Industry	less reputable	reputable	#	in % of total
Business and Financial Services	3	0	3	2.16%
Biopharmaceuticals	4	0	4	2.88%
Communications and Networking	0	1	1	0.72%
Consumer Goods	0	1	1	0.72%
Consumer Services	6	1	7	5.04%
Healthcare	21	9	30	21.58%
Information Technology	31	44	75	53.96%
Medical Devices and Equipment	2	0	2	1.44%
Medical Software and Information Services	2	6	8	5.76%
Personal Goods	2	0	2	1.44%
Renewable Energy	0	2	2	1.44%
Energy and Utilities	2	2	4	2.88%
total	73	66	139	100%

TABLE 6: DESCRIPTIVE STATISTICS ON THE INDUSTRY FOCUS FOR THE FULL SAMPLE OF VC FIRMS

The table above provides information about the primary industry focus of the venture capitalists according to Dow Jones Venture Source. Although a VC firms usually invests in companies across several different industries, only the first mentioned industry listed

in the database is considered to provide a reasonable picture. The data reveal that healthcare and information technology represent the dominant industry sectors. These findings are consistent with information provided in a report published by the Venture Capital Association (2011). Moreover, these results coincide with the fact that VCs tend to focus on high-risk industries offering high growth potential.

Taking a closer look at the differences between firms backed by less reputable and reputable VC firms[47] a significant difference at the 1% level is observed regarding the year of incorporation, the age at IPO and the age calculated with respect to 2013. However, no significant difference is found when investigating the amount of assets held. Less reputable and reputable VC firms hold almost an equal number of assets when accounting for the mean, though the median depicts another picture. Assets held by less reputable VC firms are far less compared to assets held by reputable investors. Moreover, the standard deviation is twice as high for less reputable investors.

Characteristics Venture Capital Firms										
less reputable vs. reputable	year founded less reputable	year founded reputable	Age (at IPO) Year less reputable	Age (at IPO) Year reputable	Age less reputable	Age less reputable	Assets (in mil US $) less reputable	Assets (in mil US $) reputable	% of PFC publicly held less reputable	% of PFC publicly held reputable
MEAN	1989	1969	13.53	38.85	24.43	43.68	4,467	5,394	17.61%	20.07%
MEDIAN	1989	1978	13	30.50	24	34.50	800	2,700	16.67%	18.74%
STDEVIATION	8.40	36.19	5.24	35.01	8.40	36.19	18,780	9,193	9.07%	7.95%
ttest	0.00***		0.00***		0.00***		0.71		0.09*	
# of observations	75	68	75	69	75	68	74	62	75	68

*,**, and *** denote coefficient estimates for significance of no difference in means for less reputable and reputable VC firms at the 10%, 5% and 1% level respectively.

TABLE 7: SIGNIFICANCE TESTS FOR CHARACTERISTICS OF REPUTABLE AND LESS REPUTABLE VC FIRMS[48]

The number of portfolio companies publicly held is defined as the ratio of publicly held firms in relation to all portfolio companies' investments. In this case, mean and median appear to be meaningful since their difference is relatively small and the standard deviation is modest. This variable is moreover used later on as an additional proxy for reputation in the regression analysis. Retrieved data show that the difference in means of publicly held portfolio companies by less reputable and reputable VC firms is significantly different at the 10% level. The variable does not seem to be biased as much

[47] A more detailed overview in the fashion of table 5 for reputable and less reputable Venture Capital firms is available in Appendices 8 and 9.

[48] Table 7 reports the differences regarding the characteristics of 143 less reputable and reputable Venture Capital firms. The t-test for the no difference test in means and to determine coefficient estimates for significance. The test uses a two-sides distribution and assumes unequal variances.

as variables mentioned before due to moderate standard deviations and small differences between mean and median. Accordingly, this variable can be used to proxy a venture capitalist's experience and reputation since an IPO is the strongest and most effective signal to persuade investors of the VC's abilities and the true value of the portfolio company (Gompers (1996)).

5.1.3 Descriptive Statistics and Significance Tests of Performance Indicators

To make post-IPO operating performance comparable among the portfolio companies backed by investors of two different types of reputation, the performance indicators described in chapter 4.4 are applied for the sample. As first step, underpricing at IPO as a performance measure is evaluated since this is the first performance proxy attainable when drawing a virtual timeline from the IPO onwards into the future.

The following table presents the results calculated for the full sample with respect to underpricing and money left on the table.

Underpricing and MLOTT		
full sample	Underpricing	MLOTT
MEAN	11.98%	14,519,426
MEDIAN	4.13%	606,743
STDEV	19.88%	41,471,144
MIN	-29.55%	-72,736,865
MAX	94.15%	343,629,749
25% Quartil EXKL	0.00%	0.00
75% Quartil EXKL	19.06%	12,414,177
# of observations	143	143

TABLE 8: UNDERPRICING AND MONEY LEFT ON THE TABLE FOR THE FULL SAMPLE OF PORTFOLIO COMPANIES

The average percentage of underpricing at the IPO date for all portfolio companies that went public between 2003 and 2006 is 11.98%.[49] Interestingly, this sample mirrors the real world pretty accurate. According to IPO data collected and estimated by Ritter (2013), the average underpricing for the years 2003-2006 is 11.68% which is very close to the estimated initial returns shown above. However, the median shows a remarkably lower value since very high and low initial returns ranging from -29.55% up to positive 94.55% distort the average value. The same holds true for setting the focus on the

[49] Tables showing the descriptive statistics for the IPO years 2004, 2005 and 2006 are available in Appendices 10,11 and 12.

amount of money left on the table or in other words, the wealth transfer from existing to new shareholders. The average amount is by far larger than the estimated median which is obviously caused by outliers. Google Inc. not only accounts for the largest offer size, it is also in the vanguard when it comes to the amount of money left. In the Google Inc. IPO $343.63 mil were gained by new shareholders. However, Google Inc. is not leading with respect to the highest initial return which could be assumed since MLOTT and the initial return are closely linked. Under Armour Inc., a famous US apparel clothing company shows the highest initial return in the considered sample. The amount of money left is an impressive $220.6 mil. Nevertheless, the results estimated are close to previous empirical findings. Loughran and Ritter (2002) estimated an average wealth transfer of $9.1 mil for each IPO and a considerably lower median amounting to only $2.3 mil. In addition, the 75% quartile reveals that three-fourth of the full sample in this thesis are below $12.41 mil., hence the estimated results are even closer to the empirical results just presented.

Underpricing and MLOTT				
full sample	Underpricing less reputable	Underpricing reputable	MLOTT less reputable	MLOTT reputable
MEAN	12.80%	11.08%	19,451,879	9,079,220
p-value	*0.60*		*0.12*	
MEDIAN	10.21%	3.42%	755,626	389,802
STDEVIATION	21.26%	18.36%	52,761,214	22,654,161
MIN	-29.55%	-12.65%	-31,171,795	-72,736,865
MAX	94.15%	76.23%	343,629,749	99,477,285
# of observations	75	68	75	68

*,**, and *** denote coefficient estimates for significance of no difference in means of portfolio companies backed by reputable and less reputable VC firms 10%, 5% and 1% levels respectively.

TABLE 9: UNDERPRICING AND MONEY LEFT ON THE TABLE FOR THE FULL SAMPLE

A comparison of the variables *underpricing* and *money left on the table* among portfolio companies financed by less experienced and experienced VC firms depicts that no significant difference of the means can be found. However, the amount of money left at the IPO is very close the 10% significance level.[50] It also demonstrates that the wealth transfer to new investors for firms backed by less reputable VCs is much higher. This is

[50] When adjusting the sample for outliers using the z-score methodology, the difference becomes even more insignificant. Concerning underpricing and MLOTT, the values of two companies for each variable had to be eliminated due to extreme values. The result on the adjusted sample is presented in Appendix 13.

true when looking at the outlier-sensitive median value. The underpricing at IPO is almost the same for both subsamples. The difference is not statistically significant and more or less mirrors the returns estimated by Ritter (2013). These results indeed contradict the findings made by Gompers (1996) who found that especially companies backed by less reputable investors are significantly more underpriced (13.6% versus 7.3%) at IPO. However, the median in this sample (3.42%) depicts that the underpricing for firms with reputable VC-backing is by far less compared to their counterparts. This median is also close to the median estimated by Gompers (1996) with respect to the firms with reputable VC affiliation (2.7%) Therefore hypothesis 1 can be rejected since there is no significant difference regarding underpricing and the amount of money left on the table at the IPO between portfolio companies backed by experienced and less experienced VC firms.[51] Nevertheless, the average and median underpricing is lower firms with reputable VC affiliation. Besides the insignificant differences of the averages, this result remains robust when splitting the sample into subsamples contingent on the IPO year of the portfolio companies. Calculations are performed on raw as well as adjusted data. Underpricing and MLOTT for firms backed by reputable VCs is less for 2004 and 2005 with respect to the mean and the median, though never statistically significant. The pattern reverses when setting the focus solely on 2006. Although results are not significant, the initial return and the amount of money left are lower for companies with less experienced VC affiliation.[52] Hence, hypothesis 2 is rejected due to insignificant differences in means when comparing both company types.

The next performance measure used in this thesis is the market-to-book ratio, mirrored by the Tobin's Q. Since this ratio may indicate favorable growth prospects (Baker and Wurgler (2002)) and a prediction upon the effective utilization of scarce resources (Wilbon (2003)) it is of great interest to investigate whether the age of the lead investor influences this performance metric. The following table displays information on the Tobin's Q for the entire sample adjusted for outliers applying the z-score methodology.

[51] The marginal reputation effect of the investor's age at the IPO on all performance metrics is further investigated in chapter 5.2.2.

[52] The results for the year-based calculations are available in Appendix 14.

Descriptive Statistics Tobin's Q Full Sample adjusted									
t	MEAN	MEDIAN	STDEV	MIN	MAX	Quartile 25%	Quartile 75%	IQR	#
0	4.86	4.15	4.03	-12.14	20.39	2.98	5.86	2.89	131
1	4.55	3.81	3.41	-4.78	17.51	2.43	5.86	3.43	123
2	4.18	2.84	5.01	-3.35	35.52	1.59	5.05	3.46	111
3	3.28	2.58	5.13	-17.98	19.09	1.03	4.64	3.61	100

TABLE 10: DESCRIPTIVE STATISTICS ON TOBIN'S Q FOR THE ADJUSTED SAMPLE

The ratio is obtained at four different points of time. Data for the first point in time (t_0) is obtained estimating Tobin's Q at the end of the IPO year. Hence, t_1, t_2, and t_3 are measured at the end of the first, second and third year after the IPO, respectively. The number of observations decreases in the course of the estimation process for the following reasons: first, for some companies data was simply not available at COMPUSTAT. Second, the data set is validated for extreme values since these would heavily bias the results and moreover provide no meaningful statement. Third, for some companies data was only reported for e.g. t_o and t_1. It can be conjectured that these companies got acquired, merged or simply went bankrupt. However, the reasons for delisting are not always obvious and it is beyond the scope of this thesis to go deeper into the matter. The induced survivorship bias is perceived indeed, which is why the results must be taken with caution.

The calculations depict that the investors' optimism about future growth of the company is highest at the end of the IPO year and decreases monotonically with respect to the mean and the median. The standard deviation for all points of time does not show high volatility as well as the inter quartile range. The reasons for the steady decline in the market-to-book ratio is not intuitive but it can be assumed that the longer the company is present on the market, the more information is revealed to investors, thus providing them with the true intrinsic value of the company. Since venture-backed firms are risky investments with high growth potential and affiliated with great ex ante uncertainty or optimism, the steady downward movement of the TQ from t_0 to t_3 may also be justified by unsatisfied investors' expectations. Nahata (2008) estimated market-to-book ratios for European VC-backed IPO at the end of the first trading day and finds average ratios varying between 2.3 and 4.7. Unfortunately, no calculations are made with respect to a longer observation period. The high market-to-book ratios for the UK and Germany are explainable by higher valuation and liquidity levels as well as a general large "hype".

Table 11 provides information about the comparison of firms with and without reputable VC backing for the market-to-book ratio at four different points of time as well as a three-year average which is viewed as the main indicator for long-term operating performance but especially t_0 and t_1 can be regarded as meaningful representatives of investors' optimism and future growth prospects of the firm.

As conjectured earlier, the Tobin's Q for firms with reputable VC affiliation is higher at most points in time. This holds for mean and median values. However, a significant difference in means can only be found in t_2, i.e. the end of the second year after the IPO year. The difference is significant at the 10% level. However, the results do not reveal an unambiguous picture. The Tobin's Q for firms backed by reputable VCs is highest at the end of the IPO year (t_0) and second highest for firms with less reputable VC backing. Hence, the greatest growth opportunities and optimism as well as low information levels attributed by investors towards the newly listed firms seem to be reflected by the high ratios. This trend continues to hold even till the end of the first year after the IPO year (t_1). Interestingly, portfolio companies backed by reputable VC firms significantly differ from their counterparts in t_2 which is proved by the lowest ratio for firms with less reputable VC affiliation and the second highest for firms with reputable VC backing. In t_3 however, ratios are the lowest for both types of firms.

Inferential Statistics Tobin's Q								
		less reputable	reputable	Delta Δ			less reputable	reputable	Delta Δ
t0	MEAN	4.56	5.21	0.65	t2	MEAN	3.40	5.06	1.66
	p-value	*0.35*				*p-value*	*0.10**		
	MEDIAN	3.98	4.32	0.34		MEDIAN	2.73	2.92	0.19
	MIN	-12.14	-0.40	11.75		MIN	-3.35	-0.07	3.28
	MAX	20.39	18.64	-1.74		MAX	11.12	35.52	24.40
	#	70	61	131		#	59	52	111
t1	MEAN	4.63	4.47	-0.16	t3	MEAN	3.42	3.12	-0.29
	p-value	*0.79*				*p-value*	*0.78*		
	MEDIAN	3.80	3.89	0.09		MEDIAN	2.58	2.53	-0.05
	MIN	-4.20	-4.78	-0.58		MIN	-2.62	-17.98	-15.36
	MAX	17.51	13.18	-4.33		MAX	18.73	19.09	0.35
	#	66	57	123		#	52	48	100
avg. 3yr TQ	MEAN	3.89	4.43	0.54					
	p-value	*0.44*							
	MEDIAN	3.16	3.45	0.29					
	MIN	-2.09	-3.75	-1.66					
	MAX	13.31	12.99	-0.32					
	#	50	47	97					

*,**, and *** denote coefficient estimates for significance of no difference in means of portfolio companies backed by reputable and less reputable VC firms 10%, 5% and 1% levels respectively.

TABLE 11: INFERENTIAL STATISTICS ON TOBIN'S Q FOR PORTFOLIO COMPANIES BACKED BY REPUTABLE AND LESS REPUTABLE VC FIRMS

Again, this can presumably be explained by the fact that the longer a firm is operating at the market, the more information is obtained by investors and growth opportunities as well as earnings forecasts can be arranged with greater accuracy and certainty. Nevertheless, it is noteworthy that although portfolio companies with a reputable lead VC outperform the matched companies on a three-year average and in two of four observation dates, the differences were conjectured to be larger since superior monitoring and value adding services by experienced and reputable venture capitalists should be honored more by the market. Therefore, hypothesis 3 is only partly rejected due to a similar performance of both firm types and an insignificant difference with respect to three-year average market-to-book ratio. Hypothesis 3 would not be rejected when setting the focus solely on t_2.

Following the structure of chapter 4.4, the industry-adjusted ROA is the next performance measure to be evaluated[53]. As described earlier, this ratio is composed of the industry ROA deducted from the portfolio company's ROA.

Inferential Statistics industry-adjusted ROA									
		less reputable	reputable	full sample			less reputable	reputable	full sample
t1	MEAN	-25.68%	-28.44%	-26.97%	t3	MEAN	-29.83%	-22.17%	-26.08%
	p-value	*0.67*				*p-value*	*0.27*		
	MEDIAN	-9.36%	-10.85%	-10.22%		MEDIAN	-15.14%	-16.06%	-15.60%
	STDEV	35.15%	37.00%	35.90%		STDEV	36.37%	29.75%	33.34%
	MIN	-128.70%	-154.83%	-154.83%		MIN	-132.57%	-133.67%	-133.67%
	MAX	30.07%	12.81%	30.07%		MAX	16.10%	9.86%	16.10%
	#	66	58	124		#	47	45	92
t2	MEAN	-26.14%	-26.09%	-26.11%	avg. 3yr ROA	MEAN	-24.37%	-21.39%	-22.93%
	p-value	*0.99*				*p-value*	*0.63*		
	MEDIAN	-13.15%	-12.00%	-12.57%		MEDIAN	-14.77%	-11.45%	-11.66%
	STDEV	35.42%	34.79%	34.96%		STDEV	31.25%	26.79%	29.06%
	MIN	-128.05%	-155.40%	-155.40%		MIN	-106.21%	-94.74%	-106.21%
	MAX	33.21%	17.89%	33.21%		MAX	22.76%	6.25%	22.76%
	#	57	51	108		#	47	44	91

*,**, and *** denote coefficient estimates for significance of no difference in means of portfolio companies backed by reputable and less reputable VC firms 10%, 5% and 1% levels respectively.

TABLE 12: INFERENTIAL STATISTICS ON THE INDUSTRY-ADJUSTED ROA FOR FIRMS BACKED BY LESS REPUTABLE AND REPUTABLE VC FIRMS

[53] The data set is adjusted for outliers using the z-score methodology. Significant tests are undertaken using a student's two-sided t-test assuming unequal variances. As previously described, the reduction in sample size is due to the delisting of companies, no available data and the elimination of extreme values. The induced survivorship bias is recognized which is why the results have to be recognized with caution. Estimates for t_0 (end of the IPO year) are not reported since the time distance for each company from the IPO date till the end of the year is not equal. The approach to use annualized returns provided no meaningful results. Therefore this thesis renounces to report estimates for t_0.

All estimated values are markedly negative. This can be explained by the companies' negative earnings especially in the first years after going public. High negative ratios are also reported by Rindermann (2003) comparing European venture and non venture-backed IPOs. Another explanation for the negative performance is given by Jain and Kini (1994) who predict that the results are affected by pre-IPO window-dressing and increasing agency costs after the IPO. Their interpretation is further supported by estimating negative ROAs for a sample of 682 IPOs between 1976 and 1988.[54] It is worth mentioning that the level of negativity in this sample is owed to the industry adjustments to a great extent**.** Since straight industry data was not available, industry portfolios from the S&P500 and the Nasdaq100 Composite Index are constructed and used to determine industry ROAs. Although this method is not perfect to proxy the whole industry, it is within one's means an appropriate approach to make firms of different industry sectors comparable among each other. The method's adequateness can moreover be recognized when comparing the results for the different observation dates since they are not driven by large fluctuations. Taking a closer look at the results it becomes obvious that none of the mean difference tests is statistically significant, whereas the results in t_3 are closest to the 10% significance level. Although, an intuitive interpretation of the results is tough, one might infer that the largest difference observed in t_3 is explained by greater monitoring and value adding services of reputable VC firms in the pre- and post-IPO time. Since it is anticipated that experienced VCs are able to add more value to their portfolio companies and establish a substantial basis for the future, the results in the third year after the IPO year might mirror this effect. This interpretation only holds taking averages into account. It is noteworthy that firms with reputable VC affiliation outperformed the whole sample with respect to the mean except in t_1. Median values are markedly lower than the averages and the delta between the two groups is by far less than using the mean. Nevertheless, the difference in means is highest for the three-year average ROA which might however favor the interpretations stated above.

As a result, hypothesis 4 is rejected. Investee companies with reputable investor affiliation seem to perform slightly better on average, however the differences are not

[54] Jain and Kini (1994) estimate the following median ROAs for their sample of 682 IPOs: -7.60% for t_1, -10.53% for t_2 and -9.09% for t_3 which is relatively close to the median ROAs estimated in this thesis.

statistically significant. Despite the fact that firms with reputable VC affiliation slightly outperform their counterparts, the difference was expected to be much larger and more conspicuous based on the assumptions about the reputational effect of Venture Capital firms on firm performance.

In the following, a closer investigation on the EBIDTA/Assets-ratio and the profit margin is undertaken. On the one hand, these two ratios are used to overcome the potential manipulation and bias of the return on assets as described in chapter 4.4.4 and on the other hand to check the results obtained for the ROA calculations remain robust when accounting for the EBITDA instead of net income.

The tables shown below reveal the results for the three-year average EBITDA/Assets and the three-year average profit margin. It is refrained to estimate results for each year after the IPO since these two ratios mainly serve as a check for the previously discussed ROA. Results are reported for the adjusted as well as for the unadjusted sample to discover the potential influence of extreme values and its ramifications on the test of significance.

3-year average EBITDA/Assets						
Summary	full sample	less reputable	reputable	full sample adj.	less reputable	reputable
MEAN	-6.74%	-4.79%	-8.74%	-0.84%	0.43%	-2.18%
p value		*0.59*			*0.62*	
MEDIAN	3.33%	4.63%	1.13%	4.16%	6.17%	3.45%
STDEV	33.06%	33.91%	32.47%	23.19%	24.27%	22.24%
MIN	-134.83%	-134.83%	-121.20%	-77.64%	-58.53%	-77.64%
MAX	62.08%	62.08%	31.82%	62.08%	62.08%	31.82%
# of observations	83	42	41	78	40	38

*,**, and *** denote coefficient estimates for significance of no difference in means of portfolio companies backed by reputable and less reputable VC firms 10%, 5% and 1% levels respectively.

TABLE 13: THREE-YEAR AVERAGE EBITDA/ASSETS RATIO FOR PORTFOLIO COMPANIES BACKED BY LESS REPUTABLE AND REPUTABLE VC FIRMS

3-year average EBITDA/Sales						
Summary	full sample	less reputable	reputable	full sample adj.	less reputable	reputable
MEAN	-52.19%	-47.29%	-57.10%	-25.87%	-31.22%	-20.09%
p value		*0.76*			*0.58*	
MEDIAN	2.22%	2.42%	0.57%	3.82%	3.26%	4.75%
STDEV	148.40%	117.68%	175.16%	87.71%	91.50%	84.29%
MIN	-949.21%	-478.95%	-949.21%	-403.64%	-295.73	-403.64%
MAX	70.28%	50.63%	70.28%	70.28%	50.63%	70.28%
# of observations	84	42	42	77	40	37

*,**, and *** denote coefficient estimates for significance of no difference in means of portfolio companies backed by reputable and less reputable VC firms 10%, 5% and 1% levels respectively.

TABLE 14: THREE-YEAR AVERAGE EBITDA/SALES RATIO FOR PORTFOLIO COMPANIES BACKED BY LESS REPUTABLE AND REPUTABLE VC FIRMS

At first glance, the adjustments cause the values to increase (getting closer to zero) and even turn positive with respect to the average three-year EBITDA/Assets for companies financed by less reputable VC firms. It can be detected that no significant difference in means can be found between the two firms irrespective of the sample's adjustments. Although averages are entirely negative, except the one previously mentioned, median values are positive throughout all estimates. In addition, the standard deviations take on considerably high values, thus it can be inferred that median values provide a more veritable picture and are therefore considered for the further interpretation of the results. Regardless of the affiliation to less reputable or reputable VC firms, the medians do not differ in large terms from each other with respect to the profit margin. Slightly higher median deltas (3.5% for the unadjusted and 2.72% for the adjusted sample) can be observed for the ROA based on EBITDA. Since the estimated values for both samples do not reveal any large varieties and no significant difference in means is observable, a venture capitalist's reputation has no significant influence on the portfolio companies' profit margin and the relation of EBITDA to total assets. Hence, hypothesis 5 and 5a are rejected based on the prior results.

The results obtained for the standard industry-adjusted ROA are not robust to the outcomes of the EBITDA-based ROA. As previously described, the industry-adjusted ROA is higher for firms with reputable VC affiliation on a three-year average basis. This contradicts the findings for the ROA based on EBITDA since firms with less reputable VC affiliation perform slightly better with respect to mean and median values. Nevertheless it is questionable in how far these results provide some meaningful evidence since the induced survivorship bias, the missing industry adjustment for the two EBIDTA-based ratios as well as markedly negative earnings of the considered portfolio companies may distort the results.[55]

A widely used approach to measure post-issue operating performance is analyzing buy-and-hold returns (hereinafter called BHR) and wealth relatives. Table 15 shows the

[55] As mentioned earlier, the elimination of extreme values as well as missing data of several firms induces bias to the sample. The results should be taken with caution as explained before. The adjustment of the EBITDA/Assets- ratio and the profit margin for its particular industry is due to the lack of industry specific data availability and the sake of brevity beyond the scope of this thesis.

results for the estimation of one, two and three-year BHR for the entire sample distinguishing between firms with reputable and less reputable VC backing.[56]

Inferential Statistics Buy-and-Hold Returns full sample				
		less reputable	reputable	full sample
1 year BHR	MEAN	21.14%	12.06%	16.27%
	p-value	*0.48*		
	MEDIAN	8.22%	-4.77%	2.9%
	STDEV	67.05%	66.06%	66.46%
	MIN	-78.69%	-85.66%	-85.66%
	MAX	217.92%	200.13%	217.92%
	#	72	66	138
2 year BHR	MEAN	9.69%	-0.69%	4.91%
	p-value	*0.47*		
	MEDIAN	-21.48%	-23.08%	-22.90%
	STDEV	85.92%	75.79%	81.26%
	MIN	-89.43%	-89.34%	-89.43%
	MAX	269.61%	269.49%	269.61%
	#	69	59	128
3 year BHR	MEAN	5.52%	5.29%	5.41%
	p-value	*0.99*		
	MEDIAN	-28.53%	-20.37%	-24.91%
	STDEV	90.33%	83.85%	86.69%
	MIN	-86.73%	-96.26%	-96.26%
	MAX	275.29%	237.16%	275.29%
	#	51	52	103

*,**, and *** denote coefficient estimates for significance of no difference in means of portfolio companies backed by reputable and less reputable VC firms 10%, 5% and 1% levels respectively.

TABLE 15: INFERENTIAL STATISTICS ON BUY-AND-HOLD RETURNS FOR THE FULL SAMPLE

First of all, again no significant difference is found between the two firm types irrespective of the observation period for the full sample. Although not statistically significant, it is noticeable that companies financed by less reputable VC investors outperform their counterparty across the board, except for the three-year BHR median value. Especially average BHRs differ to a large extent from each other for the first and second year. This also holds for the median one-year BHR. Since extreme values in both directions are almost identical for the two types of firms and across the three observation years, it can be assumed that the averages calculated are less strongly distorted. The reason why average BHRs for companies financed by less reputable VCs are superior to their counterparty is not obvious. High one-year BHRs might be driven by excessive optimism of investors since at that time only scarce information is available about the company's future performance. Additionally, high one-year BHRs can be explained by relatively high market-to-book ratios for firms with less reputable VC affiliation especially in year one after the IPO year. A decline in average BHRs can be

[56] It is renounced to present annualized BHR estimated from the IPO date until the end of the IPO year for the reasons already referred to in regarding the computation of the ROA.

noticed for every year for start-ups financed by less reputable investors and an overall negative trend is also observable for their counterparts. The findings are partly consistent with previous empirical findings of declining post-IPO operating performance by Jain and Kini (1994). Again this seems consistent with the findings for the market-to-book ratio that also reveal some downward trend thus leading to worse post-issue performance. Since most empirical studies just focus on the performance differences between venture and non venture-backed IPOs, findings comparable to the approached used in this thesis are hard to find. Ghosh (2011), for example, analyzed BHRs for venture and non venture-backed firms that went public between 1990 and 2000. He observed very high initial returns for both firm types and found in conjunction with existing literature that returns start to decline the more the observation window is extended. The estimated one-year BHRs in his study are superior to the ones estimated here for both firm types. However, the stock return after one year for venture-backed firms in his study (10.3%) is close to the estimations in this thesis for firms backed by reputable VC firms (12.06%).

Regarding the hypotheses to be tested, hypothesis 6 is rejected since average BHRs for both firm types are not significantly different from each other. The returns are on average positive over three years but medians are markedly negative. With respect to the decline in post-IPO operating performance documented in this study and by previous empirical findings, it can be assumed that the median is a better proxy for three-year BHRs instead of taking the mean as a proxy.

When decomposing the full sample of companies classified by their IPO year, the picture looks slightly different.[57] For all firms that went public in 2004, BHRs are positive. This holds for averages and medians. Especially the two-year BHR for both firms is explicitly positive. Portfolio companies with reputable VC affiliation gained on average returns at a height of 40.49% (median: 40.34%) within two years after going public. No less impressive are three-year BHRs for both firm types. On average, firms with less reputable VC affiliation gained 42.47% (median: 19.76%) whereas their counterparts paid off investors with an average 45.91% (median: 44.73%). Nevertheless, average returns for companies undertaking their IPO in 2004 are never statistically significant

[57] For the sake of brevity, tables showing the results for firms going public in 2004, 2005 and 2006 are available in Appendices 15, 16 and 17.

for both firm types. It is once more concluded that start-ups backed by less reputable investors do not face a performance drawback when compared to their counterparts. These results can be explained by favorable market conditions just before the beginning of the financial crisis in 2007.

The picture dramatically changes when only IPOs of 2006 are considered. In contrast to the high BHRs previously described for IPOs in 2004, returns for companies taken public in 2006 remarkably diminish and significantly different averages are obtained for one- and two-year BHRs. The average one-year BHR for firms with less reputable VC backing is again considerably positive (46.27%, median: 27.46%) and significantly different at the 10% level from their counterpart's average return (3.62%, median: -9.43%). These positive returns may once again be explained due to bullish market conditions and investors' optimism right after the IPO. The impact of the financial crisis on the companies' stock returns is clearly reflected when taking a closer look at two- and three-year BHRs. Although average two-year BHRs are again significantly different between the two firm types (less reputable VC backing: 3.49% versus -38.43%), the returns dramatically decline. Furthermore, the median for both companies is distinctly negative. The same holds for the three-year BHR, however returns continue to shrink monotonically. As a result, returns are indeed negative for all observations dates for firms with reputable VC affiliation and for their counterparts looking at two-and three-year BHRs. But interestingly, companies backed by less reputable investors significantly outperformed the other firm type showing high positive one-year BHRs.

Since BHRs only provide information on investors gaining or losing in a particular time period, wealth relatives are applied to obtain a reference value, i.e. analyzing the performance with respect to a benchmark. The two benchmarks employed in this thesis are the S&P500 as well as the Nasdaq 100 Composite index which is consistent to previous empirical studies using wealth relatives. Table 16 reports the results for the two different firm types without decomposing the sample into IPO years. Again, the difference in means is not significantly different among the portfolio companies affiliated to VC firms with different levels of experience.

Inferential Statistics Wealth Relatives						
full sample	WR S&P500			WR NASDAQ 100		
	less reputable	reputable	full sample	less reputable	reputable	full sample
MEAN	0.89	0.98	0.93	0.83	0.91	0.87
p-value	*0.46*			*0.52*		
MEDIAN	0.59	0.95	0.78	0.57	0.76	0.70
STDEV	0.76	0.72	0.74	0.73	0.68	0.70
MIN	0.01	0.05	0.01	0.01	0.04	0.01
MAX	3.49	3.61	3.61	3.26	2.92	3.26
# of observations	71	66	137	71	66	137

*,**, and *** denote coefficient estimates for significance of no difference in means of portfolio companies backed by reputable and less reputable VC firms 10%, 5% and 1% levels respectively.

TABLE 16: WEALTH RELATIVES ON THE FULL SAMPLE OF PORTFOLIO COMPANIES BACKED BY LESS REPUTABLE AND REPUTABLE VC FIRMS

Surprisingly, it seems that firms backed by reputable VCs on average perform slightly better since not only averages are higher compared to their counterparts but also median values clearly differ from each other. Standard deviations, minimum and maximum values only reveal marginal variation between the firms and benchmarks. Both, means and medians are considerably below the threshold of 1, thus the two firm types underperform the S&P500 and the Nasdaq Index when accounting for the full sample. The wealth relatives in this thesis are estimated for a maximum of 36 months after the IPO date. In case of data unavailability, the maximum number of months is considered up to the delisting of the company. On average, data of 34.8 months for each company are considered when estimating wealth relatives, thus the outcome can almost be taken as a three-year wealth relative.

The fact that portfolio companies underperform their benchmark on a three-year basis is supported by findings of Loughran and Ritter (1995) and Kraus and Burghof (2003) and is once more consistent with the long-term underperformance evidenced by Ritter (1991), Brav and Gompers (1997) as well as Jain and Kini (1994).

As a concluding comment, hypothesis 7 is rejected due to insignificant differences in means between the two firm types showing p-values of 0.46 for the S&P500 and 0.52 for the Nasdaq Index.

Decomposing the sample once again for the IPO years of 2004, 2005 and 2006, similarities to the results of the BHRs previously described appear.[58] Again, beneficial market conditions seem to impact the returns of firms going public in 2004 thus both

[58] For the sake of brevity, tables showing the results on wealth relatives for firms going public in 2004, 2005 and 2006 are available in Appendices 18,19 and 20.

firm types slightly outperform the S&P500 (1.05 and 1.01). The Nasdaq Index performed a trifle better than the S&P500, thus wealth relatives for the companies considered are lower (1.02 versus 0.98). Interestingly, median values among the two firms and both indices are exactly reversed. For this reason, an obvious interpretation of these results is quite complex. In any case it can be concluded that there seems to be no difference in performance concerning WRs no matter of a VC's reputational attributes. Apart from that, WRs are still clearly higher for firms going public in 2004 than the estimates for the entire sample.

When looking at the IPO year 2006, no statistically significant difference in means is found between the two firm types but the p-values are closer to significance compared to prior estimations. Especially firms backed by less reputable investors show high average wealth relatives (1.25) which might be explainable by the enormous BHRs discovered in the first year after the IPO in 2006 and thus offset the sharp decline during the financial crisis. The same is true for investee firms with reputable VC affiliation. Since the two indices simultaneously decreased with the stock returns of the portfolio companies, the estimated wealth relatives are not as low as expected. Nevertheless, the estimated wealth relatives for the IPO years 2005 and 2006 clearly display a downward trend in comparison to the estimates IPO year 2004. All in all, firms financed by less reputable VCs on average outperform the S&P500 but underperform the Nasdaq Index.

These findings generally reveal that portfolio companies, backed by less reputable Venture Capital firms do not significantly differ from their counterparty when estimating wealth relatives with respect to the S&P500 and the Nasdaq 100 Composite Index. Median WRs are clearly higher for firms with reputable VC affiliation for the full sample and when differentiating for each IPO year, though averages are never significantly different.

5.2 Multivariate Analysis

The following subsection presents the multivariate analysis on the reputational effect on the post-IPO operating performance indicators already described in chapter 4. This section is structured as follows: First, the methodology and the regression framework is shown. Second, the reputational effect of the VC firm's age on the post-IPO operating performance of the portfolio companies is estimated. Finally, to verify the empirical

results, regressions are conducted again using the fraction of portfolio companies publicly held by a VC firm and a reputation index as alternative reputation indicators.

5.2.1 Methodology and Control Variable Selection

In order to provide a more comprehensive overview about the influence of reputation on the post-IPO operating performance of portfolio companies and to test further for marginal effects, regression analyses from ordinary least squares (OLS) regressions based on White's heteroscedasticity-consistent standard errors and covariance are applied.

The regression framework is closely related to Yap (2009), Gompers (1996), Nahata (2008), Shu et al. (2010) and Ivanov et al. (2008) who regress performance indicators on different control variables and include a reputation indicator or a dummy variable to control for VC involvement.[59] The following regression framework is generally applied holding the control variables constant throughout all estimations:

$$Y_i = \alpha + \beta_1 VC\_AGE_i + \beta_2 AGE\_PFC_i + \beta_3 \log\_OFFER\_SIZE_i + \beta_4 FINANCING\_ROUND_i + \beta_5 ASSETS_i + \beta_6 SHARES\_OFFERED_i + \beta_7 PRICE_i + \beta_8 EMPLOYEES_i + \varepsilon_i \quad (13)$$

The regression framework contains seven control variables that include characteristics of both the portfolio company and the lead Venture Capital firm. In line with other empirical investigations (see e.g. Yap (2009), Ivanov et al. (2008) and Rindermann (2003)) the independent variables represent characteristics such as the age of the portfolio company at the IPO, the natural logarithm of the offer size, the number of financing rounds until the IPO of the portfolio company, the amount of assets managed by the lead VC firm, the number of shares offered at the IPO, the initial share price and the number of employees working at the portfolio company at the IPO. The choice for these control variables is on the one hand based on its application in other empirical studies. On the other hand it is assumed that these variables provide further information about information asymmetry, the monitoring intensity of the VC firm and the maturity of the portfolio company. The offer proceeds, i.e. the offer size is, according to Jain and

[59] A dummy variable equaling one or zero is introduced when the regression framework controls for the differences between venture and non-venture-backed firms.

Kini (2000), a reliable predictor of a firm's future performance since a greater offering size reduces uncertainty and positively contributes to a firm's post-IPO performance. The maturity of the portfolio company is proxied by its age at the IPO and the number of employees. Gompers (1996) finds evidence that less reputable VCs rush their portfolio companies to a public exit, hence their companies are on average younger and less mature. Ritter (1984) also considers the age of a company as a potential risk factor of a firm. In addition, the number of financing rounds is further used as an indicator to measure the uncertainty because a smaller number of financing rounds reduces the entrepreneur's incentives for "window dressing" activities (Tian[a] (2011)).

This thesis further assumes that the number of employees is another indicator for the firm's maturity. A higher number of employees at the IPO could indicate a well-established and more mature company which may lead to superior post-IPO performance.[60] Empirical findings by Kaplan and Schoar (2005) suggest that VC funds exceeding a certain threshold perform worse. For this reason the amount of assets managed by a VC firm is included in the regression analysis to estimate the marginal impact of the asset size on the performance measures. It can be assumed that portfolio companies backed by VC firms managing smaller bulks of capital perform better than firms backed by VCs with a huge amount of assets under management.[61]

Regressions are in a first step estimated controlling for the VC age as the reputation indicator as well as for the age of the portfolio company, the natural logarithm of the offering size, the number of financing rounds and the amount of assets because it is assumed that these independent variables provide the most meaningful results. In a second step, regressions are estimated on the basis of all control variables.

5.2.2 Reputational Effect of VC Age on the post-IPO operating Performance

In the following, regression results for the marginal effects of the age of the lead VC firm and the control variables described above on post-IPO operating performance indicators

[60] Google Inc. as an example exhibits one of the highest numbers of employees in the sample and has turned out to be a highly successful and profitable firm. For this reason, a high number of employees at the IPO date are considered as an indicator for the maturity of a firm. More mature firms at the IPO are supposed to exhibit superior post-IPO performance.

[61] Control variables such as the underwriter rank or an indicator controlling for industry specific effects are not included due to the lack of data availability.

are shown. The presentation of the performance indicators is identical to the sequence in chapter 4.

Table 17 shows the regression results using underpricing at the IPO as the dependent variable. First of all, the reputation variable VC Age is insignificant in the first regression thus it has no influence on underpricing. This result is in line with the inferential statistics on underpricing presented earlier which also indicate no significant difference between companies being backed by reputable and less reputable VC firms. However, these findings are in contrast to those by Gompers (1996) who estimated a significant difference in underpricing for portfolio companies backed by reputable and less reputable VC firms.

In the first regression, the age of the portfolio company at the IPO is significant at the 5% level and the logarithm of the offer size and the assets managed by the lead VC firms are significant even at the 1% level. The sample originally consists of 143 portfolio companies of which 136 were included in the first, and 135 in the second regression.[62] The goodness of fit (R-squared) in the first regression is relatively weak (12.3%), whereas the second regression line fits the data points slightly better (21.1%).

Underpricing at IPO											
	AGE AT IPO	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
Underpricing at IPO	3.57E-06	-0.004**	0.096***	0.004	-2.14E-06***	-	-	-	-1.595	0.123	136
	(0.001)	*(0.001)*	*(0.027)*	*(0.008)*	*(6.31E-07)*	-	-	-			
	-0.000	-0.003*	0.242***	0.007	1.79E-06	-1.65E-08***	-0.005*	-2.65E-05**	-4.075	0.211	135
	(0.001)	*(0.002)*	*(0.050)*	*(0.008)*	*(1.56E-06)*	*(4.52E-09)*	*(0.003)*	*(1.04E-05)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

TABLE 17: REGRESSION RESULTS FOR VC AGE ON UNDERPRICING

The regression results reveal an ambiguous picture. Since the coefficient for the logarithm of the offer size is positive (0.096), it suggests that underpricing is higher for IPOs with greater proceeds. Since greater underpricing is associated with greater uncertainty, these findings are in contrast to Jain and Kini (2000) who suggest that greater IPO proceeds reduce the uncertainty problem.

The negative but significant coefficient (-0.004) for the age of the portfolio companies (AGE_PFC) however suggests that an increase in age lowers the degree of underpricing.

[62] The number of observations decreases due to the lack of some data for VC firms and portfolio companies. For example, the amount of assets was not reported for all oft he sample VC firms.

This is supportive to Gompers (1996) who estimates a similar coefficient of -0.04 for the impact of portfolio companies' age on underpricing.

The inclusion of three additional control variables does not change the picture. The reputation proxy VC age (AGE AT IPO) is still insignificant in contrast to the added control variables which are significant at the 10% level (price), the 5% level (employees) and the 1% level (shares offered). All in all, hypothesis 1a can clearly be rejected since the age of the lead VC firm does not significantly impact the portfolio companies' underpricing at the IPO.

The inferential statistics on MLOTT in section 5.1.3 show that the difference in the average money left on the table is almost significant at the 10% level when comparing reputable against less reputable VC-backed firms. The first regression analysis on MLOTT reveals that the age of the VC firm positively impacts the MLOTT (0.013) and is statistically significant at the 5% level. The result suggests that an increase in the age of the VC firm at the IPO results in a greater amount of money left on the table which contradicts the results of the inferential statistics. The contrary result may partially be explained by the low number of observations which decreased from 143 to only 88 in the first regression and thus may bias the picture. The decline can be explained due to the use of the natural logarithm of MLOTT to enhance the display of data. Since negative logarithm values are mathematically not defined, portfolio companies that exhibited a negative value for MLOTT are accordingly removed from the sample.

Money Left On The Table											
	AGE AT IPO	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
LOG Money Left On The Table	0.013**	-0.078**	2.563***	0.061	-4.94E-05**	-	-	-	-31.526	0.403	88
	(0.006)	*(0.038)*	*(0.399)*	*(0.107)*	*(2.01E-05)*	-	-	-			
	0.005	-0.101***	6.213***	-0.019	-5.43E-05***	-5.16E-07***	-0.106***	-0.000**	-91.731	0.528	87
	(0.005)	*(0.031)*	*(0.852)*	*(0.112)*	*(1.78E-05)*	*(1.13E-07)*	*(0.023)*	*(0.000)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

TABLE 18: REGRESSION RESULTS FOR VC AGE ON MONEY LEFT ON THE TABLE

The induced bias is indeed perceived and accepted because regression results for MLOTT without using logs are even less meaningful.[63] The regression's goodness of fit increases when adding the remaining three control variables. However, the reputation

[63] For the purpose of integrity the regression results for MLOTT without using its natural logarithm are made available in Appendix 21.

variable becomes insignificant. All control variables are highly statistically significant except the number of financing rounds as well as the number of employees which is only significant at the 5% level. The coefficient AGE_PFC indicates once again that the age of the portfolio company negatively impacts the amount of money left on the table and is thereby consistent with the result for underpricing. Hypothesis 2a, which postulates that the age of the VC firm negatively impacts the amount of money left on the table, is rejected. Although a significant relation is obtained in the first regression, the coefficient indicates that the relation is positive rather than negative.

The third post-IPO performance indicator is the market-to-book ratio, also known as Tobin's Q. Inferential statistics in section 5.1.3 show a significant difference in t_2 for portfolio companies backed by reputable and less reputable VC firms, i.e. portfolio companies backed by reputable VC firms reveal a higher Tobin's Q. The result is supported by the following regression analysis but only for t_1. The coefficient for the age of the VC firm at the IPO is significant at the 10% level and indicates that the older the VC firm, the higher the market-to-book ratio. This result is supported by findings of Yap (2009) also estimating a positive coefficient for the VC firm's age at the IPO on the market-to-book ratio.

Tobin's Q											
	AGE AT IPO	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
Tobin's Q t1	0.054*	-0.020	-0.641	0.087	5.43E-07	-	-	-	14.305	0.113	120
	(0.031)	*(0.055)*	*(0.918)*	*(0.211)*	*(2.18E-05)*	-	-	-			
	0.051	-0.005	-1,882	0.063	2.49E-05	-1.99E-08	0.165**	1.37E-05	34.831	0.152	119
	(0.033)	*(0.054)*	*(1.353)*	*(0.213)*	*(2.28E-05)*	*(9.01E-08)*	*(0.066)*	*(0.000)*			
Tobin's Q t2	-0.264	0.013	1,886	-1,478*	-0.000	-	-	-	-12.698	0.325	109
	(0.179)	*(0.160)*	*(2.143)*	*(0.863)*	*(7.19E-05)*	-	-	-			
	-0.275	0.0360	6,563	-1,461*	3.41E-05	-5.40E-07*	-0.025	-0.002*	-92.681	0.350	108
	(0.179)	*(0.158)*	*(4.951)*	*(0.855)*	*(9.08E-05)*	*(3.11E-07)*	*(0.227)*	*(0.001)*			
Tobin's Q t3	0.030	0.030	0.344	0.858*	8.33E-06	-	-	-	-8.276	0.065	98
	(0.022)	*(0.036)*	*(0.925)*	*(0.505)*	*(1.89E-05)*	-	-	-			
	0.029	0.047	-1,263	0.805	1.58E-05	5.13E-08	0.156***	-0.000	18.707	0.073	97
	(0.023)	*(0.038)*	*(1.677)*	*(0.528)*	*(3.94E-05)*	*(1.26E-07)*	*(0.053)*	*(0.000)*			
avg. 3-year Tobin's Q	0.010	-0.005	-0.102	0.002	-1.31E-05	-	-	-	5.874	0.012	94
	(0.012)	*(0.030)*	*(0.690)*	*(0.208)*	*(1.39E-05)*	-	-	-			
	0.007	0.014	-1,212	-0.035	1.27E-05	-1.99E-08	0.155***	-0.000	24.327	0.105	93
	(0.013)	*(0.029)*	*(0.982)*	*(0.209)*	*(2.08E-05)*	*(6.98E-08)*	*(0.036)*	*(0.000)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

TABLE 19: REGRESSION RESULTS FOR VC AGE ON TOBIN'S Q

Ivanov et al. (2008) apply a similar methodology but their results for the impact of VC firm's age on the market-to-book ratio are insignificant. Interestingly, the reputation variable is the only one being statistically significant in this regression output.

The goodness of fit for all of these regressions is relatively weak except the ones for t_2. The number of observations decreases for each subsequent regression. As already mentioned earlier, the greater the time gap between the IPO and the estimation of a performance indicator, the more likely is a delisting or bankruptcy of a portfolio company. Hence only data of companies is retrievable that still operate.

A possible interpretation of the insignificant reputation variables might also be a confirmation of the results already obtained under the univariate analysis. Generally, no significant difference in terms of market-to-book ratio is found (except for t_2) when dividing the sample at the threshold of 21 years. This result is confirmed by the regression analysis. However, the results lead to a partial rejection of hypothesis 3a. Although the reputation variable is once significant, the overall results suggest that the age of the lead VC firm is not a reliable proxy for the post-IPO market-to-book ratio.[64]

When testing the marginal effects of the VC firm's age at IPO on the industry-adjusted return on assets only estimates for the ROA three years after the IPO are statistically significant at the 5% level as can bee seen from table 20. The coefficient (0.002) suggests that the older the VC at the IPO, the higher is the ROA three years subsequent to the IPO year. However, the marginal effect is very little. This result coincides with evidence provided by Ivanov et al. (2008) who find a positive and significant coefficient (but only at the 10% level) for VC age as a reputation proxy.[65]

[64] Running the regression without White's heteroscedasticity-consistent standard errors and covariance the results change. The reputation variable gets highly statistically significant for the market-to-book ratio at t_1 and t_2. Moreover, the standard errors are slightly reduced but the regression's goodness of fit remains unchanged as well as regression results for t_3 and t_4. However, the coefficient for the VC firm's age turns negative in t_2 which is inconsistent to empirical results and the univariate analysis. The regression results are presented in Appendix 22.

[65] Findings by Yap (2009) indicate also indicate a positive but insignificant coefficient for the VC firm's age at the IPO.

industry-adjusted ROA											
	AGE AT IPO	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
ROA t1	-0.002	0.004	0.143***	-0.030*	-2.57E-06***	-	-	-	-2.618	0.263	117
	(0.002)	*(0.003)*	*(0.039)*	*(0.016)*	*(8.58E-07)*	-	-	-			
	-0.003	0.004	0.283***	-0.025	1.57E-06	-1.79E-08***	-0.004	1.64E-05	-5.012	0.294	116
	(0.002)	*(0.003)*	*(0.075)*	*(0.016)*	*(1.74E-06)*	*(5.38E-09)*	*(0.004)*	*(2.01E-05)*			
ROA t2	-0.000	0.004	0.160***	0.001	-1.66E-06	-	-	-	-3.201	0.147	105
	(0.001)	*(0.003)*	*(0.042)*	*(0.013)*	*(1.24E-06)*	-	-	-			
	-0.001	0.004*	0.345***	0.007	3.17E-06	-2.17E-08***	-0.006*	1.32E-05	-6.355	0.193	104
	(0.001)	*(0.002)*	*(0.096)*	*(0.014)*	*(2.04E-06)*	*(7.12E-09)*	*(0.003)*	*(2.00E-05)*			
ROA t3	0.002**	0.003	0.134***	-0.005	-7.49E-07	-	-	-	-2.742	0.147	90
	(0.001)	*(0.002)*	*(0.037)*	*(0.014)*	*(8.79E-07)*	-	-	-			
	0.001	0.003	0.232**	-5.82E-06	1.86E-06	-1.17E-08*	-0.003	1.06E-05	-4.439	0.160	89
	(0.001)	*(0.002)*	*(0.098)*	*(0.014)*	*(1.60E-06)*	*(6.31E-09)*	*(0.003)*	*(2.56E-05)*			
avg. 3-year ROA	-0.000	0.002	0.119***	-0.019	-1.67E-06*	-	-	-	-2.287	0.191	89
	(0.001)	*(0.002)*	*(0.037)*	*(0.014)*	*(8.81E-07)*	-	-	-			
	-0.001	0.002	0.246***	-0.013	1.79E-06	-1.52E-08***	-0.003	9.79E-06	-4.483	0.226	88
	(0.001)	*(0.002)*	*(0.084)*	*(0.014)*	*(1.43E-06)*	*(5.31E-09)*	*(0.003)*	*(2.03E-05)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

TABLE 20: REGRESSION RESULTS FOR VC AGE ON INDUSTRY-ADJUSTED ROA

Coefficients for t_3 are the only statistically significant reputation proxies. The R-squared and the number of observations are highest for the first two regressions. Although the goodness of fit is relatively weak it is still up to 5 times higher as in comparable empirical studies (see Yap (2009) and Ivanov et al. (2008)). It is noteworthy that in all regressions, the logarithm of the IPO's offer size is always positive and highly statistically significant. It can be concluded that a greater offer size positively impacts the return on assets in every observation year after the IPO as well as for the three-year average ROA. This result is in line with Rindermann (2003) estimating a positive and significant impact of size on the market-to-book ratio. Interestingly, results by Ivanov et al. (2008) are contrary with respect to the influence of the offer size on the ROA. Their regression results show a statistically significant (10% level) coefficient for the impact of the offer size on the ROA, whereas the results presented here entirely show positive coefficients.

Moreover, the negative coefficient on the VC firm's assets in t_1 shows its negative relation to the ROA, thus it can be inferred that portfolio companies backed by VCs managing a smaller bulk of assets exhibit higher ROAs one year after the IPO.

The results generally show that the VC firm's age does not significantly influence the ROA (except in t_3). This leads to the partial rejection of hypothesis 4a, which postulates that the VC firm's age positively impacts the portfolio companies' post-operating performance measured by the ROA.[66]

[66] If regressions are run without adjusting for White's heteroscedasticity-consistent standard errors and covariance, the results get more significant fort he ROA in t_1 in both regressions. Coefficient estimates are

The results estimated on the impact of the EBITDA/ASSETS and the EBITDA/SALES-ratio (see table 21) reveal a similar picture as the ones on the return on assets. The reputation indicator is again not significant, thus the age of the lead VC firm does have no impact on the performance with respect to the two ratios in question. The number of observations is considerably smaller compared to previous regression, however the R-squared shows that especially for the EBIDTA/SALES-regression almost 33% of the data fits the model.

Again, the log offering size is positive and significant for both ratios. It can be inferred that IPOs with higher proceeds perform superior with respect to these two ratios.

	AGE AT IPO	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
EBITDA/ASSETS											
3-year avg. EBITDA/ASSETS	-0.002	0.009**	0.169***	0.044	-2.97E-06*	-	-	-	-3.317	0.103	**76**
	(0.002)	*(0.004)*	*(0.060)*	*(0.031)*	*(1.55E-06)*	-	-	-			
	-0.001	0.008*	0.002	0.040	-6.92E-06***	1.65E-08	0.004	5.70E-05	-0.439	0.128	**75**
	(0.002)	*(0.004)*	*(0.176)*	*(0.033)*	*(2.51E-06)*	*(1.12E-08)*	*(0.007)*	*(4.45E-05)*			
EBITDA/SALES											
3-year avg. EBITDA/SALES	-0.003	-0.008	0.276***	-0.118***	-3.27E-06*	-	-	-	-4.393	0.253	**74**
	(0.004)	*(0.005)*	*(0.100)*	*(0.036)*	*(1.70E-06)*	-	-	-			
	-0.005	-0.009**	0.892***	-0.096***	8.45E-06*	-5.65E-08***	-0.020**	-9.31E-06	-14.995	0.329	**73**
	(0.004)	*(0.004)*	*(0.261)*	*(0.033)*	*(4.73E-06)*	*(1.83E-08)*	*(0.009)*	*(4.56E-05)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

TABLE 21: REGRESSION RESULTS FOR VC AGE ON EBITDA/ASSETS AND EBITDA/SALES

The coefficient on the number of financing rounds is highly significant and negative for the EBITDA/SALES regression. Hence, increasing its number results in a reduction of the three-year average ratio. A high number of financing rounds may indicate a lot of uncertainty because the VCs are unsure about the portfolio companies' performance thus including more milestones which trigger the next capital infusion if goals are met. Therefore, the regression shows that better-established portfolio companies, where uncertainty about their future development is not as uncertain, perform better concerning the EBITDA/SALES ratio. The regression results moreover lead to the rejection of hypothesis 5a and 5b because no significant relation is found concerning the VC firm's age on the two ratios.

significant at the 5% level. The coefficients for the offering size remain positive and highly significant. The goodness of the regression's fit remains unchanged. However, standard errors become even slightly better (except for the logarithm of the offer size). Results of this regression are made available in the Appendix 23.

Table 22 provides an overview of the regression results for 1,2 and 3 year Buy-and-Hold Returns.

Buy-and-Hold Returns											
	AGE AT IPO	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
1-year BHR	0.001	0.003	-0.021	-0.056**	-2.51E-06	-	-	-	0.809	0.038	**136**
	0.002	*(0.005)*	*(0.106)*	*(0.024)*	*(2.90E-06)*	-	-	-			
	(0.002)	0.003	-0.298	-0.063***	-5.80E-06*	2.06E-08	0.020	2.98E-05	5.454	0.062	**135**
	(0.002)	*(0.005)*	*(0.192)*	*(0.024)*	*(3.55E-06)*	*(1.40E-08)*	*(0.013)*	*(3.09E-05)*			
2-year BHR	0.002	0.004	-0.011	-0.028	-3.26E-06	-	-	-	0.368	0.011	**136**
	(0.003)	*(0.005)*	*(0.154)*	*(0.030)*	*(3.89E-06)*	-	-	-			
	0.003	0.003	-0.645***	-0.038	-1.01E-05**	4.13E-08**	0.044***	0.000***	10.992	0.097	**135**
	(0.002)	*(0.005)*	*(0.237)*	*(0.028)*	*(4.70E-06)*	*(1.70E-08)*	*(0.013)*	*(5.62E-05)*			
3-year BHR	0.004	-0.006	0.076	-0.010	5.23E-07	-	-	-	-1.336	0.023	**136**
	(0.004)	*(0.006)*	*(0.201)*	*(0.029)*	*(4.31E-06)*	-	-	-			
	0.004	-0.003	-0.711***	-0.023	-1.59E-06	3.42E-08**	0.068***	0.000	11.799	0.191	**135**
	(0.004)	*(0.005)*	*(0.203)*	*(0.027)*	*(5.77E-06)*	*(1.70E-08)*	*(0.013)*	*(8.73E-05)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

TABLE 22: REGRESSION RESULTS FOR VC AGE ON BUY-AND-HOLD RETURNS

It becomes obvious that although the number of observations is high (almost the full sample can be fitted into the regression), the goodness of fit is relatively low except for the last regression on 3-year BHRs. Again, no significant relation between the VC firm's age and the BHRs can be observed. The number of significant control variables is much less compared to previous regressions. Highly significant coefficients (log offer size, price, employees) are observable with respect to 2-year BHRs. It can be derived that smaller offerings, offerings with higher initial share prices and firms with more employees perform better. Hence, the assumptions concerning the uncertainty around the IPO (proxied by the offer size) and the maturity of the firm (represented by the number of employees) can be confirmed. Moreover, the regression results lead to a rejection of hypothesis 6a because the VC firm's age does not seem to determine the portfolio company's performance based on BHRs for three years subsequent to its IPO. These findings are in line with the inferential statistics on BHRs.

The last performance measures under investigation are the portfolio companies' wealth relatives on the S&P 500 and the Nasdaq 100 Composite Index. Table 23 presents the regression results.

Wealth Relatives											
	AGE AT IPO	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
Wealth Relative S&P 500	0.004	0.002	0.058	-0.005	5.17E-06	-	-	-	-0.226	0.025	136
	(0.003)	*(0.007)*	*(0.167)*	*(0.033)*	*(3.78E-06)*	-	-	-			
	0.004	0.004	-0.496*	-0.014	2.26E-06	2.85E-08	0.045***	7.18E-05	9.035	0.083	135
	(0.003)	*(0.007)*	*(0.254)*	*(0.031)*	*(6.90E-06)*	*(2.10E-08)*	*(0.015)*	*(6.82E-05)*			
Wealth Relative Nasdaq-100	0.004	0.001	0.046	-0.016	2.40E-06	-	-	-	-0.001	0.022	136
	(0.004)	*(0.006)*	*(0.149)*	*(0.029)*	*(3.36E-06)*	-	-	-			
	0.004	0.002	-0.452**	-0.024	-1.80E-07	2.53E-08	0.040***	7.04E-05	8.324	0.081	135
	(0.003)	*(0.006)*	*(0.229)*	*(0.028)*	*(5.20E-06)*	*(1.73E-08)*	*(0.013)*	*(6.58E-05)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

TABLE 23: REGRESSION RESULTS FOR VC AGE ON WEALTH RELATIVES

Inferential statistics have already shown no significant difference between firms backed by reputable and less reputable VC firms. This result can be confirmed from the regression analysis. As expected, no significant relation between the VC firms' age and the WRs for both indices is found. Since the S&P 500 and the Nasdaq exhibited relatively equal performances throughout the observation period, a significant difference between these two was not expected. The R-squared of the regression on WRs is very low but the number of observations almost matches the full sample. Interestingly, the log of the offering size is significant at the 5% level for the Nasdaq and at the 10% level for the S&P500 and reveals that smaller offerings perform better thus the results coincide with findings on BHRs but contradict the uncertainty assumptions. Rindermann (2003) also measures the impact of several control variables on three-year WRs. The estimates show supportingly negative but insignificant coefficients. It is noteworthy that the first regressions for the S&P500 and the Nasdaq WRs generate no significant coefficients at all. As a result, hypothesis 7a is rejected because the regression reveals insignificant estimates for the VC's age on WRs for both indices thus it does not influence its performance.

5.2.3 Robustness Tests

To verify the results obtained under the regression analysis, this thesis applies two different approaches on how to measure a VC firm's reputation and its corresponding influence on several performance measures. In the following, regression results are repeated using the fraction of portfolio companies publicly held by the lead VC firm and a reputation index created by Lee and Pollock (2011). For the sake of brevity, regression results are only presented in the appendix.

5.2.3.1 Reputation Indicator: Portfolio Companies publicly held

Numerous empirical studies make use of alternative reputation proxies. A widely used indicator is the VC firm's market share, i.e. the fraction of a VC firm's IPOs on all IPOs in a certain time period (see e.g. Nahata (2008), Ivanov et al. (2008) and Chemmanur, Krishnan, and Nandy (2011)). Since data for the VC firm's market share was not available for this thesis, the number of portfolio companies publicly held is utilized as an alternative indicator. As previously stated, the IPO is the most effective way to exit a portfolio company. Hence, the fraction of firms publicly held provides information on the VC firm's abilities, skills and finally its reputation to take its investments public successfully.

The regression results on underpricing exhibit almost identical results compared to regressions on the basis of the VC firm's age at the IPO. The reputation indicator is not significant, the goodness of fit is similar and all control variables show equal significances. As a result, the initial estimations for underpricing are robust to the ones based on the fraction of firms publicly held (see Appendix 24). The same holds for regression results on the Tobin's Q (see Appendix 27) and the industry-adjusted ROA. The findings are identical to estimations in the previous section (reputation proxy for Tobin's Q in t_1 is significant at the 10% level). Concerning regressions for the ROA, the reputation proxy is now significant for the ROA in t_1, instead of t_3. However, significance levels for the log of the offering size are identical and also entirely positive thus the results can be considered as robust (see Appendix 28). A similar pattern is observable when running regressions for the EBITDA/ASSETS and EBITDA/SALES ratios. Again, the reputation proxy is insignificant but the independent variables remain their level of significance and their magnitude (see Appendix 29). Robustness estimations for the BHRs (see Appendix 30) and WRs (see Appendix 31) are also equal to initial findings, thus withstanding the robustness test. However, reputation coefficients for WRs are considerably higher in magnitude but remain insignificant.

In contrast to this, the only finings that are not robust are conducted regressions for MLOTT. The reputation indicator gets significant at the 5% level, all other variables maintain their significance level and their algebraic signs (see Appendices 25 and 26.)

As a result, the fraction of firms publicly held by the lead VC firm is an appropriate alternative to proxy the VC firm's reputation. The results are almost identical with one exception for MLOTT thus initial results can be considered as robust.

5.2.3.2 Reputation Indicator: Reputation Index

Another alternative to account for the lead VC firm's reputation is the reputation index by Lee and Pollock (2011).[67]

The regression results for underpricing are not robust since the reputation proxy is insignificant in contrast to initial estimations on underpricing. However, almost all other coefficients remain their significance level and their magnitude. The logarithm of the offering size is still highly significant and positive (see Appendix 32). The opposite is true for findings on the log of MLOTT. Initial regressions revealed a positive and significant reputation coefficient (5% level), whereas robustness regressions display an insignificant and negative value. The results on the other coefficients are also ambiguous. The log offer size, the shares offered, the initial share price and the number of employees almost remain unchanged (see Appendices 33 and 34). However, the amount of assets is only significant for initial regressions. No similarities are found regarding tests on Tobin's Q. The reputation indicator is insignificant for all observation years as well as for the average three-year ratio (see Appendix 35). In contrast to this, estimations on the ROA seem to be robust. The reputation index is significant for the ROA in t_3 which is in line with initial estimations. In addition, the logarithm of the offer size is still significant but only at the 10% level and similar in magnitude (see Appendix 36). Concerning the EBITDA/ASSETS and EBITDA/SALES ratio as well as the BHRs and WRs, results seem robust since none of the regressions shows significant and divergent results (see Appendices 37, 38, and 39).

All in all, the reputation index does not seem to be a reliable predictor of a VC firm's reputation with respect to the chosen sample because hardly any estimations are significant.[68]

[67] For detailed information on the composition of the index, please refer to Appendix 2 or visit the website of Timothy G. Pollock at: http://www.timothypollock.com/vc_reputation.htm.

[68] The weak regression output may also be due to the extremely reduced number of observations. Since not all lead VC firms were listed in the index and assigned with a reputation, only VC firms that are included in the index are considered in the regression analysis. Against this background it is still surprising that the estimated coefficients do not vary heavily in magnitude compared to initial regressions.

Chapter 6: Concluding Remarks

6.1 Conclusions

This master thesis aims to capture the reputational effect of Venture Capital firms on the post-IPO operating performance of their portfolio companies. Contrary to related existing empirical investigations, the thesis on hand does not find supporting evidence that portfolio companies backed by reputable VC firms significantly outperform portfolio companies backed by less reputable VCs. This overall conclusion is drawn upon the insignificance of the applied reputation indicators and the rejection of the postulated research hypotheses for the most part. Even when introducing two alternative reputation proxies to test for the results' robustness, the reputation indicators largely remain insignificant as well as other coefficients exhibiting similar values and algebraic signs compared to initial regressions. In general, the empirical findings of this thesis are ambiguous and often hard to interpret in a meaningful way.

When applying the average age of the lead Venture Capital as a reputation indicator to decompose the sample of 143 portfolio companies into two parts, the subsequent empirical investigation on 68 portfolio companies backed by reputable- and 75 portfolio companies backed by less reputable VC firms suggests that portfolio companies backed by less reputable investors are significantly older at the IPO and have more employees which is contrary to existing literature.

Although estimations on underpricing for the entire sample are supportive to previous findings, neither inferential statistics nor the regression analysis find significant differences between both firm types and no significant influence of the lead VC firms' age. Results on the market-to-book ratio measured over a three-year time horizon reveal portfolio companies backed by reputable investors outperforming their counterparts in every point of time (except in year 3 after the IPO) but the difference is only significant in the second post-IPO year. As higher market-to-book ratios indicate favorable growth prospects, it can be interfered from the results that a portfolio company's affiliation with a reputable VC firm is more honored by the market. This is further supported by the regression analysis which finds a significant and positive impact on the VC firms' age for the one-year Tobin's Q. The catching up of portfolio companies in year 3 after the IPO is presumably based on the disclosure of additional

information over time thus investors can more accurately evaluate a company's growth opportunities and seem to judge start-ups with less reputable VC affiliation superiorly.
Results on the industry-adjusted ROA are also not intuitive. Inferential statistics do not reveal a significant difference on average ROAs, however the ROA in t_3 is closest to being significant. In contrast, regression results find a positive and significant impact of the VC firms' age on the ROA's trend. For all other ratios employed in this thesis, neither the inferential statistics nor the regression analysis finds a significant difference in means or a significant influence of the reputation indicator on the portfolio companies' performance. On the basis of the estimated results, this thesis arrives at the conclusion that the post-IPO performance of companies backed by reputable and less reputable VC firms does not significantly differ from each other.

However, these results must be regarded with caution. The determination of the lead investor, the sample selection and the definition of the reputation indicator are largely conducted on the basis of various assumptions which were inevitable due to the lack of data availability. Although all assumptions are empirically verifiable, the danger of biased results is present without any doubt. With respect to the availability of data and information for the empirical analysis being solely provided by Dow Jones Venture Source, the author conducts the empirical analysis and is thereby making use of the provided data to the best of his knowledge.
Ideally, this thesis should have built its empirical investigation upon the identical sample used by Gompers (1996) and further apply his methodology to distinguish between reputable and less reputable VC firms for an exact measurement of the reputational effect on the post-IPO performance differences among portfolio companies. Since the same data set was not available and even approaching Paul Gompers directly for justifying his decomposing of the sample was unsuccessful, this thesis constructs its own methodology, sample selection and regression framework which is nevertheless related as close as possible to existing empirical investigations on this topic.

6.2 Suggestions for further Research

Investigating the effects of reputation is a crucial issue especially for the Venture Capital industry where credibility, the showcase of capabilities and skills as well as raising the

awareness of potential investors is of invaluable importance. This master thesis bases the empirical investigation on reputation indicators and performance measures that have widely been applied in existing literature. Since data for the Venture Capital industry is limited and their gathering is accompanied at great expense, the accuracy and availability is a serious issue, not only for this master thesis but also in most empirical investigations. It can be assumed that more reliable results could have been estimated if data availability was enhanced. It is of great interest to see if the results obtained in this thesis would remain robust if e.g. increasing the number of observations, retrieving precise information on the lead investor, estimating a reliable reputation indicator, including industry effects in the regressions or retrieving data on the lead underwriter. Further research on this topic would provide entrepreneurs and investors with valuable information if the affiliation with reputable Venture Capital firms is worth while. If no long-term post-IPO performance difference between portfolio companies backed by reputable or less reputable VC firms exists, why would an investor incur higher management fees and carried interest charged by reputable VCs when finally being provided with return comparable to one provided by a less reputable VC firm? Why would an entrepreneur engage in a contract of receiving funding with a reputable VC firm when instead the performance of his enterprise is irrelevant of the investor's reputation? For this reason, the reputation effect of Venture Capital on the long-run prospects of start-ups deserves greater attention and may lead to interesting insights on the contingencies for firm performance.

Bibliography

Achleitner, Ann-Kristin, Nico Engel, and Uwe Reiner. 2013. "The Performance of Venture Capital Investments: Do Investors Overreact?" *Review of Financial Economics* 22 (1) (January): 20–35. doi:10.1016/j.rfe.2012.10.001.

Ahmand-Zaluki, Nurwati A. 2008. "Post-IPO Performance and Earnings Management." *International Business Research* 1 (2) (April): 39–48.

Baker, Malcolm, and Jeffrey Wurgler. 2002. "Market Timing and Capital Structure." *The Journal of Finance* 57 (1) (February): 1–32. doi:10.1111/1540-6261.00414.

Barry, Christopher B. 1994. "New Directions in Research on Venture Capital Finance." *Financial Management* 23 (3).

Barry, Christopher B., Chris J. Muscarella, John W. Peavy, and Michael R. Vetsuypens. 1990. "The Role of Venture Capital in the Creation of Public Companies." *Journal of Financial Economics* 27 (2) (October): 447–471. doi:10.1016/0304-405X(90)90064-7.

Bengtsson, Ola. 2009. "Restrictive Covenants in Venture Capital Contracts". SSRN Scholarly Paper ID 1459012. Rochester, NY: Social Science Research Network. http://papers.ssrn.com/abstract=1459012.

Ber, Hedva, Yishay Yafeh, and Bank Yisrael. 2003. *Venture Capital Funds and post-IPO Performance in Booms and Busts: Evidence from Israeli IPO's in the US in the 1990's*. Jerusalem: Research Dept., Bank of Israel.

Bessler, Wolfgang, and Martin Seim. 2011. "European Venture-backed IPOs: An Empirical Analysis". EVCA & Justus-Liebig-University Giessen. http://www.evca.eu/uploadedFiles/News1/News_Items/2011-03-07_PR_EVCA_VC_IPO_Europe_Study_BesslerSeim.pdf.

Brander, James A., Raphael Amit, and Werner Antweiler. 2002. "Venture-Capital Syndication: Improved Venture Selection Vs. The Value-Added Hypothesis." *Journal of Economics & Management Strategy* 11 (3): 423–452.

Brav, Alon, and Paul A. Gompers. 1997. "Myth or Reality? The Long-Run Underperformance of Initial Public Offerings: Evidence from Venture and Nonventure Capital-Backed Companies." *The Journal of Finance* 52 (5) (December): 1791–1821.

Brav, Alon, and Paul A. Gompers. 1999. "Insider Trading Subsequent to Initial Public Offerings: Evidence from Expirations of Lock-Up Provisions." http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.202.3305.

Brown, James R. 2005. "Venture Capital and Firm Performance over the Long-run: Evidence from High-tech IPOs in the United States." *Journal of Entrepreneurial Finance* 10 (3): 1–33.

Burgstahler, David, and Michael Eames. 2006. "Management of Earnings and Analysts' Forecasts to Achieve Zero and Small Positive Earnings Surprises." *Journal of Business Finance Accounting* 33 (5-6) (June): 633–652. doi:10.1111/j.1468-5957.2006.00630.x.

Bygrave, William D, and Timmons. 1992. *Venture Capital at the Crossroads*. Boston, Mass.: Harvard Business School Press.

Casamatta, Catherine, and Carole Haritchabalet. 2007. "Experience, Screening and Syndication in Venture Capital Investments". IDEI Working Paper 443. Institut d'Économie Industrielle (IDEI), Toulouse. http://ideas.repec.org/p/ide/wpaper/6748.html.

Chemmanur, T. J., S. He, and D. K. Nandy. 2009. "The Going-Public Decision and the Product Market." *Review of Financial Studies* 23 (5) (December 4): 1855–1908. doi:10.1093/rfs/hhp098.

Chemmanur, Thomas J., Karthik Krishnan, and Debarshi K. Nandy. 2011. "How Does Venture Capital Financing Improve Efficiency in Private Firms? : a Look Beneath the Surface." *The Review of Financial Studies* 24: 4037–4090.

Cochrane, John H. 2005. "The Risk and Return of Venture Capital." *Journal of Financial Economics* 75 (1) (January): 3–52. doi:10.1016/j.jfineco.2004.03.006.

Cumming, Douglas. 2012. *The Oxford Handbook of Venture Capital*. New York: Oxford University Press.

Cumming, Douglas, Grant Fleming, and Armin Schwienbacher. 2006. "Legality and Venture Capital Exits." *Journal of Corporate Finance* 12 (2) (January): 214–245. doi:10.1016/j.jcorpfin.2004.12.004.

Da Rin, Marco, Thomas Hellmann, and Manju Puri. 2012. "A Survey of Venture Capital Research." *Handbook of the Economics of Finance* Vol.2. http://arno.uvt.nl/show.cgi?fid=120560.

Dimovski, William, and Robert Brooks. 2006. "Factors Influencing Money Left on the Table by Property Trust IPO Issuers." *Journal of Property Research* 23 (3) (September): 269–280. doi:10.1080/09599910600969206.

Doukas, John A., and Halit Gonenc. 2005. "Long-term Performance of New Equity Issuers, Venture Capital and Reputation of Investment Bankers." *Economic Notes* 34 (1) (February): 1–34. doi:10.1111/j.0391-5026.2005.00142.x.

Dushnitsky, Gary, and Michael J. Lenox. 2005. "When Do Firms Undertake R&D by Investing in New Ventures?" *Strategic Management Journal* 26: 947–965. doi:10.1002/smj.488.

Dushnitsky, Gary, and Michael J. Lenox. 2006. "When Does Corporate Venture Capital Investment Create Firm Value?" *Journal of Business Venturing* 21 (6) (November): 753–772. doi:10.1016/j.jbusvent.2005.04.012.

Engelen, Peter-Jan, and Marc van Essen. 2010. "Underpricing of IPOs: Firm-, Issue- and Country-specific Characteristics." *Journal of Banking & Finance* (34) (January): 1958–1969. doi:10.1016/j.jbankfin.2010.01.002.

Field, Laura Casares, and Gordon Hanka. 2001. "The Expiration of IPO Share Lockups." *The Journal of Finance* 56 (2): 471–500. doi:10.1111/0022-1082.00334.

Field, Laura Casares, and Jonathan M. Karpoff. 2002. "Takeover Defenses of IPO Firms." *The Journal of Finance* 57 (5) (October): 1857–1889. doi:10.1111/0022-1082.00482.

Francis, Bill B., and Iftekhar Hasan. 2001. "Underpricing of Venture and Non Venture Capital IPOs: An Empirical Investigation." *Journal of Financial Services Research* 19 (2): 99–113.

Franzke, Stefanie A. 2001. "Underpricing of Venture-Backed and Non Venture-Backed IPOs: Germany's Neuer Markt." *Center for Financial Studies* CFS Working Paper (2001/01) (September). http://www.cepr.org/meets/wkcn/5/575/papers/franzke.pdf.

Fund, Bret R., Timothy G. Pollock, Ted Baker, and Adam J. Wowak. 2008. "Who's the New Kid? The Process of Developing Centrality in Venture Capitalist Deal Networks." *Advances in Strategic Management* 25 (July 25): 563–593. doi:10.1016/S0742-3322(08)25016-3.

Ghosh, Arvin. 2011. "Pricing And Long-Run Performance Of The Venture-Backed And Nonventure-Backed IPOS." *International Business & Economics Reserach Journal* 2 (6): 87–94.

Gill, Andrej, and Uwe Walz. 2012. "Going Public - Going Private: The Case of VC-backed Firms". CFS Working Paper Series 2012/02. Center for Financial Studies (CFS). http://ideas.repec.org/p/zbw/cfswop/201202.html.

Giot, Pierre, and Armin Schwienbacher. 2007. "IPOs, Trade Sales and Liquidations: Modelling Venture Capital Exits Using Survival Analysis." *Journal of Banking & Finance* 31 (3) (March): 679–702. doi:10.1016/j.jbankfin.2006.06.010.

Gompers, Paul A. 1995. "Optimal Investment, Monitoring, and the Staging of Venture Capital." *The Journal of Finance* 50 (5) (December): 1461. doi:10.2307/2329323.

Gompers, Paul A. 1996. "Grandstanding in the Venture Capital Industry." *Journal of Financial Economics* 42 (1) (September): 133–156. doi:10.1016/0304-405X(96)00874-4.

Gompers, Paul A., and Josh Lerner. 2001. "The Venture Capital Revolution." *The Journal of Economic Perspectives* 15 (2): 145–168.

Gompers, Paul A., Josh Lerner, Margaret M. Blair, and Thomas Hellmann. 1998. "What Drives Venture Capital Fundraising?" *Brookings Papers on Economic Activity. Microeconomics* 1998: 149. doi:10.2307/2534802.

Gompers, Paul A., and Joshua Lerner. 1997. "The Use of Covenants: An Empirical Analysis of Venture Partnership Agreements." *Journal of Law and Economics* 1 (2). Investment Policy (September): 122–130.

Gompers, Paul A., and Joshua Lerner. 1999. "An Analysis of Compensation in the U.S. Venture Capital Partnership." *Journal of Financial Economics* 51: 3–44.

Gorman, Michael, and William A. Sahlman. 1989. "What Do Venture Capitalists Do?" *Journal of Business Venturing* 4 (4): 231–248.

Guler, Isin. 2007. "Throwing Good Money after Bad? Political and Institutional Influences on Sequential Decision Making in the Venture Capital Industry." *Administrative Science Quarterly* 52 (2) (June): 248–285.

Harris, Robert S., Tim Jenkinson, and Steven N. Kaplan. 2013. "Private Equity Performance: What Do We Know?" SSRN Scholarly Paper ID 1932316. Rochester, NY: Social Science Research Network. http://papers.ssrn.com/abstract=1932316.

Hellmann, Thomas, and Manju Puri. 2000. "The Interaction Between Product Market and Financing Strategy: The Role of Venture Capital." *Review of Financial Studies* 13 (4): 959–84.

Hsu, David H. 2004. "What Do Entrepreneurs Pay for Venture Capital Affiliation." *The Journal of Finance* 59 (4) (August): 1805–1844.

Hsu, Scott H.C. 2009. "Industry Technological Changes, Venture Capital Incubation, and Post-IPO Firm Innovation and Performance." *EFA 2009 Bergen Meetings Paper* (February). http://dx.doi.org/10.2139/ssrn.1341857.

Ivanov, Vladimir, C.N.V. Krishnan, Ronald W. Masulis, and Ajai K. Singh. 2008. "Does Venture Capital Reputation Matter? Evidence from Successful IPOs" (February). http://ssrn.com/abstract=910982.

Jain, Bharat A., and Omesh Kini. 1994. "The Post-Issue Operating Performance of IPO Firms." *The* 49 (5): 1699–1726.

Jain, Bharat A., and Omesh Kini. 1995. "Venture Capitalist Participation and the Post-issue Operating Performance of IPO Firms." *Managerial and Decision Economics* 16 (6): 593–606. doi:10.1002/mde.4090160603.

Jain, Bharat A., and Omesh Kini. 2000. "Does the Presence of Venture Capitalists Improve the Survival Profile of IPO Firms?" *Journal of Business Finance* 27 (9&10) (December): 1139–1183. doi:10.1111/1468-5957.00350.

Kaplan, Steven N., and Antoinette Schoar. 2005. "Private Equity Performance: Returns, Persistence, and Capital Flows." *The Journal of Finance* 60 (4) (August): 1791–1823. doi:10.1111/j.1540-6261.2005.00780.x.

Kaplan, Steven N., and Per Strömberg. 2004. "Characteristics, Contracts, and Actions: Evidence from Venture Capitalist Analyses." *The Journal of Finance* 59 (5) (October): 2177–2210. doi:10.1111/j.1540-6261.2004.00696.x.

Kaplan, Steven, and Per Strömberg. 2000. "How Do Venture Capitalists Choose Investments?" *White Paper* (August). http://www.hec.fr/var/corporate/storage/original/application/2bab283a1bb53fc01cf38f0629bb59c4.pdf.

Kaplan, Steven, and Per Strömberg. 2001. "Venture Capitalists as Principals: Contracting, Screening, and Monitoring." *National Bureau of Economic Research* (Working Paper No. 8202) (April). http://www.nber.org/papers/w8202.

Kaplan, Steven, and Per Strömberg. 2002. "Financial Contracting Theory Meets the Real World: An Empirical Analysis of Venture Capital Contracts." *Review of Economic Studies* 00: 1–35.

Kenney, Martin, and Donald Patton. 2013. "Firm Database of Initial Public Offerings (IPOs) from June 1996 through 2010 (Version C)". University of California.

Kortum, Samuel, and Joshua Lerner. 1998. "Does Venture Capital Spur Innovation?" *NBER Working Paper Series* Working Paper 6846 (December). http://www.nber.org/papers/w6846.pdf.

Kraus, Tilo, and Hans-Peter Burghof. 2003. "Post-IPO Performance and the Exit of Venture Capitalists". University of Munich. http://www.en.bwl.uni-muenchen.de/research/diskus_beitraege/workingpaper/3255.pdf.

Krishnan, C.N.V., Vladimir Ivanov, Ronald W. Masulis, and Ajai K. Singh. 2011. "Venture Capital Reputation, Post-IPO Performance, and Corporate Governance." *Journal of Financial and Quantitative Analysis* 46 (5) (October): 1295–1333.

Lee, Peggy M., and Timothy G. Pollock. 2011. "The Contingent Value of Venture Capitalist Reputation." *Strategic Organization* 9 (1): 33–69. doi:10.1177/1476127011400505.

Lee, Peggy M., and Sunil Wahal. 2004. "Grandstanding, Certification and the Underpricing of Venture Capital Backed IPOs." *Journal of Financial Economics* 73 (2) (August): 375–407. doi:10.1016/j.jfineco.2003.09.003.

Lerner, Josh. 1995. "Venture Capitalists and the Oversight of Private Firms." *The Journal of Finance* 50 (1) (March): 301–318.

Lerner, Josh. 2002. "Boom and Bust in the Venture Capital Industry and the Impact on Innovation." *Economic Review* (Q4): 25–39.

Lerner, Josh. 2011. "The Future of Private Equity: The Future of Private Equity." *European Financial Management* 17 (3) (June): 423–435. doi:10.1111/j.1468-036X.2010.00589.x.

Lerner, Josh, Antoinette Schoar, and Wan Wongsunwai. 2007. "Smart Institutions, Foolish Choices: The Limited Partner Performance Puzzle." *The Journal of Finance* 62 (2): 731–764. doi:10.1111/j.1540-6261.2007.01222.x.

Lerner, Joshua. 1994. "The Syndication of Venture Capital Investments." *Financial Management* 23 (3): 16.

Ljungqvist, Alexander, Yael V. Hochberg, and Yang Lu. 2005. "Whom You Know Matters: Venture Capital Networks and Investment Performance". SSRN Scholarly Paper ID 631941. Rochester, NY: Social Science Research Network. http://papers.ssrn.com/abstract=631941.

Ljungqvist, Alexander, Felicia C. Marston, and William J. Wilhelm. 2007. "Scaling the Hierarchy: How and Why Investment Banks Compete for Syndicate Co-Management Appointments". SSRN Scholarly Paper ID 800184. Rochester, NY: Social Science Research Network. http://papers.ssrn.com/abstract=800184.

Ljungqvist, Alexander, and Matthew Richardson. 2003. "The Cash Flow, Return and Risk Characteristics of Private Equity". w9454. National Bureau of Economic Research.

Loderer, Claudio, and Kenneth Martin. 1997. "Executive Stock Ownership and Performance Tracking Faint Traces." *Journal of Financial Economics* 45 (2) (August): 223–255. doi:10.1016/S0304-405X(97)00017-2.

Loughran, Tim, and Jay R. Ritter. 1995. "The New Issues Puzzle." *The Journal of Finance* 50 (1): 23–51.

Loughran, Tim, and Jay R. Ritter. 2002. "Why Don't Issuers Get Upset About Leaving Money on the Table in IPOs?" *The Review of Financial Studies* 15 (2): 413–443.

McKenzie, Michael D., and William H. Janeway. 2011. "Venture Capital Funds and the Public Equity Market." *Accounting & Finance* 51 (3) (September): 764–786. doi:10.1111/j.1467-629X.2010.00373.x.

Meggison, William L., and Kathleen A. Weiss. 1991. "Venture Capitalist Certification in Initial Public Offerings." *The Journal of Finance* 46 (3). Papers and Proceedings (July): 879–903.

Nahata, Rajarishi. 2008. "Venture Capital Reputation and Investment Performance." *Journal of Financial Economics* 90 (2) (November): 127–151. doi:10.1016/j.jfineco.2007.11.008.

Neher, Darwin V. 1999. "Staged Financing: An Agency Perspective." *The Review of Economic Studies* 66 (2) (April 1): 255–274. doi:10.1111/1467-937X.00087.

Rindermann, Georg. 2003. "Venture Capitalist Participation and the Performance of IPO Firms: Empirical Evidence from France, Germany, and the UK." http://papers.ssrn.com/sol3/papers.cfm?abstract_id=425080.

Rindova, Violina P., Ian O. Williamson, and Antoaneta P. Petkova. 2005. "Being Good or Being Known: An Empirical Examination of the Dimensions, Antecedents, and Consequences of Organizational Reputation." *Academy of Management Journal* 48 (6): 1033–1049.

Ritter, Jay R. 1984. "The 'Hot Issue' Market of 1980." *The Journal of Business* 57 (2) (April): 215–240.

Ritter, Jay R. 1987. "The Cost of Going Public." *Journal of Financial Economics* (19) (January): 269–281.

Ritter, Jay R. 1991. "The Long-Run Performance of Initial Public Offerings." *The Journal of Finance* 46 (1): 3–27.

Ritter, Jay R. 1998. "Initial Public Offerings." *Contemporary Finance Digest* 2 (1): 5–30.

Ritter, Jay R. 2013. "Initial Public Offerings: Updated Statistics." http://bear.warrington.ufl.edu/ritter/IPOs2012Underpricing.pdf.

Sah, Raaj Kumar, and Joseph E. Stiglitz. 1986. "The Architecture of Economic Systems: Hierarchies and Polyarchies." *American Economic Review* 76 (4): 716–27.

Sahlman, William. 1994. "Venture Capital: A Model of Project Governance." *Unpublished Manuscript* (Harvard University, Boston, MA).

Sahlman, William A. 1990. "The Structure and Governance of Venture-capital Organizations." *Journal of Financial Economics* 27: 473–521.

Schwienbacher, Armin. 2005. "An Empirical Analysis of Venture Capital Exits in Europe and the United States". SSRN Scholarly Paper ID 302001. EFA 2002 Berlin Meetings Discussion Paper. Rochester, NY: Social Science Research Network. http://papers.ssrn.com/abstract=302001.

Schwienbacher, Armin. 2008. "Innovation and Venture Capital Exits*." *The Economic Journal* 118 (533) (November): 1888–1916. doi:10.1111/j.1468-0297.2008.02195.x.

Shu, Pei-Gi, Yin-Hua Yeh, Shean-Bii Chiu, and Fu-Sheng Ho. 2010. "The Reputation Effect of Venture Capital." *Review of Quantitative Finance and Accounting* 36 (4) (June 26): 533–554. doi:10.1007/s11156-010-0188-x.

Smart, Scott B, and Chad J Zutter. 2003. "Control as a Motivation for Underpricing: a Comparison of Dual and Single-class IPOs." *Journal of Financial Economics* 69 (1) (July): 85–110. doi:10.1016/S0304-405X(03)00109-0.

Smith, Richard, Roberto Pedace, and Vijay Sathe. 2010. "Venture Capital Fund Performance: The Effects of Exits, Abandonment, Persistence, Experience, and Reputation" (September). http://ssrn.com/abstract=1432858.

Sørensen, Morten. 2007. "How Smart Is Smart Money? A Two-Sided Matching Model of Venture Capital." *The Journal of Finance* 62 (6) (November 28): 2725–2762. doi:10.1111/j.1540-6261.2007.01291.x.

Sorenson, Olav, and Toby Stuart. 1999. "Syndication Networks and the Spatial Distribution of Venture Capital Investments". SSRN Scholarly Paper ID 220451. Rochester, NY: Social Science Research Network. http://papers.ssrn.com/abstract=220451.

Su, Roger, Keith Hooper, Amitabh S. Dutta, and Ronghua Yi. 2011. "Why Small Business Owners Should Not Worry About 'Money Left on the Table' in IPOs!" *International Business Research* 4 (4) (October): 42–52. doi:10.5539/ibr.v4n4p42.

Teoh, Siew Hong, Ivo Welch, and T.J. Wong. 1998. "Earnings Management and the Long-Run Market Performance of Initial Public Offerings." *The Journal of Finance* 53 (6) (December): 1935–1974. doi:10.1111/0022-1082.00079.

The National Venture Capital Association. 2007. "Venture Impact: The Economic Importance of Venture Capital Backed Companies to the U.S. Economy". Fourth Edition. IHS Global Insight.

The National Venture Capital Association. 2009. "Venture Impact: The Economic Importance of Venture Capital-Backed Companies to the U.S. Economy". Fifth Edition. IHS Global Insight.

The National Venture Capital Association. 2011. "Venture Impact: The Economic Importance of Venture Capital-Backed Companies to the U.S. Economy". Global Insight. http://www.nvca.org/index.php?option=com_content&view=article&id=255&Itemid=103.

Tian, Xuan. 2011. "The Role of Venture Capital Syndication in Value Creation for Entrepreneurial Firms." *Review of Finance* 16 (1) (June 23): 245–283. doi:10.1093/rof/rfr019.

Tian[a], Xuan. 2011. "The Causes and Consequences of Venture Capital Stage Financing." *Journal of Financial Economics* 101 (1) (July): 132–159. doi:10.1016/j.jfineco.2011.02.011.

Tobin, James. 1969. "A General Equilibrium Appraoch To Monetary Theory." *Journal of Money, Credit and Banking* 1 (1) (February): 15–29.

Wang, Clement K., Kangmao Wang, and Qing Lu. 2002. "Effects of Venture Capitalists' Participation in Listed Companies." *Journal of Banking & Finance* 27 (10) (March): 2015–2034. doi:10.1016/S0378-4266(02)00317-5.

Wang, Susheng, and Hailan Zhou. 2004. "Staged Financing in Venture Capital: Moral Hazard and Risks." *Journal of Corporate Finance* 10 (1) (January): 131–155. doi:10.1016/S0929-1199(02)00045-7.

Wilbon, Anthony D. 2003. "Competitive Posture and IPO Performance in High Technology Firms." *Journal of Engineering and Technology Management* 20 (3) (September): 231–244. doi:10.1016/S0923-4748(03)00020-1.

Yap, Huei Siang. 2009. "Venture Capital Firm's Reputation Effect on Its Start-up Company's Long Term Operating Performance and Survivorship". Dissertations and Theses Collections. http://ink.librabry.smu.edu.sg/etd_coll.

Appendices

Appendix 1: Summary in German

Venture Capital gewinnt seit dem Beginn der 1990er Jahre insbesondere für junge Unternehmen als Finanzierungsmöglichkeit zunehmend an Bedeutung. In den USA ist der Einsatz von Venture Capital weit verbreitet und leistet einen bemerkenswerten Beitrag zur Stärkung der Wirtschaft im Hinblick auf die Schaffung von neuen Arbeitsplätzen, der Gründung von neuen Unternehmen und der Anmeldung von neuen Patenten und Technologien. Venture Capital Firmen akquirieren Kapital von verschiedenen Investorenklassen und bündeln dieses in geschlossenen Fonds mit einer Laufzeit von üblicherweise 8-10 Jahren. Nach der sorgfältigen Prüfung von oft mehreren hundert eingereichten Business Plänen der kapitalbedürftigen Start-Up Unternehmen, wird das im Fond befindliche Kapital schrittweise an nur einige wenige Unternehmen gegen Austausch von Eigenkapitalanteilen weitergeleitet. Weitere Investitionen in die Unternehmen knüpfen die Venture Capital Gesellschaften an verschiedene Zwischenziele, die vertraglich mit dem Management des Start-Ups vereinbart wurden. Der effektivste und ertragreichste Weg das Start-Up Unternehmen nach der Laufzeit des Fonds abzuwickeln ist ein Börsengang. Zahlreiche empirische Untersuchungen beschäftigen sich mit der Auswirkung der Reputation der Venture Capital Gesellschaften auf verschiedene Performancemerkmale der Start-Up Unternehmen. Diese Masterthesis basiert auf einer Studie von Gompers (1996), der Erkenntnisse über die Unterschiede von Start-Up Unternehmen, die von erfahrenen und unerfahrenen Venture Capital Gesellschaften finanziert worden sind, gewinnen konnte. Die vorliegende Arbeit führt in Ansätzen seine Methodik fort, stützt jedoch die empirische Untersuchung auf einen anderen Datensatz und versucht darüberhinaus zu ermitteln, in wieweit die sich der Reputationsunterschied der Venture Capital Firmen auf die Performance der Start-Up Unternehmen bis zu drei Jahre nach ihrem Börsengang auswirkt. Die Performance wird anhand von acht verschiedenen Indikatoren berechnet. Der Reputationsunterschied wird auf Basis des Alters der Venture Capital Gesellschaften zum Zeitpunkt des Börsengangs des jeweiligen Start-Ups ermittelt. Da Datenmaterial zu Venture Capital Transaktionen schwer zugänglich ist, basiert die vorliegende Arbeit auf zahlreichen Annahmen, die allerdings anhand von früheren empirischen Studien verifizierbar sind. Die empirische Untersuchung findet teilweise Parallelen zu Gompers (1996), aber auch zu anderen vergleichbaren Studien. Allerdings wird deutlich, dass auf Basis des

vorliegenden Datenmaterials kein signifikanter Unterschied in den Performancemerkmalen zwischen Unternehmen, die von renommierten und weniger renommierten Venture Capital Firmen finanziert werden, gefunden wird. Die Ergebnisse sind, bei einer Wiederholdung der Regressionsanalysen mit zwei weiteren Reputations-Indikatoren, weitestgehend robust.

Appendix 2: Definition of Variables

In the following an overview about the variables used in this thesis is provided. The variables are separated into three categories: proxies for measuring long term performance, Venture Capital reputation metrics and control variables used in the regression framework. Abbreviations in parenthesis and printed in italic denote the items used in COMPUSTAT.

I.) IPO Long Term Performance Measures

ROA
The Return on Assets (ROA) is the industry-adjusted rate of return on assets, calculated as the Net Income (*NI*) divided by Total Assets (*AT*) minus the industry average ROA. The industry ROA is defined as the average ROA in a particular industry based on the 2-digit SIC Codes. The ROA is estimated at four different points of time. ROA_t_0 is the annualized ROA at the end of the IPO year. ROA_t_1 is defined as the Return on Assets at the end of the first year after the IPO year. ROA_t_2 and ROA_t_3 calculated at the end of the second and third year after the IPO, respectively. The three-year average industry-adjusted ROA is defined as the mean of ROA_$_{t1,}$ ROA_$_{t2}$ and ROA_t3. Data (*NI*, *AT*, SIC Codes) are taken from COMPUSTAT.

BHR
Buy-and-Hold Return (BHR) is the return of a stock that was bought at a certain point of time in the past and held for a particular period. The BHR is calculated by subtracting the closing bid price (*BID*) in t_1 from the closing bid price in t_0 and divide this by the closing bid price in t_0. An alternative approach to compute the BHR is to set up the product function of all returns in the observation period and deduct the value of 1 from the result. BHRs are estimated for the time horizon of exactly 1,2 and 3 years after the IPO on the basis of monthly stock prices retrieved from CRSP.

CAR
The average cumulative abnormal return is defined as the sum of all abnormal returns of a stock against a benchmark over a predefined period of time. The abnormal return of a stock is calculated by deducting the return of the benchmark from the return of the stock in each point of time during the observation window. Abnormal returns are estimated on the basis of monthly stock closing bid prices (*BID*) and the return of the S&P500 Index (*SPRTRN*) and the Nasdaq 100 Composite Index. Closing bid prices and the S&P500 return are available on CRSP, the return of the Nasdaq 100 Composite Index was retrieved from Yahoo Finance. Cumulative Abnormal Returns are estimated for the time horizon of exactly 1,2 and 3 years after the IPO.

WR
Wealth Relatives (WR) are defined as the Buy-and-hold Return of a stock in relation to the Buy-and-hold Return of a comparable benchmark. A value greater than 1 indicates a superior performance of the particular stock against its benchmark. A value of exactly 1 reveals that the stock and the benchmark have performed equally. A Wealth Relative below 1 displays underperformance of the stock against its benchmark index. The stocks of the portfolio companies are compared against the S&P500 and Nasdaq 100 Composite Index. Wealth Relatives are estimated on the basis of monthly returns for a maximum of exactly three years after the IPO date. In case of less than 36 months of observations available, the maximum possible number of months was taken into account. Stock prices (*BID*) and the return on the S&P500 Index (*SPRTRN*) were taken from CRSP. Closing prices of the Nasdaq 100 Composite Index were gathered from Yahoo Finance.

Tobin's Q
Tobin's Q (TQ), also called market-to-book ratio is defined as the market value of equity to the book value of equity. The market value of equity is computed by the number of (common) shares outstanding (*CSHO*) multiplied by the stock's closing price (*PRCC*) at the end of the year. The book value of equity is composed of the total common equity of the stockholders (*SEQ*) plus net deferred balance sheet income taxes (*TXDITC*), minus carrying value of preferred stock (*PSTK*). To check the estimated market value for correctness, the market value (*MKVALT*) available on COMPUSTAT is also retrieved. Tobin's Q is estimated at four different points of time. TQ_t_0 is the market-to-book value at the end of the IPO year. TQ_t_1 is defined as the market-to-book value at the end of the first year after the IPO year. TQ_t_2 and TQ_t_3 calculated at the end of the second and third year after the IPO, respectively. Data (*CSHO, PRCC, SEQ, TXDITC, PSTK, MKVALT*) are taken from COMPUSTAT.

EBITDA/ Sales
EBITDA/Sales is defined as Earnings before Interest, Taxes, Depreciation and Amortization (*EBITDA*) as a percentage of total sales (*SALE*), also known as the profit margin. EBITDA/Sales is estimated at four different points of time. $EBITDA/Sales\_t_0$ is the profit margin at the end of the IPO year. $EBITDA/Sales\_t_1$ is retrieved at the end of the first year after the IPO year. $EBITDA/Sales\_t_2$ and $EBITDA/Sales\_t_3$ are calculated at the end of the second and third year after the IPO, respectively. The three year average EBITDA/Sales-ratio is computed by taking the average of all estimated values to obtain a value including three complete years of performance measurement and the value at the end of the IPO year. Data (*EBITDA, SALE*) are taken from COMPUSTAT.

EBITDA/ Assets
EBITDA/Sales is defined as Earnings before Interest, Taxes, Depreciation and Amortization (*EBITDA*) as a percentage of total assets (*AT*). EBITDA/Assets is estimated at four different points of time. $EBITDA/Assets\_t_0$ is the profit margin at the end of the IPO year. $EBITDA/Assets\_t_1$ is retrieved at the end of the first year after the IPO year. $EBITDA/Assets\_t_2$ and $EBITDA/Assets\_t_3$ are calculated at the end of the second and third year after the IPO, respectively. The three year average EBITDA/Assets-ratio is computed by taking the average of all estimated values to obtain a value including three complete years of performance measurement and the value at the end of the IPO year. Data (*EBITDA, AT*) are taken from COMPUSTAT.

Underpricing
Underpricing at the IPO date is defined as the closing bid price (*BID*) minus the initial share price divided by the initial share price. Underpricing is also known as the initial return at the day of the IPO. A positive return indicates an indirect cost for the issuing firm and that the stock experienced a higher valuation of the market in comparison to the initial valuation by the company. Hence, a negative value represents the opposite case. The initial share price for each IPO was available at the IPO database of Martin Kenney and Donald Patton containing all IPOs from June 1996 through 2010. The closing bid price was taken from Yahoo Finance in case it could not be retrieved from CRSP.

Money Left On The Table
Money left on the Table (MLOTT) is defined as the difference of the first day closing bid price (*BID*) and the initial share price multiplied by the number of shares sold at the IPO date. A positive value indicates a wealth transfer from existing shareholders to new investors since their stocks were offered at a lower price than the valuation of the stock by the market. A negative value signalizes that the stock was valued lower by the market than the initial share price set by the company. Closing bid prices are taken from CRSP or in case of unavailability from Yahoo Finance. The number of shares sold at the IPO date (*VOL*) is also retrieved from CRSP. The initial share price is available at Martin Kenney and Don Patton's IPO database.

II.) VC Reputation Proxies

VC Age
The VC Age is defined as the age of the lead Venture Capital firm measured form the year of its incorporation until the year of the IPO. Data is taken from the database Dow Jones Venture Source or from the webpages of the Venture Capital firms when data was not readily accessible.

VC Reputation Index
The Venture Capital Reputation Index is a multi-item and time varying index of formative indicators of Venture Capital reputation. Data is gathered for up to 1300 Venture Capital firms from 1990-2010. Indicators considered

in the index are: total dollar amount of funds, age of the Venture Capital firm, number of investment funds under management, number of start-up firms invested in, number of companies taken public and dollar amounts of funds invested in. Lead Venture Capital firms in this sample are matched to the firms listed in the reputation index and the corresponding value is retrieved as a reputation proxy. Most congruities regarding the Venture Capital firms are found for the Reputation Index estimated in the year 2000. The Venture Capital Reputation Index is available for download on the webpage of Timothy G. Pollock.

III.) Control Variables

Financing Rounds
The Variable *Financing Rounds* is defined as the number of different financing stages at which investors infuse a portfolio company with capital. New investments by Venture Capital firms are usually made contingent upon the completion of specified targets or milestones. Data are retrieved from Dow Jones Venture Source database.

Employees
The control variable *Employees* is defined as the number of employees working in the portfolio company at the time of the IPO. Data are retrieved from Dow Jones Venture Source database.

CEO Stake
A variable indicating the stake in the firm held by the CEO of the portfolio company at the IPO date. Data are retrieved from Dow Jones Venture Source database.

Founder Stake
A variable indicating the stake in the firm held by the founder of the portfolio company at the IPO date. Data are retrieved from Dow Jones Venture Source database.

Shares Offered
Shares Offered represents a variable providing information about the total amount of shares offered in the initial public offering. The amount of shares offered for each IPO was available at the IPO database of Martin Kenney and Donald Patton containing all IPOs from June 1996 through 2010.

Initial Share Price
The *Initial Share Price* is the price of the stock of the portfolio company that is determined upon the valuation of the firm prior to the IPO. Data for the variable is available at the IPO database of Martin Kenney and Donald Patton containing all IPOs from June 1996 through 2010.

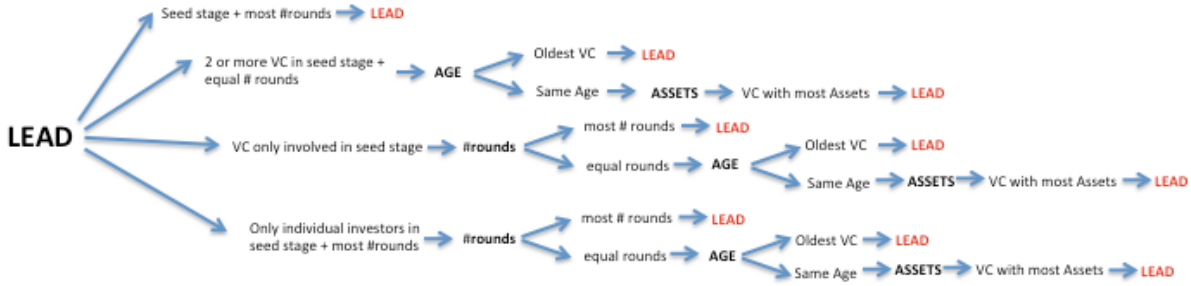
Offer Size
The *Offer Size* is defined as the initial share price multiplied by the shares offered at the IPO date of each portfolio company.

Assets
A variable providing information about the value of assets owned by the lead Venture Capital firm. The latest value available at Dow Jones Venture Source database is taken.

Age
The *Age* of the lead Venture Capital firm defined as the difference between the year of incorporation and today. Data are retrieved from Dow Jones Venture Source database or from the webpages of the Venture Capital firms when data was not readily accessible.

Publicly Held
A control variable indicating how many portfolio companies that a particular lead Venture Capital firm has invested in are now listed as publicly held firms. The variable is calculated as the number of publicly held portfolio companies divided by the total number of portfolio companies invested in. Data are retrieved from Dow Jones Venture Source database.

Appendix 3: Decision Tree for determining the Lead Investor



Appendix 4: Overview Research Hypotheses

Underpricing
H1: *The IPO issuers financed by reputable Venture Capital firms experience lower underpricing at the IPO date than issuer firms backed by less reputable investors.* **H1a:** *The older the lead Venture Capital firm, the lower the underpricing at the IPO.*
Money Left on the Table
H2*: The amount of money left on the table is less for portfolio companies backed by reputable Venture Capital firms compared to IPO issuers backed by less reputable Venture Capital firms.* **H2a:** *The older the lead Venture Capital firm at the IPO date, the less money is left on the table.*
Tobin's Q
H3: *Portfolio companies backed by reputable investors have a higher Tobin's Q compared to portfolio companies backed by less reputable Venture Capital firms.* **H3a:** *The higher the age of the lead Venture Capital firm at the IPO of its portfolio company, the higher is the portfolio company's Tobin's Q.*
Industry-adjusted ROA
H4: *Firm performance measured by industry-adjusted ROA is on average higher for portfolio companies backed by reputable investors in contrast to firms backed by less reputable VC firms.* **H4a:** *The age of the Venture Capital firm has a positive impact on post-IPO operating performance measured by the industry-adjusted ROA.*
EBITDA/ASSETS and EBITDA/SALES
H5: *The profit margin of companies backed by reputable VC firms is superior on a three-year average basis compared to portfolio companies backed by less reputable VC firms.* **H5a:** *The return on assets based on EBITDA is higher for portfolio companies backed by reputable VC firms on a three-year post-IPO average basis compared to portfolio companies backed by less reputable investors.* **H5b:** *The age of the lead VC at the IPO has a positive impact on the portfolio company's profit margin and the ROA based on EBITDA.*
Buy-and-Hold Returns
H6: *Portfolio companies backed by reputable investors outperform portfolio companies backed by less reputable VC firms in the first, second and third year after the IPO with respect to BHR.*

H6a: *The older the lead VC firm at the IPO, the higher the portfolio company's one-, two-, and three-year BHRs.*
Wealth Relatives
H7: *Wealth Relatives for portfolio companies backed by reputable investors are on average significantly higher than those of firms backed by less reputable investors.*
H7a: *The age of the lead Venture Capital firm at the IPO has a positive impact on the portfolio company's Wealth Relatives.*

Appendix 5: Descriptive Statistics on Portfolio Companies for IPO year 2004

Descriptive Statistics Portfolio Companies for IPO year 2004									
2004	# financing rounds till IPO	Employees	IPO Year	Age at IPO (in years)	CEO stake (in %)	founder stake (in %)	Shares Offered	Initial Share Price (in US $)	Offer Size (in US $)
MEAN	6.43	522	2004	9.75	6.07	12.57	5,938,689	12.77	98,943,524
MEDIAN	6	136	2004	7.00	3.00	10.00	5,500,000	11.00	52,300,000
MODE	6	83	2004	7.00	2.70	14.70	5,000,000	7.00	35,000,000
QUARTIL 25%	5	77	2004	5.00	2.28	4.10	4,912,500	7.00	39,843,750
QUARTIL 75%	8	302	2004	9.00	6.35	18.20	6,250,000	15.00	845,68,020
QUARTIL EXKL. 25%	5	76	2004	5.00	2.23	3.90	4,737,500	7.00	39,531,250
QUARTIL EXKL. 75%	8	311	2004	9.00	6.65	18.80	6,250,000	15.00	85,704,061
MIN	2	17	2004	2.00	1.20	1.30	2,100,000	6.00	12,600,000
MAX	11	7700	2004	76.00	45.80	45.80	19,605,052	85.00	1,666,429,420
STDEVIATION	2.17	1280	0.00	12.04	7.80	11.32	2,709,555	11.44	234,156,545
# of observations	48	48	48	48	44	33	48	48	48

Appendix 6: Descriptive Statistics on Portfolio Companies for IPO year 2005

Descriptive Statistics Portfolio Companies for IPO year 2005									
2005	# financing rounds till IPO	Employees	IPO Year	Age at IPO (in years)	CEO stake (in %)	founder stake (in %)	Shares Offered	Initial Share Price (in US $)	Offer Size (in US $)
MEAN	5.44	384	2005	7.83	9.36	15.58	6,912,528	11.74	90,062,855
MEDIAN	6	131	2005	7.00	3.80	6.20	5,333,333	11.00	55,300,000
MODE	7	71	2005	6.00	1.30	2.20	5,000,000	12.00	42,000,000
QUARTIL 25%	4	73	2005	5.00	2.35	3.20	4,300,000	9.00	42,000,000
QUARTIL 75%	7	275	2005	9.00	8.95	23.93	6,700,000	14.00	96,000,000
QUARTIL EXKL. 25%	3,5	72	2005	5.00	2.20	3.20	4,150,000	8.50	41,399,995
QUARTIL EXKL. 75%	7	276	2005	9.00	9.10	25.18	6,750,000	14.00	99,600,000
MIN	2	17	2005	2.00	1.30	1.60	2,400,000	5.50	19,200,000
MAX	11	6200	2005	20.00	57.20	63.50	29,500,000	24.00	560,500,000
STDEVIATION	2.26	981	0.00	4.07	14.38	19.16	5,531,324	4.23	104,466,934
# of observations	42	41	42	41	32	25	42	42	42

Appendix 7: Descriptive Statistics on Portfolio Companies for IPO year 2006

Descriptive Statistics Portfolio Companies for IPO year 2006									
2006	# financing rounds till IPO	Employees	IPO Year	Age at IPO (in years)	CEO stake (in %)	founder stake (in %)	Shares Offered	Initial Share Price (in US $)	Offer Size (in US $)
MEAN	5.57	327	2006	10.43	7.99	12.03	9,847,947	12.38	135,761,065
MEDIAN	5	165	2006	8.00	4.80	9.40	6,250,000	11.50	78,600,000
MODE	5	58	2006	6.00	3.50	9.40	6,000,000	10.00	35,000,000
QUARTIL 25%	4	74	2006	6.00	2.79	4.40	5,000,000	9.00	48,250,000
QUARTIL 75%	7	316	2006	10.50	8.54	16.60	9,165,400	15.00	105,423,912
QUARTIL EXKL. 25%	4	67	2006	6.00	2.78	4.10	5,000,000	9.00	47,000,000
QUARTIL EXKL. 75%	7	320	2006	11.00	8.55	17.40	9,230,800	15.00	106,500,000
MIN	2	24	2006	2.00	1.00	1.50	3,500,000	6.00	24,000,000
MAX	16	2700	2006	51.00	43.40	54.10	70,600,000	25.00	1,059,000,000
STDEVIATION	2.63	461	0.00	8.53	9.28	11.38	11,606,836	4.79	188,971,843
# of observations	51	51	51	51	43	31	51	51	51

Appendix 8: Descriptive Statistics on less reputable VC firms

Descriptive Statistics for less reputable Venture Capital Firms					
less reputable	year founded	Age (from today)	Age (at IPO) Year	Assets (in mil US $)	% of PFC publicly held
MEAN	1989	24.43	13.53	4,467	17.61%
MEDIAN	1989	24	13	800	16.67%
MODE	1985	28	17	500	19.46%
QUARTIL 25%	1985	19	9,5	300	10.37%
QUARTIL 75%	1994	28	18	2400	24.91%
QUARTIL EXKL. 25%	1985	19	9	300	10.34%
QUARTIL EXKL. 75%	1994	28	18	2400	25.21%
MIN	1961	10	3	66	3.57%
MAX	2003	52	21	159,000	41.18%
STDEVIATION	8.40	8.40	5.24	18,780	9.07%
# of observations	75	75	75	74	75

Appendix 9: Descriptive Statistics on reputable VC firms

Descriptive Statistics for reputable Venture Capital Firms					
reputable	year founded	Age (from today)	Age (at IPO) Year	Assets (in mil US $)	% of PFC publicly held
MEAN	1969	43.68	38.85	5,394	20.07%
MEDIAN	1978	34.50	30.50	2,700	18.74%
MODE	1969	44	23	4,000	12.50%
QUARTIL 25%	1969	30	23.75	1,062	14.33%
QUARTIL 75%	1983	44	36.25	4,000	23.78%
QUARTIL EXKL. 25%	1969	30	23.25	950	14.30%
QUARTIL EXKL. 75%	1983	44	36.75	4,000	23.98%
MIN	1796	12	22	26	6.12%
MAX	2001	217	210	63,000	43.86%
STDEVIATION	36.19	36.19	35.01	9,193	7.95%
# of observations	68	68	68	62	68

Appendix 10: Descriptive Statistics on Underpricing and MLOTT for IPO year 2004

Underpricing and MLOTT		
2004 adj.	Underpricing	MLOTT
MEAN	12.31%	11,628,091
MEDIAN	3.88%	606,743
STDEV	19.48%	25,924,508
MIN	-18.00%	-31,171,795
MAX	65.71%	102,861,693
25% Quartil EXKL	0.00%	0.00
75% Quartil EXKL	20.44%	7,823,001
# of observations	48	47

Appendix 11: Descriptive Statistics on Underpricing and MLOTT for IPO year 2005

Underpricing and MLOTT		
2005 adj.	Underpricing	MLOTT
MEAN	7.28%	7,358,148
MEDIAN	0.05%	7.5
STDEV	13.20%	15,737,197
MIN	-10.95%	-2,762,626
MAX	50.12%	66,658,290
25% Quartil EXKL	-2.10%	-430,820
75% Quartil EXKL	15.72%	9,206,862
# of observations	40	40

Appendix 12: Descriptive Statistics on Underpricing and MLOTT for IPO year 2006

Underpricing and MLOTT		
2006 adj.	Underpricing	MLOTT
MEAN	14.30%	10,576,445
MEDIAN	4.44%	576,683
STDEV	21.53%	26,179,487
MIN	-29.55%	-72,736,865
MAX	76.23%	99,477,285
25% Quartil EXKL	0.00%	0.00
75% Quartil EXKL	22.52%	14,112,524
# of observations	51	50

Appendix 13: Inferential Statistics on the adjusted sample for Underpricing and MLOTT

Underpricing and MLOTT				
full sample adjusted	Underpricing less reputable	Underpricing less reputable	MLOTT less reputable	MLOTT reputable
MEAN	11.70%	10.10%	10,494,140	9,079,220
p-value	*0.60*		*0.72*	
MEDIAN	8.39%	3.33%	651,085	389,802
STDEVIATION	19.14%	16.64%	23,989,183	22,654,161
MIN	-29.55%	-12.65%	-31,171,795	-72,736,865
MAX	65.71%	67.47%	102,861,693	99,477,284
# of observations	74	67	72	68

*,**, and *** denote coefficient estimates for significance of no difference in means of portfolio companies backed by reputable and less reputable VC firms 10%, 5% and 1% levels respectively.

Appendix 14: Inferential Statistics on Underpricing and MLOTT

Inferential Statistics Underpricing and MLOTT					
IPO Year		Underpricing		MLOTT	
		less reputable	reputable	less reputable	reputable
2004	MEAN	14.45%	9.78%	15,547,482	7,174,238
	p-value	*0.40*		*0.26*	
	MEDIAN	8.57%	3.38%	651,085	548,005
	STDEV	22.07%	16.04%	32,594,303	14,796,894
	MIN	-18.00%	-6.43%	-31,171,795	-4,240,392
	MAX	65.71%	46.07%	102,861,693	45,400,512
	# of observations	26	22	25	22
2005	MEAN	8.12%	5.87%	6,931,342	8,069,491
	p-value	*0.58*		*0.84*	
	MEDIAN	10.21%	0.00%	11,510	0
	STDEV	14.73%	10.48%	14,237,116	18,481,420
	MIN	-10.95%	-7.14%	-2,762,626	-1,393,590
	MAX	50.12%	24.33%	66,658,290	66,567,231
	# of observations	25	15	25	15
2006	MEAN	12.39%	14.12%	9,589,911	11,234,135
	p-value	*0.78*		*0.82*	
	MEDIAN	4.44%	5.62%	713,549	389,802
	STDEV	20.55%	22.52%	21,566,544	29,192,152
	MIN	-29.55%	-12.65%	-20,138,632	-72,736,865
	MAX	63.71%	76.23%	62,966,177	99,477,285
	# of observations	21	30	20	30

*,**, and *** denote coefficient estimates for significance of no difference in means of portfolio companies backed by reputable and less reputable VC firms 10%, 5% and 1% levels respectively.

Appendix 15: Inferential Statistics on Buy-and-Hold Returns for the IPO year 2004

Inferential Statistics Buy-and-Hold Returns				
2004		less reputable	reputable	full sample
1 year BHR	MEAN	20.94%	22.46%	21.63%
	p-value	*0.94*		
	MEDIAN	0.83%	2.10%	1.46%
	STDEV	74.47%	62.51%	68.52%
	MIN	-78.69%	-49.26%	-78.69%
	MAX	178.95%	200.13%	200.13%
	#	25	21	46
2 year BHR	MEAN	24.34%	40.49%	31.51%
	p-value	*0.57*		
	MEDIAN	7.79%	40.34%	24.37%
	STDEV	91.69%	95.99%	92.90%
	MIN	-79.18%	-80.24%	-80.24%
	MAX	269.61%	317.71%	317.71%
	#	25	20	45
3 year BHR	MEAN	42.47%	35.91%	39.28%
	p-value	*0.86*		
	MEDIAN	19.76%	44.73%	25.57%
	STDEV	126.56%	89.60%	108.68%
	MIN	-82.80%	-79.56%	-82.80%
	MAX	402.77%	201.09%	402.77%
	#	19	18	37

*,**, and *** denote coefficient estimates for significance of no difference in means of portfolio companies backed by reputable and less reputable VC firms 10%, 5% and 1% levels respectively.

Appendix 16: Inferential Statistics on Buy-and-Hold Returns for the IPO year 2005

Inferential Statistics Buy-and-Hold Returns				
2005		less reputable	reputable	full sample
1 year BHR	MEAN	9.95%	13.42%	11.16%
	p-value	*0.89*		
	MEDIAN	9.09%	-13.92%	-7.3%
	STDEV	57.05%	80.47%	65.17%
	MIN	-78.31%	-85.66%	-85.66%
	MAX	114.71%	193.13%	193.13%
	#	26	14	40
2 year BHR	MEAN	16.44%	33.99%	22.45%
	p-value	*0.61*		
	MEDIAN	-30.33%	19.47%	-20.89%
	STDEV	105.80%	94.32%	101.08%
	MIN	-82.17%	-65.15%	-82.17%
	MAX	327.21%	269.49%	327.21%
	#	25	13	38
3 year BHR	MEAN	-1.32%	4.30%	1.09%
	p-value	*0.88*		
	MEDIAN	-35.91%	-24.05%	-26.72%
	STDEV	96.78%	95.92%	94.66%
	MIN	-86.73%	-86.06%	-86.73%
	MAX	275.29%	237.16%	275.29%
	#	16	12	28

*,**, and *** denote coefficient estimates for significance of no difference in means of portfolio companies backed by reputable and less reputable VC firms 10%, 5% and 1% levels respectively.

Appendix 17: Inferential Statistics on Buy-and-Hold Returns for the IPO year 2006

Inferential Statistics Buy-and-Hold Returns				
2006		less reputable	reputable	full sample
1 year BHR	MEAN	46.27%	3.62%	20.68%
	p-value	*0.06**		
	MEDIAN	27.46%	-9.43%	5.43%
	STDEV	85.31%	63.42%	75.15%
	MIN	-72.65%	-81.45%	-81.45%
	MAX	250.16%	178.38%	250.16%
	#	20	30	50
2 year BHR	MEAN	3.49%	-38.43%	-21.28%
	p-value	*0.07**		
	MEDIAN	-22.71%	-43.42%	-36.67%
	STDEV	82.38%	51.21%	68.14%
	MIN	-86.91%	-89.34%	-89.34%
	MAX	229.68%	137.11%	229.68%
	#	18	26	44
3 year BHR	MEAN	-4.71%	-22.39%	-14.75%
	p-value	*0.50*		
	MEDIAN	-33.68%	-28.53%	-30.21%
	STDEV	84.71%	65.60%	73.89%
	MIN	-80.02%	-96.26%	-96.26%
	MAX	254.84%	182.26%	254.84%
	#	16	21	37

*,**, and *** denote coefficient estimates for significance of no difference in means of portfolio companies backed by reputable and less reputable VC firms 10%, 5% and 1% levels respectively.

Appendix 18: Inferential Statistics on Wealth Relatives for the IPO year 2004

Inferential Statistics Wealth Relatives						
2004	WR S&P500			WR NASDAQ 100		
	less reputable	reputable	full sample	less reputable	reputable	full sample
MEAN	1.05	1.01	1.03	1.02	0.98	1.01
p-value	*0.89*			*0.85*		
MEDIAN	0.91	1.07	1.00	0.87	1.04	0.96
STDEV	0.92	0.62	0.79	0.86	0.61	0.75
MIN	0.01	0.08	0.01	0.01	0.07	0.01
MAX	3.81	2.28	3.81	3.40	2.14	3.4
# of observations	25	21	46	25	21	46

*,**, and *** denote coefficient estimates for significance of no difference in means of portfolio companies backed by reputable and less reputable VC firms 10%, 5% and 1% levels respectively.

Appendix 19: Inferential Statistics on Wealth Relatives for the IPO year 2005

Inferential Statistics Wealth Relatives						
2005	WR S&P500			WR NASDAQ 100		
	less reputable	reputable	full sample	less reputable	reputable	full sample
MEAN	0.82	1.05	0.90	0.82	1.10	0.92
p-value	*0.44*			*0.37*		
MEDIAN	0.47	0.68	0.50	0.49	0.67	0.51
STDEV	0.86	0.90	0.87	0.86	0.95	0.89
MIN	0.13	0.09	0.09	0.11	0.09	0.09
MAX	3.49	2.78	3.49	3.26	2.92	3.26
# of observations	26	14	40	26	14	40

*,**, and *** denote coefficient estimates for significance of no difference in means of portfolio companies backed by reputable and less reputable VC firms 10%, 5% and 1% levels respectively.

Appendix 20: Inferential Statistics on Wealth Relatives for the IPO year 2006

Inferential Statistics Wealth Relatives						
2006	WR S&P500			WR NASDAQ 100		
	less reputable	reputable	full sample	less reputable	reputable	full sample
MEAN	1.25	0.93	1.05	0.98	0.76	0.85
p-value	*0.34*			*0.40*		
MEDIAN	0.82	0.83	0.82	0.64	0.68	0.66
STDEV	1.35	0.73	1.03	1.07	0.57	0.80
MIN	0.11	0.05	0.05	0.10	0.04	0.04
MAX	6.18	3.61	6.18	4.89	2.67	4.89
# of observations	20	30	50	20	30	50

*,**, and *** denote coefficient estimates for significance of no difference in means of portfolio companies backed by reputable and less reputable VC firms 10%, 5% and 1% levels respectively.

Appendix 21: Impact of VC Age on Money left on the Table at IPO date

Appendix 21 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions based on White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$MLOTT = \alpha + \beta_1 VC\_AGE + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE$$
$$+ \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable *MLOTT* is tested against the reputation variable VC_AGE and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds *(FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

Money Left On The Table											
	AGE AT IPO	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
Money Left On The Table	-11327.16	-946379.9***	31289013**	468618.1	-648.381***	-	-	-	-5.42E+08	0.287	136
	(62871.85)	*(349042.7)*	*(13050119)*	*(1816366)*	*(242.226)*	-	-	-			
	-73925.77	-565169.8**	1142380	-323691.7	-184.697	-0.012	3954533***	-3148.781**	-43638729	0.527	135
	(55885.44)	*(262115.4)*	*(9762216)*	*(1553380)*	*(252.262)*	*(0.713)*	*(760778.3)*	*(1557.998)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 22: Impact of VC Age on Tobin's Q

Appendix 22 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions **without** adjusting for White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$TQ_{1,2,3,avg3yr} = \alpha + \beta_1 VC\_AGE + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE$$
$$+ \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable *Tobin's Q* for year 1,2 and 3 after the IPO year and a three-year average is tested against the reputation variable VC_AGE and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds (*FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

Tobin's Q											
	AGE AT IPO	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
Tobin's Q t1	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-			
	0.051***	-0.005	-1,882	0.063	2.49E-05	-1.99E-08	0.165*	1.37E-05	34.831	0.152	119
	(0.017)	*(0.046)*	*(1.437)*	*(0.195)*	*(4.12E-05)*	*(1.24E-07)*	*(0.086)*	*(0.001)*			
Tobin's Q t2	-0.264***	0.013398	1,886	-1,478**	-0.000110	-	-	-	-12.698	0.324895	109
	(0.052)	*(0.134)*	*(1.934)*	*(0.588)*	*(8.45E-05)*	-	-	-			
	-0.275***	0.0360	6,563	-1,461**	3.41E-05	-5.40E-07	-0.025	-0.002	-92.681	0.350	108
	(0.052)	*(0.139)*	*(4.599)*	*(0.601)*	*(0.000)*	*(3.78E-07)*	*(0.258)*	*(0.001)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 23: Impact of VC Age on industry-adjusted ROA

Appendix 23 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions **without** adjusting for White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$ROA_{1,2,3,avg3yr} = \alpha + \beta_1 VC\_AGE + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE$$
$$+ \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable *ROA* for year 1,2 and 3 after the IPO year and a three-year average is tested against the reputation variable VC_AGE and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds (*FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

industry-adjusted ROA											
	AGE AT IPO	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
ROA t1	-0.002**	0.004	0.143***	-0.030**	-2.57E-06	-	-	-	-2.618	0.263	117
	(0.001)	*(0.003)*	*(0.042)*	*(0.013)*	*(1.92E-06)*	-	-	-			
	-0.003**	0.004	0.283***	-0.025*	1.57E-06	-1.79E-08**	-0.004	1.64E-05	-5.012	0.294	116
	(0.001)	*(0.003)*	*(0.097)*	*(0.013)*	*(2.77E-06)*	*(8.34E-09)*	*(0.006)*	*(3.06E-05)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 24: Impact of Firms Publicly Held on Underpricing at IPO date

Appendix 24 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions based on White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$Underpricing = \alpha + \beta_1 PUBLICLY\_HELD + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE$$
$$+ \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable *Underpricing* is tested against the reputation variable PUBLICLY_HELD indicating the fraction of all portfolio companies backed by a VC firm that are publicly held and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds (*FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

Underpricing at IPO											
	PUBLICLY HELD	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
Underpricing at IPO	-0.192	-0.004**	0.092***	0.005	-2.06E-06***	-	-	-	-1,492	0.130	136
	(0.184)	*(0.001)*	*(0.028)*	*(0.008)*	*(6.60E-07)*	-	-	-			
	-0.280	-0.003*	0.239***	0.007	2.00E-06	-1.69E-08***	-0.005*	-2.88E-05**	-3,984	0.222	135
	(0.178)	*(0.002)*	*(0.050)*	*(0.007)*	*(1.57E-06)*	*(4.59E-09)*	*(0.003)*	*(1.15E-05)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 25: Impact of Firms Publicly Held on logarithm of Money left on the Table at IPO date

Appendix 25 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions based on White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$\log MLOTT = \alpha + \beta_1 PUBLICLY\_HELD + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE$$
$$+ \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable log_*MLOTT* is tested against the reputation variable PUBLICLY_HELD which indicating the fraction of all portfolio companies backed by a VC firm that are publicly held and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds (*FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

Money Left On The Table											
	PUBLICLY HELD	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
LOG Money Left On The Table	3.376	-0.079**	2.649***	0.063	-5.19E-05**	-	-	-	-33.279	0.403	88
	(2.792)	*(0.038)*	*(0.414)*	*(0.108)*	*(2.04E-05)*	-	-	-			
	3.342	-0.105***	6.356***	-0.021	-5.73E-05***	-5.20E-07***	-0.108***	-0.000**	-94.640	0.535	87
	(2.697)	*(0.031)*	*(0.858)*	*(0.115)*	*(1.72E-05)*	*(1.11E-07)*	*(0.023)*	*(0.000)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 26: Impact of Reputation Index on Money left on the Table at IPO date

Appendix 26 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions based on White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$MLOTT = \alpha + \beta_1 PUBLICLY\_HELD + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE$$
$$+ \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable *MLOTT* is tested against the reputation variable PUBLICLY_HELD which indicating the fraction of all portfolio companies backed by a VC firm that are publicly held and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds (*FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

Money Left On The Table											
	PUBLICLY HELD	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
Money Left On The Table	-29811518	-947038.6***	30655566**	589729.6	-636.644***	-	-	-	-5.26E+08	0.291	**136**
	(27761506)	*(353140.4)*	*(12867483)*	*(1748446)*	*(240.929)*	-	-	-			
	-41223409	-569468.3**	618745.7	-317192.7	-163.488	-0.053	3943531***	-3464842**	-2,8E+07	0.531	**135**
	(27912606)	*(256279.8)*	*(9788327)*	*(1505408)*	*(254.099)*	*(0.718)*	*(758980.7)*	*(1679032)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 27: Impact of Firms Publicly Held on Tobin's Q

Appendix 27 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions based on White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$TQ_{1,2,3,avg3yr} = \alpha + \beta_1 PUBLICLY\_HELD + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE$$
$$+ \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable *Tobin's Q* for year 1,2 and 3 after the IPO year and a three-year average is tested against the reputation variable PUBLICLY_HELD which indicating the fraction of all portfolio companies backed by a VC firm that are publicly held and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds (*FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

Tobin's Q	PUBLICLY HELD	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
Tobin's Q t1	10.233*	-0.011	-0.363	0.177	-5.87E-07	-	-	-	8.470	0.069	120
	(5.933)	*(0.054)*	*(0.925)*	*(0.302)*	*(2.21E-05)*	-	-	-			
	9.651	0.003	-1.532	0.149	2.80E-05	-3.54E-08	0.167***	4.31E-05	27.814	0.113	119
	(6.012)	*(0.053)*	*(1.310)*	*(0.303)*	*(2.33E-05)*	*(8.32E-08)*	*(0.058758)*	*(0.000)*			
Tobin's Q t2	-17.806	-0.036	1.367	-2.227	-0.000*	-	-	-	-3.663	0.160	109
	(2.457)	*(0.184)*	*(2.223)*	*(1.609)*	*(7.62E-05)*	-	-	-			
	-20.359	-0.022	4.827	-2.241	-2.76E-05	-3.63E-07	-0.026	-0.002	-62.395	0.176	108
	(2.548)	*(0.187)*	*(4.687)*	*(1.619)*	*(8.29E-05)*	*(2.78E-07)*	*(0.192)*	*(0.001)*			
Tobin's Q t3	1.202	0.035	0.400	0.958*	1.01E-05	-	-	-	-9.158	0.058	98
	(6.819)	*(0.036)*	*(0.912)*	*(0.565)*	*(1.98E-05)*	-	-	-			
	1.064	0.053	-1.022	0.909	2.38E-05	2.65E-08	0.154***	-0.000	14.671	0.067	97
	(7.933)	*(0.039)*	*(1.744)*	*(0.600)*	*(4.72E-05)*	*(1.46E-07)*	*(0.056)*	*(0.000)*			
avg. 3-year Tobin's Q	7.245*	-0.006	0.021	-0.060	-1.55E-05	-	-	-	2.938	0.037	94
	(4.414)	*(0.028)*	*(0.688)*	*(0.227)*	*(1.53E-05)*	-	-	-			
	7.385*	0.011	-1.292	-0.106	6.10E-06	-4.19E-10	0.164***	-0.000	24.746	0.131	93
	(4.569)	*(0.026)*	*(0.958)*	*(0.233)*	*(2.18E-05)*	*(6.78E-08)*	*(0.037)*	*(0.000)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Regression results based on estimations **without** White's heteroscedasticity-consistent standard errors and covariance:

Tobin's Q	PUBLICLY HELD	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
Tobin's Q t1	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-			
	9.651*	0.003	-1.532	0.149	2.80E-05	-3.54E-08	0.167**	4.31E-05	27.814	0.113	119
	(5.316)	*(0.046)*	*(1.465)*	*(0.195)*	*(4.24E-05)*	*(1.27E-07)*	*(0.088)*	*(0.001)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 28: Impact of Firms Publicly Held on industry-adjusted ROA

Appendix 28 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions based on White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$ROA_{1,2,3,avg3yr} = \alpha + \beta_1 PUBLICLY\_HELD + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE$$
$$+ \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable *ROA* for year 1,2,3 after the IPO year and a three-year average is tested against the reputation variable PUBLICLY_HELD which indicating the fraction of all portfolio companies backed by a VC firm that are publicly held and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds (*FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

industry-adjusted ROA											
	PUBLICLY HELD	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
ROA t1	-0.565	0.003	0.127***	-0.033*	-2.46E-06***	-	-	-	-2.293	0.254	117
	(0.388)	*(0.003)*	*(0.039)*	*(0.017)*	*(8.27E-07)*	-	-	-			
	-0.644*	0.003	0.262***	-0.028	1.54E-06	-1.73E-08***	-0.004	1.41E-05	-4.580	0.282	116
	(0.397)	*(0.003)*	*(0.074)*	*(0.018)*	*(1.67E-06)*	*(5.21E-09)*	*(0.003)*	*(2.11E-05)*			
ROA t2	-0.073	0.004	0.158***	0.001	-1.66E-06	-	-	-	-3.164	0.147	105
	(0.377)	*(0.003)*	*(0.042)*	*(0.013)*	*(1.23E-06)*	-	-	-			
	-0.182	0.004*	0.341***	0.007	3.19E-06	-2.17E-08***	-0.006*	1.21E-05	-6.278	0.193	104
	(0.398)	*(0.002)*	*(0.095)*	*(0.0141)*	*(2.03E-06)*	*(7.06E-09)*	*(0.003)*	*(2.00E-05)*			
ROA t3	0.489	0.003	0.144***	-0.006	-8.55E-07	-	-	-	-2.971	0.147	90
	(0.447)	*(0.002)*	*(0.039)*	*(0.015)*	*(8.79E-07)*	-	-	-			
	0.427	0.003*	0.238**	-0.001	1.74E-06	-1.15E-08*	-0.002	1.31E-05	-4.585	0.161	89
	(0.472)	*(0.002)*	*(0.099)*	*(0.017)*	*(1.59E-06)*	*(6.35E-09)*	*0.003*	*(2.47E-05)*			
avg. 3-year ROA	0.041	0.002	0.119***	-0.020	-1.71E-06**	-	-	-	-2.299	0.190	89
	(0.388)	*(0.002)*	*(0.036)*	*(0.015)*	*(8.73E-07)*	-	-	-			
	-0.046	0.002	0.241***	-0.015	1.67E-06	-1.48E-08***	-0.003	9.97E-06	-4.393	0.224	88
	(0.410)	*(0.0020)*	*(0.084)*	*(0.016)*	*(1.45E-06)*	*(5.41E-09)*	*(0.003)*	*(2.05E-05)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Regression results based on estimations **without** White's heteroscedasticity-consistent standard errors and covariance:

industry-adjusted ROA											
	PUBLICLY HELD	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
ROA t1	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-			
	-0.644*	0.003	0.262***	-0.028**	1.54E-06	-1.73E-08**	-0.004	1.41E-05	-4.580	0.282	116
	(0.359)	*(0.003)*	*(0.098)*	*(0.013)*	*(2.81E-06)*	*(8.40E-09)*	*(0.006)*	*(3.09E-05)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 29: Impact of Firms Publicly Held on EBITDA/SALES and EBITDA/ASSETS

Appendix 29 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions based on White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$EBITDA/ASSETS = \alpha + \beta_1 PUBLICLY\_HELD + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE + \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

$$EBITDA/SALES = \alpha + \beta_1 PUBLICLY\_HELD + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE + \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable *EBITDA/ASSETS* and *EBITDA/SALES* estimates as a three-year average is tested against the reputation variable PUBLICLY_HELD which indicating the fraction of all portfolio companies backed by a VC firm that are publicly held and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds (*FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

	PUBLICLY HELD	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
EBITDA/ASSETS											
3-year avg. EBITDA/ASSETS	0.254	0.009	0.175**	0.043**	-3.04E-06*	-	-	-	-3.505	0.097	**76**
	(1.021)	*(0.004)*	*(0.067)*	*(0.027)*	*(1.71E-06)*	-	-	-			
	0.570	0.007*	-0.020	0.032	-7.84E-06***	1.97E-08*	0.005	6.41E-05	-0.183	0.131	**75**
	(1.056)	*(0.004)*	*(0.176)*	*(0.029)*	*(2.45E-06)*	*(1.09E-08)*	*(0.008)*	*(4.88E-05)*			
EBITDA/SALES											
3-year avg. EBITDA/SALES	0.372	-0.008	0.285***	-0.120***	-3.38E-06*	-	-	-	-4.725	0.246	**74**
	(0.837)	*(0.005)*	*(0.103)*	*(0.037)*	*(1.73E-06)*	-	-	-			
	0.135	-0.009**	0.858***	-0.097***	7.42E-06*	-5.23E-08***	-0.019**	-1.51E-06	-14.598	0.313	**73**
	(0.839)	*(0.004)*	*(0.247)*	*(0.035)*	*(4.38E-06)*	*(1.65E-08)*	*(0.008)*	*(4.49E-05)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 30: Impact of Firms Publicly Held on Buy-and-Hold Returns

Appendix 30 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions based on White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$BHR_{1,2,3} = \alpha + \beta_1 PUBLICLY\_HELD + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE$$
$$+ \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable *BHR* for year 1,2,3 after the IPO year is tested against the reputation variable PUBLICLY_HELD which indicating the fraction of all portfolio companies backed by a VC firm that are publicly held and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds (*FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

Buy-and-Hold Returns											
	PUBLICLY HELD	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
1-year BHR	0.299	0.003	-0.014	-0.054**	-2.49E-06	-	-	-	0.667	0.037	**136**
	(0.781)	*(0.005)*	*(0.107)*	*(0.022)*	*(2.93E-06)*	-	-	-			
	0.444	0.003	-0.288	-0.061***	-5.74E-06	2.03E-08	0.020	3.26E-05	5.234	0.062	**135**
	(0.782)	*(0.005)*	*(0.192)*	*(0.022)*	*(3.59E-06)*	*(1.41E-08)*	*(0.013)*	*(3.06E-05)*			
2-year BHR	-0.582	0.004	-0.024	-0.018	-2.76E-06	-	-	-	0.713	0.010	**136**
	(0.931)	*(0.006)*	*(0.154)*	*(0.029)*	*(3.66E-06)*	-	-	-			
	-0.297	0.004	-0.634***	-0.029	-8.84E-06*	3.83E-08**	0.044***	0.000***	10.887	0.093	**135**
	(0.903)	*(0.005)*	*(0.235)*	*(0.027)*	*(4.61E-06)*	*(1.68E-08)*	*(0.013)*	*(5.57E-05)*			
3-year BHR	0.649	-0.005	0.090	-0.001	7.11E-07	-	-	-	-1.626	0.012	**136**
	(0.818)	*(0.006)*	*(0.198)*	*(0.024)*	*(4.24E-06)*	-	-	-			
	0.739	-0.002	-0.688***	-0.015	-1.04E-06	3.26E-08*	0.068***	0.000	11.339	0.183	**135**
	(0.784)	*(0.005)*	*(0.197)*	*(0.022)*	*(5.68E-06)*	*(1.73E-08)*	*(0.013)*	*(8.40E-05)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 31: Impact of Firms Publicly Held on Wealth Relatives

Appendix 31 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions based on White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$WR_{S\&P,ND} = \alpha + \beta_1 PUBLICLY\_HELD + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE$$
$$+ \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable *WR* of the S&P 500 (S&P) and the Nasdaq 100 Composite Index (ND) is tested against the reputation variable PUBLICLY_HELD which indicating the fraction of all portfolio companies backed by a VC firm that are publicly held and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds (*FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

Wealth Relatives											
	PUBLICLY HELD	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
Wealth Relative S&P 500	1.057	0.002	0.081	0.001	5.14E-06	-	-	-	-0.740	0.024	**136**
	(1.055)	*(0.007)*	*(0.164)*	*(0.027)*	*(3.74E-06)*	-	-	-			
	1.149	0.004	-0.472*	-0.008	2.31E-06	2.80E-08	0.045***	7.91E-05	8.482	0.083	**135**
	(1.068)	*(0.007)*	*(0.250)*	*(0.026)*	*(6.96E-06)*	*(2.17E-08)*	*(0.014)*	*(6.46E-05)*			
Wealth Relative Nasdaq-100	0.546	0.001	0.058	-0.006	2.61E-06	-	-	-	-0.239	0.011	**136**
	(0.894)	*(0.007)*	*(0.146)*	*(0.024)*	*(3.28E-06)*	-	-	-			
	0.615	0.003	-0.430*	-0.015	5.05E-07	2.34E-08	0.040***	7.27E-05	7.896	0.071	**135**
	(0.907)	*(0.006)*	*(0.225)*	*(0.023)*	*(5.23E-06)*	*(1.79E-08)*	*(0.012)*	*(6.38E-05)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 32: Impact of Reputation Index on Underpricing at IPO date

Appendix 32 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions based on White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$Underpricing = \alpha + \beta_1 REPUTATION\_INDEX + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE$$
$$+ \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable *Underpricing* is tested against the reputation variable REPUTATION_INDEX and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds (*FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

Underpricing at IPO											
	REPUTATION INDEX	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
Underpricing at IPO	-0.000	-0.006*	0.122***	0.004	1.06E-06	-	-	-	-2.070	0.224	70
	(0.000)	*(0.003)*	*(0.039)*	*(0.009)*	*(5.53E-06)*	-	-	-			
	-1.88E-06	-0.007*	0.311***	0.001	-2.54E-06	-1.99E-08**	-0.010***	-1.62E-05	-5.183	0.326	70
	(0.001)	*(0.003)*	*(0.076)*	*(0.009)*	*(5.44E-06)*	*(9.48E-09)*	*(0.003)*	*(3.34E-05)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 33: Impact of Reputation Index on logarithm of Money left on the Table at IPO date

Appendix 33 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions based on White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$\log MLOTT = \alpha + \beta_1 REPUTATION\_INDEX + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE$$
$$+ \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable log_*MLOTT* is tested against the reputation variable REPUTATION_INDEX and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds (*FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

Money Left On The Table											
	REPUTATION INDEX	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
LOG Money Left On The Table	-0.001	0.007	2.777***	-0.036	-2.72E-05	-	-	-	-35,597	0.463618	44
	(0.010)	*(0.062)*	*(0.573)*	*(0.177)*	*(6.56E-05)*	-	-	-			
	0.006	-0.082	8.614***	-0.338*	-0.000	-6.82E-07***	-0.286***	0.003**	-130,93	0.673415	44
	(0.010)	*(0.072)*	*(1.463)*	*(0.194)*	*(8.44E-05)*	*(1.69E-07)*	*(0.073)*	*(0.001)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 34: Impact of Reputation Index on Money left on the Table at IPO date

Appendix 34 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions based on White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$MLOTT = \alpha + \beta_1 REPUTATION\_INDEX + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE$$
$$+ \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable *MLOTT* is tested against the reputation variable REPUTATION_INDEX and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds (*FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

Money Left On The Table											
	REPUTATION INDEX	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
Money Left On The Table	70634.67	-1751711**	51754733***	1312971	-2017.761*	-	-	-	-9.05E+08	0.629	70
	(173684.5)	*(675447.2)*	*(15184714)*	*(1365169)*	*(1237708)*	-	-	-			
	-19464.07	-1271202**	-1321307	1398879	-6250613	2.496	3995851***	163.,991	-2,2E+07	0.854	70
	(84849.08)	*(440446.7)*	*(10965894)*	*(1010118)*	*(5246911)*	*(2355291)*	*(332565.5)*	*(3592892)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 35: Impact of Reputation Index on Tobin's Q

Appendix 35 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions based on White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$TQ_{1,2,3,avg3yr} = \alpha + \beta_1 REPUTATION\_INDEX + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE$$
$$+ \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable *Tobin's Q* for year 1,2 and 3 after the IPO year and a three-year average is tested against the reputation variable REPUTATION_INDEX and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds (*FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

Tobin's Q											
	REPUTATION INDEX	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
Tobin's Q t1	0.031	-0.445	-0.268	-0.002	-1.54E-05	-	-	-	11.993	0.197	61
	(0.022)	*(0.323)*	*(1.007)*	*(0.461)*	*(0.000)*	-	-	-			
	0.023	-0.425	-0.866	-0.064	6.60E-05	-2.29E-07	0.174**	-0.001	22.705	0.264	61
	(0.021)	*(0.301)*	*(2.159)*	*(0.469)*	*(0.000)*	*(2.92E-07)*	*(0.072)*	*(0.001)*			
Tobin's Q t2	-0.010	1.627	2.786	-1.266	-0.000	-	-	-	-47.966	0.416	57
	(0.053)	*(0.925)*	*(2.286)*	*(0.997)*	*(0.001)*	-	-	-			
	-0.005	1.593*	9.378*	-1.415	-0.000	-8.22E-07	-0.258	0.001	-157.005	0.433	57
	(0.053)	*(0.921)*	*(5.383)*	*(1.139)*	*(0.001)*	*(8.15E-07)*	*(0.205)*	*(0.002)*			
Tobin's Q t3	0.103	0.280	0.512	1.176	-0.000	-	-	-	-16.400	0.095	49
	(0.099)	*(0.230)*	*(1.216)*	*(1.171)*	*(0.001)*	-	-	-			
	0.100	0.309	-2.119	1.169	-0.000	2.22E-07	0.136	-0.001	27.672	0.098	49
	(0.101)	*(0.253)*	*(5.325)*	*(1.177)*	*(0.001)*	*(5.47E-07)*	*(0.146)*	*(0.001)*			
avg. 3-year Tobin's Q	0.007	0.003	0.249	-0.201	-0.000	-	-	-	1.605	0.034	46
	(0.024)	*(0.142)*	*(0.970)*	*(0.410)*	*(0.000)*	-	-	-			
	0.002	-0.023	-0.073	-0.230	-0.000	-1.81E-07	0.107	-0.001	7.870	0.096	46
	(0.024)	*(0.156)*	*(2.279)*	*(0.445)*	*(0.000)*	*(2.31E-07)*	*(0.069)*	*(0.000)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 36: Impact of Reputation Index on industry-adjusted ROA

Appendix 36 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions based on White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$ROA_{1,2,3,avg3yr} = \alpha + \beta_1 REPUTATION\_INDEX + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE$$
$$+ \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable *ROA* for year 1,2,3 after the IPO year and a three-year average is tested against the reputation variable REPUTATION_INDEX and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds (*FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

industry-adjusted ROA											
	REPUTATION INDEX	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
ROA t1	0.001	0.012	0.149***	-0.046*	-6.65E-06	-	-	-	-2.790	0.253	60
	(0.002)	*(0.007)*	*(0.050)*	*(0.026)*	*(1.47E-05)*	-	-	-			
	0.001	0.011	0.388***	-0.043*	-7.63E-06	-2.53E-08	-0.016***	0.000***	-6.803	0.350	60
	(0.002)	*(0.008)*	*(0.141)*	*(0.026)*	*(1.49E-05)*	*(1.56E-08)*	*(0.005)*	*(6.38E-05)*			
ROA t2	0.001	0.019**	0.166***	-0.013	2.53E-07	-	-	-	-3.383	0.196	55
	(0.002)	*(0.008)*	*(0.055)*	*(0.020)*	*(1.51E-05)*	-	-	-			
	0.001	0.018**	0.347*	-0.012	-6.27E-07	-1.78E-08	-0.012*	0.000	-6.441	0.254	55
	(0.002)	*(0.009)*	*(0.198)*	*(0.021)*	*(1.60E-05)*	*(1.96E-08)*	*(0.007)*	*(6.24E-05)*			
ROA t3	0.004**	0.024**	0.105*	-0.026	-1.73E-05	-	-	-	-2.395	0.223	44
	(0.002)	*(0.009)*	*(0.061)*	*(0.027)*	*(2.48E-05)*	-	-	-			
	0.005**	0.023**	0.238	-0.017	-1.53E-05	-8.04E-09	-0.012	0.000***	-4.724	0.311	44
	(0.002)	*(0.011)*	*(0.277)*	*(0.029)*	*(2.72E-05)*	*(2.72E-08)*	*(0.009)*	*(6.46E-05)*			
avg. 3-year ROA	0.003	0.018**	0.088*	-0.039*	-1.42E-05	-	-	-	-1.824	0.259	44
	(0.002)	*(0.007)*	*(0.046)*	*(0.023)*	*(1.72E-05)*	-	-	-			
	0.003	0.017**	0.229	-0.033	-1.23E-05	-1.31E-08	-0.010	0.000***	-4.266	0.349	44
	(0.002)	*(0.008)*	*(0.228)*	*(0.024)*	*(1.82E-05)*	*(2.22E-08)*	*(0.007)*	*(5.21E-05)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 37: Impact of Reputation Index on EBITDA/SALES and EBITDA/ASSETS

Appendix 37 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions based on White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$EBITDA/ASSETS = \alpha + \beta_1 REPUTATION\_INDEX + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE + \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

$$EBITDA/SALES = \alpha + \beta_1 REPUTATION\_INDEX + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE + \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable *EBITDA/ASSETS* and *EBITDA/SALES* estimates as a three-year average is tested against the reputation variable REPUTATION_INDEX and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds (*FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

	REPUTATION INDEX	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
EBITDA/ASSETS											
3-year avg. EBITDA/ASSETS	-0.004	-0.013	0.209	0.039	-7.35E-06	-	-	-	-3.788	0.116	36
	(0.003)	*(0.018)*	*(0.099)*	*(0.046)*	*(1.93E-05)*	-	-	-			
	-0.004	-0.010	0.219**	0.045	-1.39E-06	-5.33E-09	-0.003	0.000***	-4.053	0.161	36
	(0.003)	*(0.020)*	*(0.413)*	*(0.049)*	*(1.87E-05)*	*(3.90E-08)*	*(0.013)*	*(9.51E-05)*			
EBITDA/SALES											
3-year avg. EBITDA/SALES	-0.003	-0.003	0.247	-0.164***	-8.90E-06	-	-	-	-3.617	0.264	34
	(0.0075)	*(0.019)*	*(0.174)*	*(0.057)*	*(2.71E-05)*	-	-	-			
	-0.004	-0.012	1.365	-0.158***	-8.69E-06	-1.33E-07	-0.035	0.000*	-22.448	0.352	34
	(0.008)	*(0.024)*	*(0.865)*	*(0.049)*	*(2.70E-05)*	*(8.41E-08)*	*(0.024)*	*(0.000)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 38: Impact of Reputation Index on Buy-and-Hold Returns

Appendix 38 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions based on White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$BHR_{1,2,3} = \alpha + \beta_1 REPUTATION\_INDEX + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE$$
$$+ \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable *BHR* for year 1,2,3 after the IPO year is tested against the reputation variable REPUTATION_INDEX and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds (*FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

Buy-and-Hold Returns											
	REPUTATION INDEX	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
1-year BHR	0.002	-0.002	0.081	-0.060	-2.21E-05*	-	-	-	-0.955	0.051	70
	(0.003)	*(0.018)*	*(0.142)*	*(0.039)*	*(1.29E-05)*	-	-	-			
	0.002	0.000	-0.204	-0.060	-1.43E-05	1.01E-08	0.022	2.54E-05	3.793	0.086	70
	(0.003)	*(0.017)*	*(0.325)*	*(0.041)*	*(1.29E-05)*	*(4.46E-08)*	*(0.014)*	*(0.000)*			
2-year BHR	0.002	-0.002	0.078	-0.026	-2.39E-05	-	-	-	-1.167	0.013	70
	(0.004)	*(0.026)*	*(0.237)*	*(0.050)*	*(2.18E-05)*	-	-	-			
	0.001	0.003	-0.661*	-0.020	-6.45E-06	3.97E-08	0.044***	0.001***	11.096	0.161	70
	(0.003)	*(0.024)*	*(0.403)*	*(0.052)*	*(1.51E-05)*	*(4.58E-08)*	*(0.016)*	*(0.000)*			
3-year BHR	0.004	-0.025	0.230***	-0.027	-4.24E-05	-	-	-	-3.751	0.083	70
	(0.005)	*(0.023)*	*(0.290)*	*(0.039)*	*(3.10E-05)*	-	-	-			
	0.002	-0.016	-0.694	-0.027	-1.75E-05	3.52E-08	0.070***	0.000*	11.652	0.328	70
	(0.004)	*(0.016)*	*(0.225)*	*(0.034)*	*(2.00E-05)*	*(3.08E-08)*	*(0.008)*	*(9.44E-05)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 39: Impact of Reputation Index on Wealth Relatives

Appendix 39 shows the results of the parameter estimates and standard errors in parenthesis from ordinary least squares (OLS) regressions based on White's heteroscedasticity-consistent standard errors and covariance. The following regression model is:

$$WR_{S\&P,ND} = \alpha + \beta_1 REPUTATION\_INDEX + \beta_2 AGE\_PFC + \beta_3 \log\_OFFER\_SIZE$$
$$+ \beta_4 FINANCING\_ROUND + \beta_5 ASSETS + \beta_6 SHARES\_OFFERED + \beta_7 PRICE + \beta_8 EMPLOYEES + \varepsilon$$

where the dependent variable *WR* of the S&P 500 (S&P) and the Nasdaq 100 Composite Index (ND) is tested against the reputation variable REPUTATION_INDEX and seven control variables composed of the portfolio companies' age at the IPO (AGE_PFC), the natural logarithm of the offering size (log_OFFER_SIZE), the number of financing rounds (*FIN_ROUNDs)*, the VC's amount of assets (ASSETS), the number of shares offered at the IPO *(SHARES_OFFERED)*, the offering price *(PRICE)* and number of the portfolio companies' employees (*EMPLOYEES*).

Wealth Relatives											
	REPUTATION INDEX	AGE_PFC	LOG OFFER_SIZE	FIN_ROUNDS	ASSETS	SHARES_OFFERED	PRICE	EMPLOYEES	Intercept	R-squared	#
Wealth Relative S&P 500	0.005	-0.005	0.128	-0.039	-3.00E-05	-	-	-	-1.281	0.050	70
	(0.004)	*(0.025)*	*(0.143)*	*(0.051)*	*(3.29E-05)*	-	-	-			
	0.004	0.001	-0.630*	-0.033	-1.21E-05	4.77E-08	0.048***	0.000	11.293	0.193	70
	(0.003)	*(0.016)*	*(0.332)*	*(0.035)*	*(1.54E-05)*	*(4.07E-08)*	*(0.013)*	*(0.000)*			
Wealth Relative Nasdaq-100	0.004	-0.009	0.093	-0.031	-2.67E-05	-	-	-	-0.727	0.043	70
	(0.004)	*(0.018)*	*(0.223)*	*(0.036)*	*(2.22E-05)*	-	-	-			
	0.003	-0.003	-0.567*	-0.028	-1.05E-05	3.59E-08	0.044***	0.000	10.244	0.178	70
	(0.004)	*(0.015)*	*(0.330)*	*(0.034)*	*(1.63E-05)*	*(3.64E-08)*	*(0.012)*	*(0.000)*			

*,**, and *** denote coefficient estimates significant at the 10%, 5% and 1% levels respectively.

Appendix 40: Curriculum Vitae

DANIEL STAPELFELDT, BBA

UNIVERSITY EDUCATION

Master of Science in Business Administration (MSc.)
University of Vienna, Specialization in *Corporate Finance* and *Energy- and Environmental Management*
03/2011 – 09/2013

Bachelor of Arts in Business Administration (BBA)
Hochschule Bonn-Rhein-Sieg, Specialization in *Banking Management*
10/2006 – 03/2010, Final Grade: 2.2

Semester abroad during bachelor's degree
Murdoch University, Specialization in *Finance & Accounting*
07/2008 – 01/2009, Final Grade: 2.2

WORK EXPERIENCE

ALLIANZ AG
Internship in the division of *Investment Reporting*
07/2011 – 09/2012, Vienna

- Creating reports for monthly statements of the pension fund's capital investments
- Performance analysis of the collective risk- and investment schemes (VRGs)
- Monthly performance attribution of VRGs and supportive work on management reporting

DEUTSCHE POSTBANK AG
Internship in the division of *Investor Relations* and *Financial Markets*
09/2009 – 05/2010, Bonn

- Assistance in creation of quarterly-, annual- and risk statements
- Sub-project manager and team leader for annual shareholders' meeting 2010 in Frankfurt/Main
- Analysis of planned/actual costs for the department of Financial Markets

IT SKILLS

- Microsoft Office Word, Excel, Power Point: strong skills
- EViews6, Bloomberg, SAP R3: user-level knowledge

LANGUAGE SKILLS

- German: native tongue
- English: business fluent
- French: basic knowledge